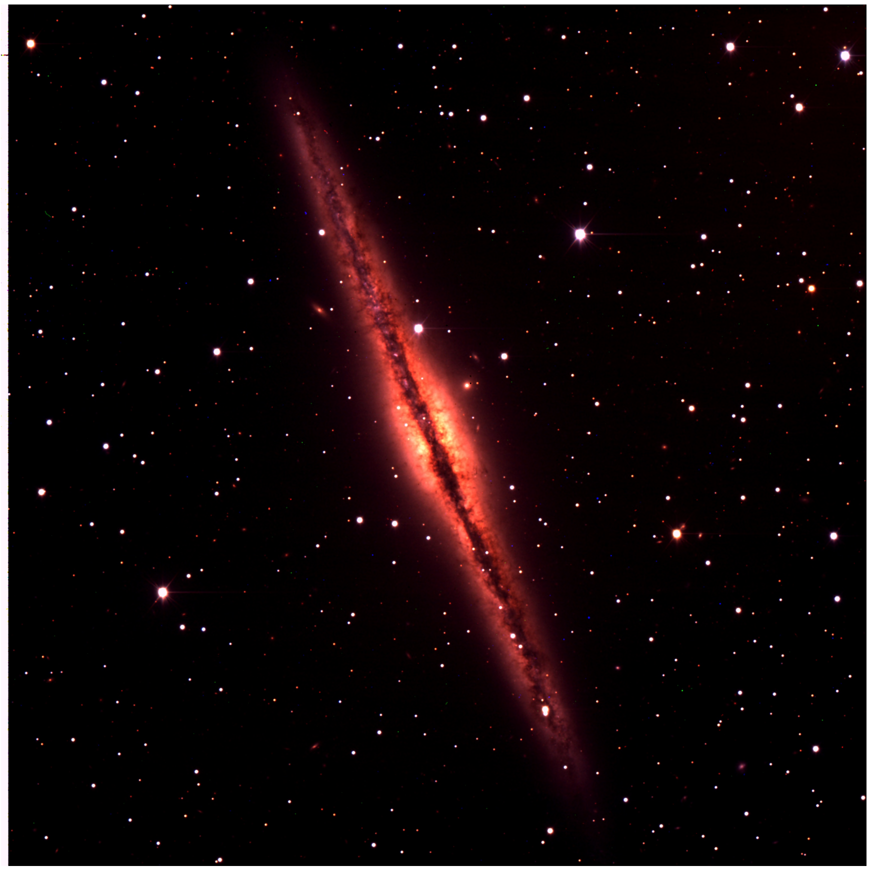
# Boston University

# Institute for Astrophysical Research



Stunning image of the spiral galaxy NGC891, which we Earthlings view edge-on, obtained with the Discovery Channel Telescope by Professor Elizabeth Blanton and her AS710 class. The dark dust lane is clearly visible, as is a collection of hot gas clouds (bright yellow spots) near the center. The galaxy lies at a distance of about 30 million light-years.

# 2014-15 Bi-Annual Report

**Period Covered: July 1, 2013 – June 30, 2015**

# Overview

## Introduction

The mission of the Institute for Astrophysical Research (IAR) is to promote and facilitate research and education in astrophysics at Boston University. The IAR accomplishes this mission by administering research grants, enhancing the visibility of IAR members with funding agencies, coordinating the use of Boston University astrophysics facilities, promoting the design, development, and operation of Boston University instruments and telescopes, sponsoring regular seminars and occasional professional meetings, and actively engaging students of all levels in research. The primary research fields in which IAR astronomers are involved include blazars and other active nuclei of galaxies, clusters of galaxies, the formation of stars, the gaseous and ionized interstellar medium, the physical properties, evolution, and magnetic activity of stars, extrasolar planets, planet-forming disks around young stars, magnetic fields, high-energy phenomena, dark matter, and the large-scale structure of the universe.

## Executive Summary

FY14 – FY 15 marked highly successful 16$^{th}$ & 17$^{th}$ years in the IAR's mission to foster research in astrophysics at Boston University. The scientific productivity of IAR astronomers remained at a high level over these two years, resulting in the publication of 104 scientific papers in the peer-reviewed literature and garnering significant interest in the popular media. In FY14 – FY15 the IAR managed 31 active research grants, the total funding for which was $6.43M awarded to date. The amount of funds awarded for single and multi-year new grants awarded in FY14 – FY15 totaled $4.80M.

Boston University is a permanent partner with Lowell Observatory, entitled to use of the facilities operated by the observatory in northern Arizona. The IAR manages the use of Boston University's share of observing time at the 4.3-meter-diameter Discovery Channel Telescope (DCT) in Happy Jack, Arizona, and the 1.83-meter-diameter Perkins Telescope of Lowell Observatory in Flagstaff, Arizona. These telescopes are vital to the research of a number of IAR faculty, scientific staff, and students. The IAR also plays a key role in instrument development for the telescopes. A number of new scientific projects that depend on observations with the DCT were initiated in FY14 – FY15, and some of the results have been published in scientific journals.

IAR members were integral to the organization of the Boston University alumni event "Experience: Space Beyond Earth," led by the BU Office of Development and Alumni Relations, at Lowell Observatory in Flagstaff, Arizona, over the October 10-12, 2014 weekend. The 13 attending alumni enjoyed formal and informal interactions with Profs. Clemens and West, observed deep sky objects with the Discovery Channel Telescope, individually operated the Perkins Telescope, and participated in a tour of the Grand Canyon led by senior research scientist Brian Taylor.

# Faculty, Staff and Leadership

## Size and Organization

In FY14 – FY15, the IAR personnel included 5 full professors (Thomas Bania, Kenneth Brecher, Dan Clemens, James Jackson, and Alan Marscher), 3 associate professors (Elizabeth Blanton, Tereasa Brainerd, and Merav Opher), 3 assistant professors (Andrew West, Catherine Espaillat, and Philip Muirhead), 1 professor *emeritus* (Kenneth Janes), 2 senior research scientists (Dr. Svetlana Jorstad and Brian Taylor), 2 senior postdoctoral associates (Dr. Manasvita Joshi and Dr. Bryce Croll), 4 postdoctoral associates (Dr. Saurav Dhital, Dr. Laura Ingleby, Dr. Julie Skinner, and Dr. Ian Stephens), an *Einstein* Postdoctoral Fellow (Dr. Joseph Neilsen), a *Hubble* Postdoctoral Fellow (Dr. Philip Muirhead, who joined the faculty in FY15), a Postdoctoral Fellow for Research Abroad through the Japan Society for the Promotion of Science (Dr. Mahito Sasada), and 4 visiting researchers (Drs. Iván Agudo, Kathleen Kraemer, Joshua Wing, and Andrew Mann). In addition, 23 graduate students (3 of which earned their PhD degrees) and 15 undergraduate students were actively involved in IAR research programs. Professor Espaillat, Drs. Muirhead, Stephens, Ingleby, and Wing, were all new appointments in FY14, while Professor Muirhead and Drs. Skinner, Croll, and Sasada were new appointments in FY15. Dr. Neilsen left in December 2014 to accept a *Hubble* Postdoctoral Fellowship at MIT. Karen Williamson, who obtained her MA degree in Astronomy from Boston University in 2014, serves as a research technician for the Marscher/Jorstad research group.

The IAR is administered by its director, Professor Alan Marscher (appointed through June 2015), an assistant director (Heidi Kendig), a proposal developer (Erin Reynolds), and a fiscal coordinator (Mary Gordon). The latter three personnel are shared with the Center for Space Physics. During FY14, Despina Bokios resigned as assistant director and Heidi Kendig was hired to fill the position. Zachary Grein was hired as a financial administrator, promoted after Alysson Savoie left the position in early 2014. He resigned his position in mid-2014 and was replaced by Brandon Frazho in the position of fiscal coordinator in May 2014. Mr. Frazho left after the probationary period and was replaced by Mary Gordon. Erin Reynolds was hired as the proposal developer in September 2014.

## Related Professional Activities and Accomplishments

Professor Blanton is serving a three-year term (2012-15) on the Nominating Committee of the American Astronomical Society. This committee selects a slate of candidates for the various officers of the society, which is the primary professional association of astronomers in North America. In 2015, she was also appointed to a 3-year term on an American Astronomical Society committee that selects winners of the Warner and Pierce prizes for outstanding research.

Professor Clemens served a third and final one-year term as Chair of the AURA Board for 2013-14 and for a second and final three-year term as a member of that Board (ending 6/30/15). AURA manages the National Optical Astronomy Observatory (NOAO), the National Solar Observatory (NSO), the Gemini International Observatory, the Space Telescope Science Institute (STScI), and the construction of the Large Synodic Survey Telescope (LSST, in Chile) and the Daniel K. Inouye Solar Telescope (DKIST, on Haleakala in Hawaii) on behalf of the National Science Foundation. This major commitment of effort by

Prof. Clemens represented a key national leadership role serving the entire US professional astronomical community.

Prof. West serves as a co-chair of the LSST Galactic Structure and Interstellar Medium sub-group. The LSST is a major new telescope initiative, dedicated to deep, repeated surveys of the sky. “With a light-gathering power among the largest in the world, it can detect faint objects with short exposures. Its uniquely wide field of view allows it to observe large areas of the sky at once; compact and nimble, it can move quickly between images. Taking more than 800 panoramic images each night, it can cover the sky twice each week.” (From the LSST website)

IAR members played a number of other important roles in service to the profession. These include reviewing proposals for observing time on telescopes, papers submitted to scientific journals, and funding proposals, serving as members on the scientific organizing committees of, and as session chairs at scientific conferences, and providing data or training to colleagues and their students from other institutions around the world.

## Honors and Awards

Professor Espaillat was awarded a 5-year National Science Foundation CAREER grant in 2014. The grant, “Bridging the Gaps: Connecting Theory and Observation,” will support her research on planet formation in disks around young stars.

Professor Marscher was honored with a Metcalf Award for Excellence in Teaching by Boston University at the May 2014 Commencement exercise.

Professor West has been selected as a Scialog Fellow for *Scialog: Time Domain Astrophysics: Stars and Explosions*, which includes participation in two annual Scialog Conferences. Much of the conference time will be spent in breakout discussions with the goal of identifying key research challenges and collaborative approaches that might lead to breakthroughs. **The 2015 Scialog Conference is scheduled for October 22–25 at Biosphere 2** (http://b2science.org/), located near Tucson, Arizona. As a Scialog Fellow, Prof. West will have the opportunity to present results of his research, participate in multiple small group discussions, and form small teams with other Scialog Fellows to write proposals for seed funding at the conferences. Successful proposals will describe highly innovative ideas to initiate novel collaborative projects.

Graduate student Nicholas MacDonald was honored with the "Best Student Talk" award at the annual meeting of the Canadian Astronomical Society in May 2015 Hamilton, Ontario. The talk focused on his recent publication: "Through the Ring of Fire: Gamma-ray Variability in Blazars by a Moving Plasmoid Passing a Local Source of Seed Photons" by N.R. MacDonald, A.P. Marscher, S.G. Jorstad, and M. Joshi (2015, Astrophysical Journal, vol. 804, article no. 111). A press release was associated with the talk: http://people.bu.edu/nmacdona/Press_files/press.pdf .

IAR students have garnered several awards and honorable mentions at recent scientific meetings. The American Astronomical Society has awarded Chambliss Awards to graduate students Dylan Morgan (Jan. 2014), Lauren Cashman (Hon. Mention, Jan. 2014), Paul Dalba (Hon. Mention, Jan. 2014), Sadia Hoq (Hon. Mention, Jan 2014), and Brandon Harrison (Jan. 2015) and also to IAR undergraduate Kelly Blumenthal (Hon. Mention, Jan. 2014).

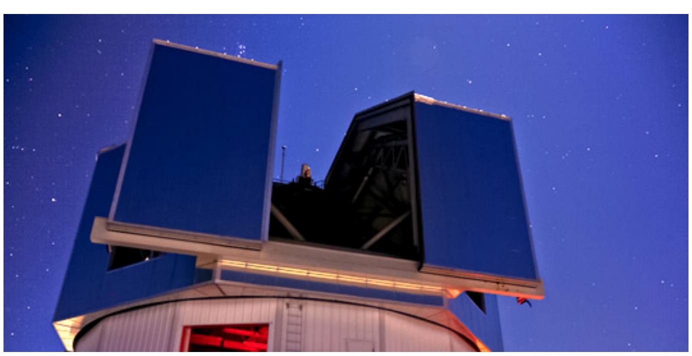
# Facilities at Lowell Observatory

An agreement signed in 2011 makes Boston University a permanent partner with Lowell Observatory to operate the new **Discovery Channel Telescope** (DCT) and provides Boston University astronomers with guaranteed observing time on this world-class scientific facility. It also provides them with access to the Perkins Telescope by allowing the exchange of 1 DCT night for 18 nights on the Perkins Telescope (see description below). The IAR administers Boston University's role in the DCT and other Lowell Observatory telescopes, and serves as the primary unit for managing external funding of research projects that use the telescopes. The DCT is a reflecting telescope with a diameter of 4.3 meters, located at Happy Jack, Arizona, on National Forest Service land. The large light-collecting area of the telescope allows ultra-high-sensitivity observations of faint cosmic objects such as the lowest-mass stars and distant galaxies.

The other major facility of Lowell Observatory used by BU astronomers is the Perkins Telescope, a 1.83 meter (6 feet) diameter reflecting telescope located on Anderson Mesa, near Flagstaff, Arizona.

The IAR director solicits proposals for observing time from members of the BU astronomical community on a quarterly basis. The proposals are reviewed by a BU time allocation committee. Those proposals that are approved are recommended to Lowell Observatory, where the schedule is drafted. During FY14-FY15, Boston University astronomers were scheduled to observe on the DCT on 70 nights. Of these, 66 used the Large Monolithic Imager, while the other 4 used the DeVeny spectrograph. The DeVeny instrument was installed in spring 2015. A total of 300 nights were scheduled for BU observers on the Perkins Telescope during the two years. Of these, roughly half used the PRISM camera at visible wavelengths, while the other half used the Mimir near-infrared camera.

Professor Clemens serves as the BU representative on the DCT Advisory Board, which met for the first time in May 2014, and continues meeting via quarterly teleconferences. This committee represents all partner interests to Lowell Observatory for issues and operations involving the DCT. Other Board members include representatives from the University of Maryland/Goddard Space Flight Center, the University of Toledo, Northern Arizona University, and, most recently,Yale University.



Top left: Dome housing the DCT, with the Pleides star cluster above the left panel. Top right: the DCT, viewed from inside its dome.

Senior Research Scientist Svetlana Jorstad serves as the Boston University representative on the Lowell Observatory Mesa Advisory Board, which met for the first time in May 2014, and continues meeting via regular teleconferences. This committee represents partner interests to Lowell Observatory for issues and operations of astronomical facilities on Anderson Mesa, where the Perkins Telescope is located.

Senior Research Scientist Brian Taylor serves as the main support person for BU astronomers who use the Lowell Observatory facilities. In addition to scientific advice and logistical support, he performs a variety of repairs, maintenance operations, and upgrades on the telescope hardware and software systems. Over the past two years, he has implemented a climate control system that he designed and constructed for the Perkins Telescope. This system utilizes a propylene glycol chiller that has the ability to provide cooling capacities even at the low temperatures that are typical of the winters in northern Arizona. The idea is to keep the primary mirror as close as possible to the ambient temperatures throughout the night in order to provide better image quality. He also repaired the PRISM camera after it was damaged by collision with a telescope support pier. He is currently beta-testing a new data pipeline software system for observations with the PRISM camera.

# Research & Scholarship

## Research with the Discovery Channel Telescope

IAR members have started major projects based on observations with the DCT, some of which are discussed in the "Selected New Results from IAR Research" subsection below. A milestone was reached in March 2015, when Prof. Philip Muirhead and international collaborators published a paper in the *Astrophysical Journal* entitled "Kepler-445, Kepler-446 and the Occurrence of Compact Multiples Orbiting Mid-M Dwarf Stars." The paper is the first BU-led refereed publication to use data from the DCT. In this study, they used the Discovery Channel Telescope and NASA's Kepler Spacecraft to study exotic, compact planetary systems orbiting small stars.
Link: http://iopscience.iop.org/0004-637X/801/1/18/article

## New Collaborative Research Initiatives

IAR faculty formed a number of national and international collaborations in FY14 – FY15 in order to expand their research capabilities, including access to world-class facilities.

One such collaboration, the Southern Hemisphere HII Region Discovery Survey, led by Professors Thomas Bania and John Dickey (University of Tasmania), uses the Australia Telescope Compact Array (ATCA) to discover ionized regions in the southern sky, where the bulk of such clouds are situated. The team represents several US and Australian research universities, as well as the US National Radio Astronomy Observatory. The collaboration will involve exchanges of students and postdocs. This project demonstrates new technology in the broad-band system on the ATCA, leading to future applications that may go far beyond radio astronomy to advance communication and data handling technology.

Professor Alan Marscher and Senior Research Scientist Svetlana Jorstad have joined international collaborations to study the high-energy plasma jets of blazars, powered by super-massive black holes at the centers of galaxies. They are involved in observations with the Event Horizon Telescope, an array of microwave telescopes scattered around the globe, that will probe the ultra-fine scale structure of the jets very close to their respective black holes. In another collaboration with colleagues in Spain, Germany, and Russia, they will use a Russian-launched radio dish in space, RadioAstron, as an extension of a ground-based array that will serve as a similar probe at longer wavelengths. They have also joined forces with the VERITAS telescope array in Arizona, which observes "air showers" of light emitted as very high-energy gamma rays from blazars strike the Earth's upper atmosphere. By measuring changes in the polarization of visible light with the Lowell Observatory Perkins Telescope together with detection of gamma rays by VERITAS, they hope to unravel the mystery of how the gamma rays are produced.

One of the key goals in the field of Astronomy is to understand how planets form. Full understanding can only be achieved by imaging a planet while it is still forming in its natal proto-planetary disk. However, this requires a powerful high-resolution instrument, which has yet to exist. An international consortium has emerged to build such an instrument: the Planet Formation Imager (PFI). Professor Catherine Espaillat serves as the Science Working Group leader of PFI's Protoplanet Properties and Detection team. The team's goal is to define the most exciting areas of science that will drive the instrument concept.

Professor Dan Clemens' research group has undertaken international collaborative research with two different groups in Taiwan, one in Germany, and one in Greece, all with similar goals of utilizing the unique infrared polarimetric capabilities of the Mimir instrument on the Perkins telescope to reveal and characterize weak magnetic fields in the dense molecular clouds in the Milky Way Galaxy that proceed to form stars. Graduate students in the Clemens group have hosted and trained graduate students and postdocs from these external institutions at the Perkins telescope for extended observing campaigns. A new domestic collaboration with Cornell University exploited the sensitivity of the DCT to follow the interactions of a runaway neutron star as it plows through the interstellar medium.

## Selected New Results from IAR Research

### *Study of Planet-forming Disks around Young Stars by Professor Espaillat's Group*

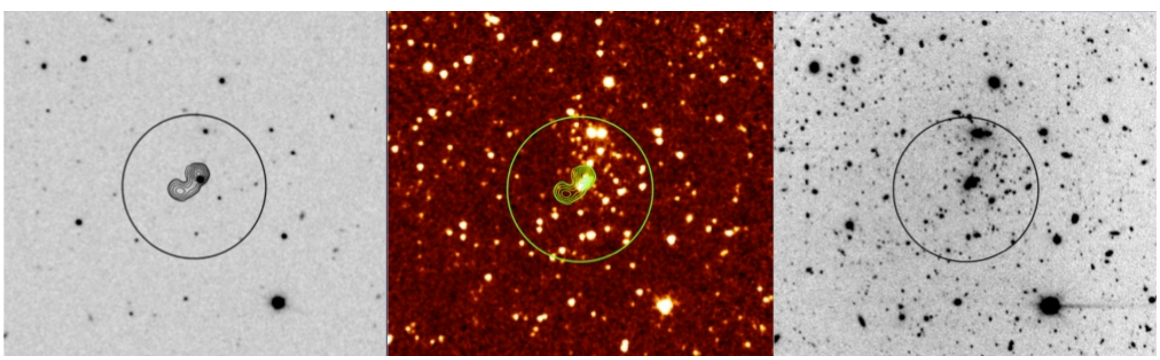
Professor Catherine Espaillat's group focuses on understanding the origin of planets. This involves better understanding protoplanetary disk structure and the star-disk connection in young objects. Of particular interest are the "transitional disks," which have inner holes and gaps in their disks that are most likely the result of young planets.

Previous observations of young stars have given us an unprecedented look at the dust evolution in the circumstellar disks surrounding these young objects. However, despite this ground-breaking progress, basic accretion and stellar properties for most of these objects remain uncertain. Prof. Espaillat is using the DCT's LMI instrument to address this gap in our knowledge by using UBVIR photometry to derive mass accretion rates, extinctions, luminosities, radii, and masses for the largest sample of young stars studied to date. Prof. Espaillat collected four nights of data with DCT in November 2013 for over 50 young stars in the star-forming regions of Taurus and Orion. Data reduction is underway and the sample will be expanded in future observing runs.

Espaillat was first-author on the first review of the field of transitional disks, which was included in the book "Protostars and Planets VI." Post-doctoral scholar Laura Ingleby, Espaillat, and collaborators also published a paper in the Astrophysical Journal regarding the variability of accretion onto the young star GM Aur, which is surrounded by a transitional disk. In particular, they found evidence that the dust in the disk is closer to the star than previously thought. Espaillat also published a first-author paper along with collaborators and graduate student Daniel Feldman combining DCT data, Spitzer IRS spectra, and a Submillimeter Array image to model in detail the faintest transitional disk observed to date. This illustrates there may be many more transitional disks that await detection with the much more sensitive ALMA instrument which recently came online. Espaillat's group also has an ongoing DCT study of ~400 young stars to measure how accretion rates evolve. This project involves graduate students Daniel Feldman and Connor Robinson.

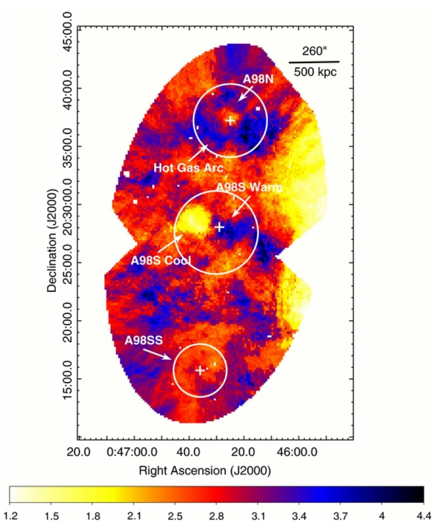
### *Studies of Clusters of Galaxies by Professor Blanton and Collaborators*

Professor Blanton and collaborators are conducting a large survey of distant clusters of galaxies called the COBRA (Clusters Occupied by Bent Radio AGN) survey. They are using bent, double-lobed radio sources (AGN) as signposts for these high-redshift systems since radio sources with these morphologies usually reside in clusters and the radio emission is easy to see to large distances. The group has followed up 651 of these sources that were not detected optically to the limit of the Sloan Digital Sky Survey in the infrared using *Spitzer*. Based on these observations, approximately 300 new distant cluster candidates have been discovered. Deep, follow-up observations in the optical with the Discovery Channel Telescope are ongoing and will be crucial for estimating the photometric redshifts of the potential clusters and studying the galaxies they contain in more detail.



*Left:* Sloan Digital Sky Survey r-band image with 1.4 GHz radio contours of a bent-double radio source from the COBRA survey superposed. Cluster galaxies are not detected to the limit of the SDSS. *Middle:* Infrared 3.6 um image of the same field from Professor Blanton's group's Spitzer Snapshot program. A newly discovered cluster is easily visible. *Right:* i-band image from the LMI at the Discovery Channel Telescope of the same field. The circle has a radius of 50'' (more than 1 million light-years). Optical observations combined with those in the infrared are important for estimating the redshifts of the clusters in our survey as well as for studying the galaxy populations in detail. The cluster shown is at a redshift of z=0.7, so that the light we now observe left the galaxy more than 6 billion years ago.

Prof. Blanton and collaborators are studying the detailed environments of nearby groups and clusters of galaxies primarily using X-ray observations from the Chandra X-ray Observatory combined with optical and radio observations. Graduate student Rachel Paterno-Mahler led a study of the triple cluster system, Abell 98. Through multi-wavelength analysis, it was found that two of the cluster components are bound, but the third is not. Evidence of feedback from the central radio source was seen which is a fairly uncommon observation in a merging cluster system. In a study of Abell 2443 (led by collaborator T. Clarke), they found for a shock and cold front in the cluster. Detailed analysis of X-ray and radio data revealed that the radio relic in the cluster is likely produced by shock reacceleration or adiabatic compression of fossil relativistic electrons. A study of the galaxy group NGC 5813 led by collaborator S. Randall used a very deep Chandra observation (the longest total Chandra observation for any group of galaxies to date). Analysis of the data reveals that it shows three sets of cavities or bubbles inflated by the AGN (the largest number seen in any system). In addition, each pair of cavities is associated with a shock front. The cavities and shocks result from feedback from the central AGN, with each cavity pair and associated shock representing an outburst from the AGN. In this system, heating from the shocks alone is sufficient to offset cooling of the intracluster medium (ICM). In addition, based on measured shock front widths, turbulent velocities within the ICM are constrained.

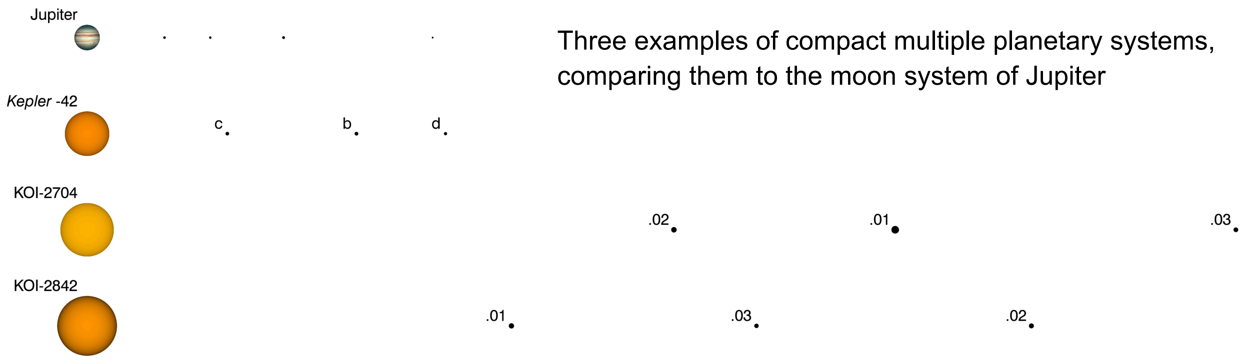



Chandra X-ray temperature map of the triple cluster system Abell 98

### *Study of Small Exoplanets orbiting Small Stars by Professor Muirhead's Group*

Professor Philip Muirhead's group, which includes senior postdoctoral associate Bryce Croll, visiting scientist Andrew Mann, graduate students Paul Dalba, Eunkyu Han, and Mark Veyette, and BU undergraduate students Howard Chen, Zachary Hall, and Brian Healy, has been investigating small stars that contain multiple, rocky, short-period exoplanets. By following up discoveries by NASA's Kepler Mission with the the Large Monolithic Imager on the DCT, Prof. Muirhead's group has determined that 20% of the smallest main sequence stars ("mid-to-late M dwarfs") harbor such planets. These so-called "compact multiples" have more in common with the moons of Jupiter than our solar system as a whole. Studying the planets in detail reveals that planet formation around small stars is highly efficient, with the planets containing over 50% of the available metals in the stars' original protoplanetary disks. The results were published in *The Astrophysical Journal* in January of 2015 and presented that same month at the 225th Meeting of the American Astronomical Society in Seattle, WA.

Prof. Muirhead's group, which includes two Research Experiences for Undergraduates students from other institutions, is investigating a variety of science topics related to stars and planets, from Saturn's atmosphere with NASA Cassini spacecraft to a search for new planets around small stars with the Perkins Telescope at Lowell Observatory.

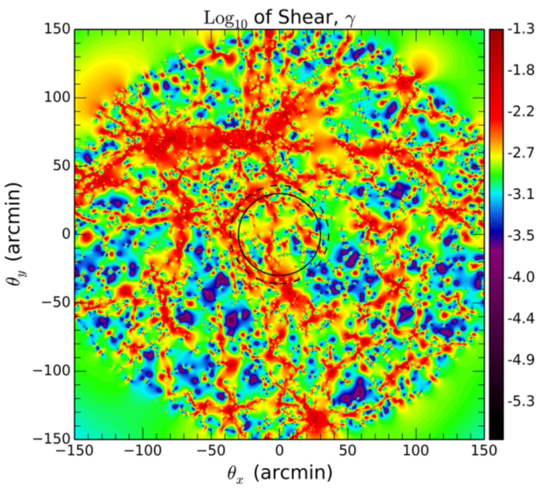



Three examples of compact multiple planetary systems, comparing them to the moon system of Jupiter

### ***Mapping Dark Matter via Weak Gravitational Lensing by Professor Brainerd***

Prof. Brainerd has continued her investigations into the locations and orientations of small satellite galaxies that have been identified using spectroscopic methods. Following on her previous study, which showed that, on average, the satellites of relatively isolated galaxies in the Sloan Digital Sky Survey (SDSS) tend to be radially aligned in the direction of their host galaxy on the sky, Prof. Brainerd has found that this effect is significantly stronger for blue satellite galaxies than it is for red satellites. This suggests that these particular satellites are undergoing significant Newtonian tidal distortions as they approach close to their host galaxy, causing them to "stretch" along their orbital path and inducing a large burst of star formation (making them blue). In a theoretical investigation using the Millennium Run Simulation, Prof. Brainerd has also shown that the spatial locations of spectroscopically selected satellite galaxies do not, in general, trace the dark matter halos of the host galaxies. While both the satellite distributions and the halo dark matter distributions can be fitted well by the so-called Navarro, Frenk & White (NFW) profile, Prof. Brainerd finds that the satellites of red host galaxies with stellar masses > $10^{11}$ $M_{sun}$ are significantly more centrally-concentrated than is the dark matter. In the case of blue host galaxies with stellar masses > $10^{11}$ $M_{sun}$, Prof. Brainerd finds that the satellite galaxies are somewhat less concentrated than is the dark matter.

Example of a host galaxy – satellite galaxy pair. The alignment of the satellite galaxy with the direction between the centers of the two galaxies is apparent.




Color scale shows the logarithm of the weak lensing shear for a plane of source galaxies at redshift z = 0.4, lensed by a Monte Carlo realization of a small region of the Sloan Digital Sky survey. Note that regions of high shear (shown in red) are highly interconnected, much more so than is the underlying mass distribution. This is an effect caused by the fact that most of the background galaxies have been lensed at a weak level by many independent foreground galaxies.

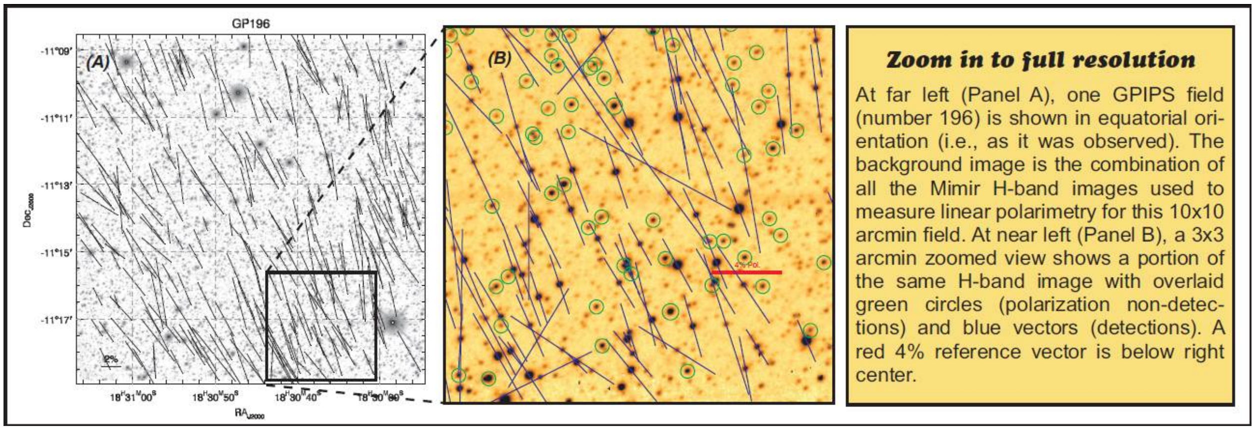
Prof. Brainerd and graduate student Brandon Harrison have begun a theoretical investigation into the accuracy with which the observed weak lensing due to galaxies (known as "galaxy-galaxy lensing") can constrain the dark matter surface mass density due to the lensing galaxies when all instances of "multiple deflections" are taken into account. The term "multiple deflections" refers to the fact that most distant galaxies have been lensed at a comparable level by two or more foreground galaxies. Brandon Harrison has constructed Monte Carlo simulations of galaxy-galaxy lensing in a large, contiguous area of the SDSS using the observed redshifts, celestial coordinates, stellar masses, and colors of the galaxies. He embeds each of the galaxies within a Cold Dark Matter halo whose properties are scaled to the observed properties of the SDSS galaxies, and he then lenses a plane of theoretical background galaxies by the foreground SDSS galaxies. In his initial comparisons of the validity of the expected relationship between the observed weak lensing shear, g(q), and the surface mass mass density, DS(q), Brandon finds that the values of DS(q) that are inferred from the weak lensing shear are about 25% lower than the actual values of DS(q) that were put in to the simulation.

### *Mapping of the Milky Way's Magnetic Field by Professor Clemens' Group*

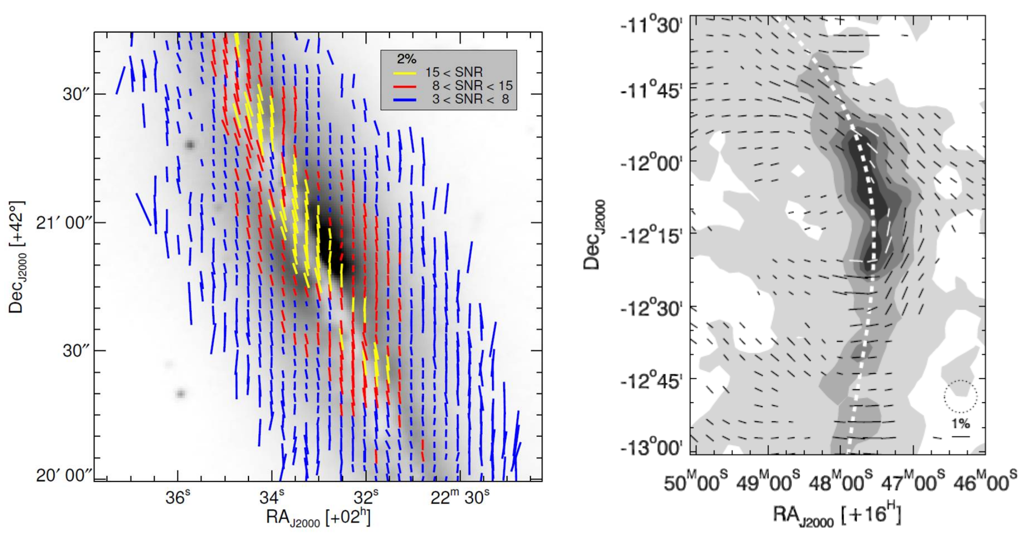
The Galactic Plane Infrared Polarization Survey (GPIPS), an eight-year observing effort with the Mimir instrument on the Perkins telescope, and conducted by Professor Clemens' group was completed in the Fall of 2013. All of the data obtained were processed to "science-quality" levels and shared with the broader astronomical community in March 2014 via a dedicated website. GPIPS contains some one million stellar polarization detections – about a multiplicative factor of 100,000 more than previously measured in this portion of the Milky Way Galaxy. The first scientific papers by outside investigators using the public GPIPS data have been submitted and should see publication later in 2015.

The Clemens Group is also actively exploiting the wealth of scientific potential contained in the GPIPS data set. PhD student Lauren Cashman is using the full GPIPS data set to test models of dust grain alignment with magnetic fields in dust clouds. She is also studying the polarization properties of stars that probe the members of a new 100-member sample of Galactic dark, molecular clouds appearing in the GPIPS survey region. PhD student Sadia Hoq has recently completed a project to obtain robust distances to Galactic star clusters, based only on available near-infrared data and a new isochrone fitting technique. She will use the distances obtained for a sample of 30 star clusters to probe the nature of changes in the Galactic magnetic field with distance and how spiral arms affect magnetic fields. She is also using deep

Mimir polarization observations to reveal the magnetic fields embedded in Infrared Dark Clouds, the most opaque clouds in our Galaxy and those that go on to form massive stars and star clusters. PhD student Jordan Montomery is using deep Mimir polarization observations to study the magnetic fields in distant galaxies that are considered analogs of our Milky Way Galaxy, so as to gain a better understanding of how the interpret the GPIPS information for the Milky Way.




Panel showing a partial zoom of one small segment of the data in the GPIPS. The linear ‘sticks’ or ‘vectors’ show the orientation on the sky of the of the magnetic field revealed by these Mimir observations. GPIPS consists of 3,237 of the 10 x 10 arcmin fields shown at left (and is too large to present here!).

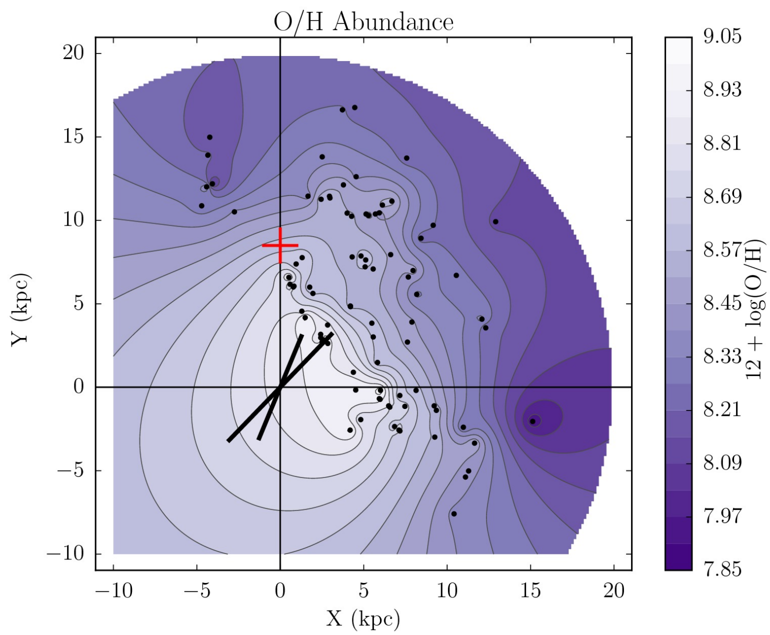



Left: Zoom-in of the Mimir-revealed magnetic field directions of the center of the edge-on Milky Way analog galaxy NGC891 (from Montgomery & Clemens 2014). Right: Mimir-based vectors reveal a magnetic field wrapping around the dense cloud condensation shown in the gray-scale, driven by interaction of the magnetic field and cloud with a nearby runaway massive hot star (from Cashman & Clemens 2014).

***Finding Distant Ionized Gas Clouds and Using them to Explore our Milky Way Galaxy by Professor Bania and Collaborators***

Stars with masses greater than ten times that of our Sun shine for only ~10 million years before they detonate in titanic supernova explosions that spew into space heavy elements forged by nuclear reactions in their cores. While they are shining, massive stars ionize the gas that surrounds them creating "H II Regions".

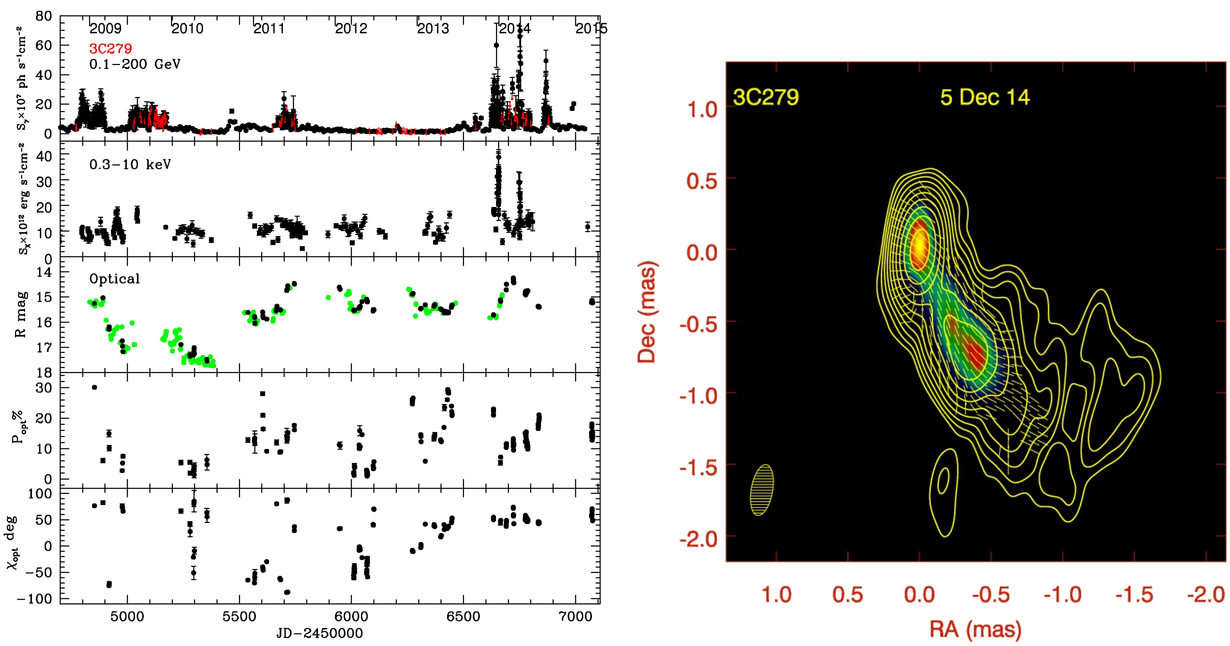
These HII regions form from gas that has been enriched in heavy elements by previous generations of massive stars. Determining the heavy element abundance of HII regions thus probes billions of years of chemical evolution in our Milky Way galaxy. Bania's research team has recently derived the first galactic scale maps of the Oxygen abundance in HII regions. These unprecedented maps show unforeseen structure in the metallicity abundance distribution: instead of the expected smooth decrease in oxygen abundance as one moves outward from the Galactic Center, Bania's team finds pockets of increased or decreased abundance in small zones scattered throughout the disk of the Milky Way. These abundance variations will set strong constraints on theories of the formation and evolution of the Galaxy. Bania's research team is comprised of his former graduate and undergraduate students: Dana Balser (NRAO CV), Loren Anderson (WVU) and Trey Wenger (UVa).




Face-on map of the Milky Way Galaxy showing the distribution of "metals" i.e. elements heavier than Helium. Metals are produced by stars during their lifetimes and expelled back into the interstellar medium during their death throes. Here, the Oxygen abundance relative to hydrogen, [O/H], map shows the effects of billions of years of Galactic chemical evolution. The black circles show the locations of HII regions and the contours/color shadings result from numerical interpolation of these data. The red cross marks the location of the Sun. The thick black lines cross at the Galactic Center and schematically mark the locations of models for the Galactic bar.

### *Probing the Ultra-high-energy Jets of Blazars across the Electromagnetic Spectrum by Professor Marscher, Senior Research Scientist Jorstad, and their Group*

The blazar research group explores the jets of high-energy particles and magnetic field produced by supermassive (of order 1 billion times the Sun's mass) black holes accreting matter at the centers of some galaxies. The jets stream out of the galaxy's nucleus at near-light speeds and emit radiation profusely across the entire electromagnetic spectrum, with rapidly variable brightness. In order to probe the jets, Professor Marscher and Senior Research Scientist Jorstad have developed a comprehensive program to monitor changes in their brightness and polarization at microwave, infrared, visible, ultra-violet, X-ray, and gamma-ray frequencies. Their project includes monthly radio frequency observations with the Very Long Baseline Array (which produces images of the jets of blazars with angular resolution 1000 times finer than that of the Hubble Space Telescope) of a sample of 37 blazars, as well as optical polarimetric and photometric observations on the Perkins Telescope. Graduate students Michael Malmrose, Nicholas MacDonald, Karen Williamson (who became a research technician in FY15), and undergraduates Kelly Blumenthal, Adi Foord and Vishal Bala participated in the analysis of the data from these extensive observations. The data collected by the group and their collaborators are from numerous space-based observatories, such as the Fermi Gamma-ray Space Telescope, Swift, and NuSTAR, and ground-based telescopes around the world. The goal is to answer major outstanding questions in blazar physics: the origin of the gamma-ray and X-ray emission, how the relativistic plasma jet is collimated and accelerated, and what processes are responsible for producing flux outbursts and bright knots that appear to move faster than light.




Sample graphs of flux and polarization vs. time at different frequencies (left) and VLBA image of a blazar (3C 279), where contours represent total intensity and colors indicate polarized intensity.

Marscher, Senior Postdoctoral Associate Joshi, and MacDonald have each developed a new theoretical paradigm and numerical code that attempts to explain the observational results, with all three models described in separate papers in the *Astrophysical Journal*.

### *Finding Planets around Other Stars by Emeritus Professor Janes and Collaborators*

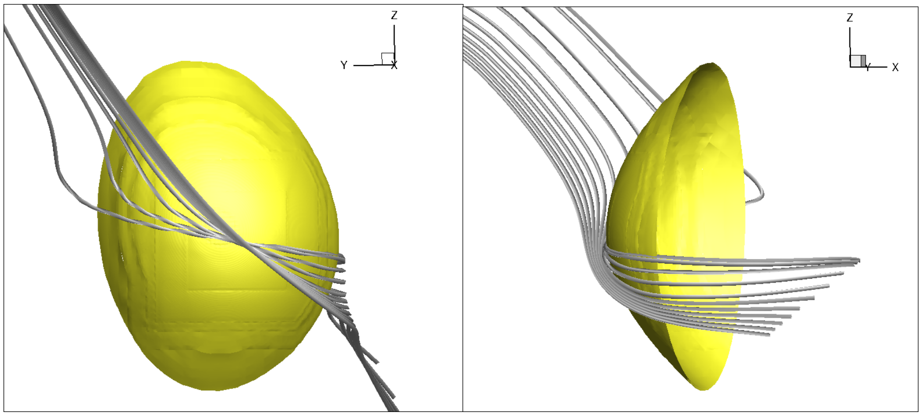
NASA's Kepler Mission is a space telescope that has been staring at one spot in the sky continuously for over four years to search about 150,000 stars for signs of orbiting extra-solar planets. Emeritus Professor Kenneth Janes has been working with members of the Kepler team to study several star clusters located in the field of view of the Kepler telescope. In addition to searching for planets around cluster stars (they have found two planets thus far), they are finding how fast stars of different ages spin, by monitoring the subtle brightness variations as starspots rotate across their surfaces. In a supporting ground-based study using the PRISM camera on the Perkins Telescope, he has developed a new Bayesian statistical procedure for finding the overall properties of the star clusters.

In a related study, supported by a NASA grant, Prof Janes has been searching the Kepler Mission catalog for pairs of stars moving together through space. These so-called common proper motion (CPM) stars are presumed to have a common origin - so they have the same chemical composition and age. With the help of the Kepler data archive, the CPM stars can be used to determine how regular the relationship is between a star's age and physical properties and its period of rotation. Observations he recently obtained at the DCT telescope support this project.

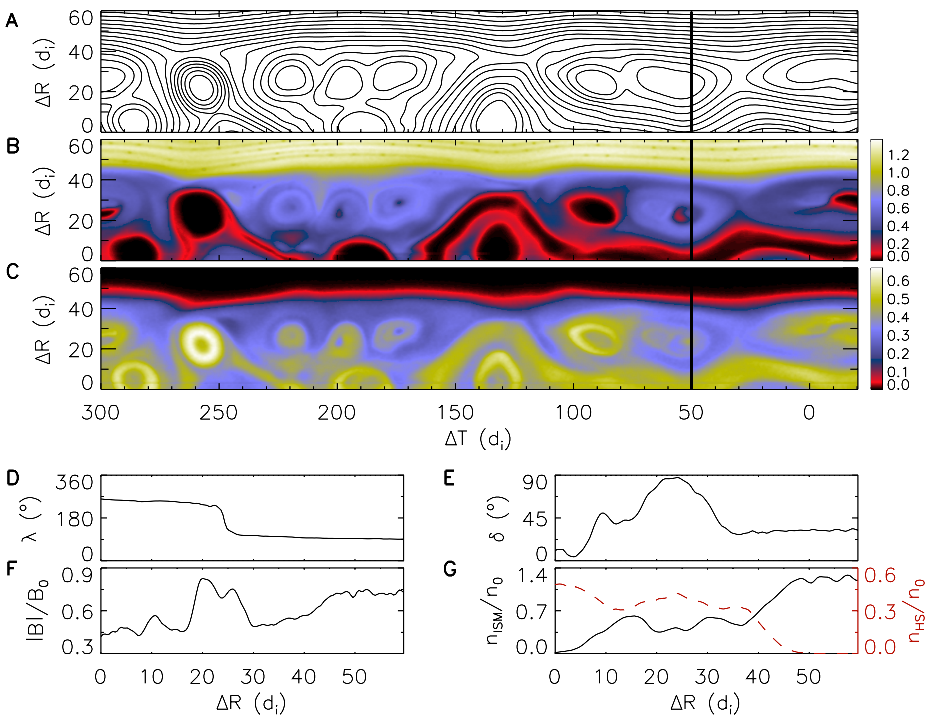
### *Crossing the Last Frontier of the Solar System, the Heliopause, by Professor Opher's Group*

Professor Opher's group was involved in two ground- breaking papers related to the announcement in September 2013 that Voyager 1 had crossed the last frontier of the solar system, the heliopause. The first paper (Swisdak, Drake, & Opher 2013) argued that the heliopause is porous. They presented a model, based on both observations and simulations (detailed particle-in-cell and global magneto-hydrodynamics), of the heliopause (HP) as a porous, multi-layered structure threaded by magnetic fields. They suggested that Voyager 1 had crossed the HP at the end of July 2012. Soon after this paper was published, the Voyager team reached the conclusion that Voyager 1 was in interstellar space, based on the detection of radio emission (Gurnett et al. 2013).

Another major paper (Opher & Drake 2013) proposed that, regardless of its direction in the interstellar medium, near the HP the interstellar magnetic field twists in the Parker direction (solar direction). This corresponds to the observation by the Voyager team that the magnetic field outside the HP is still within ~20° of the Parker spiral direction. This work is being hotly debated. Voyager 1 is more than 1.5 astronomical units beyond the heliopause, yet the field is still very much solar-like. This difference could be due to the shape of the HP and the magnetic draping geometry, to magneto-hydrodynamic (MHD) instabilities, time variations, or to not having really crossed HP.



View at the nose of the heliosphere from the interstellar medium toward the Sun. The nose of the heliopause is shown in the yellow iso-surface. The gray field lines are the $B_{ISM}$ wrapping and twisting around the heliopause.



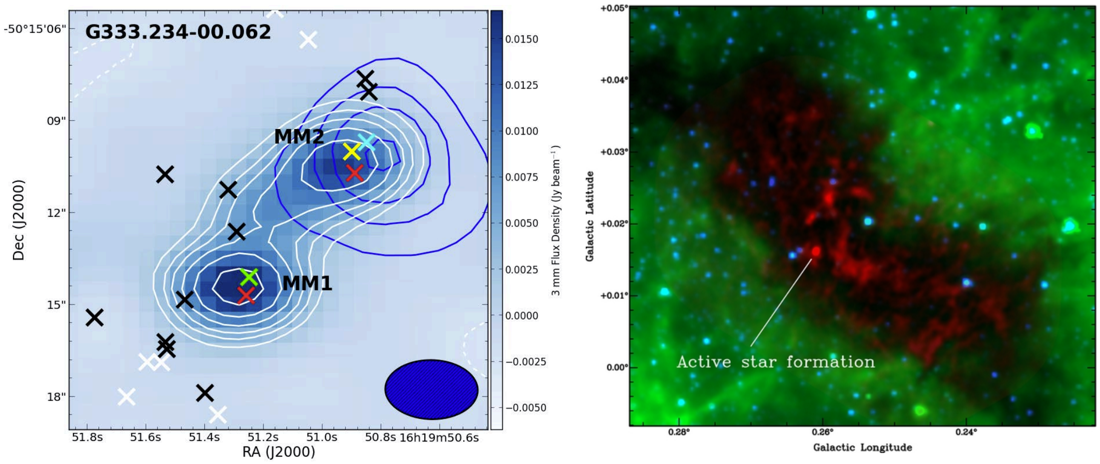

Structure of the heliopause and adjacent local interstellar medium and heliosphere at late time from a particle-in-cell simulation. In the radius/time (*R*/*T*) plane in (A) the magnetic field lines and in (B) and (C) the number density $n_{LISM}$ ($n_{HS}$) of particles originally in the LISM (HS). Panels (D)–(G) are cuts along the vertical line in panels (A)–(C). In (D) λ is the angle of the magnetic field **B** in the R–T plane with respect to the *R* direction. In (E) δ is the angle between **B** and the R–T plane. In (F), the magnitude of *B* and, in (G), the number density $n_{LISM}$ (solid) and the number density

***Studies of Massive Studies of Massive Star Formation in the Milky Way Galaxy by Professor Jackson's Group***

Professor Jackson, postdoctoral researcher Ian Stephens, graduate students Matthew Camarata and Taylor Hogge, BU physics Professor Scott Whitaker, and their overseas collaborators focus their research on the early stages of high-mass star formation in the Milky Way Galaxy. Although the formation of low-mass stars such as the sun is well understood, the formation of high-mass stars (more than 10 times as massive as the sun) has remained more difficult to understand. This is because high-mass stars are very rare, and because they quickly disrupt their natal environment via strong winds, radiation fields, and supernova explosions.

To help remedy this situation, the group has recently completed a large survey of dense molecular gas — the raw material for star formation — toward an unprecedentedly large sample of over 3,000 high-mass star-forming gas clumps. This survey, the Millimeter Astronomy Legacy Team 90 Gigahertz Survey (MALT90) used the 22-meter diameter Mopra radio telescope near Coonabarrabran, New South Wales, Australia to map different molecular tracers toward the clumps. This survey has been essential to deduce the distances and physical properties of high-mass star-forming clumps. Two of these clumps have proved to be important targets for follow-up work with interferometers. First, in the clump G33.234-00.062, MALT90 data showed unusual ratios of the molecular lines. In follow-up observations with the Australia Telescope Compact Array radio interferometer, the group discovered that these line ratios were caused by an enormous concentration of material. Remarkably, they also discovered that this clump hosts two of the most massive known protostars (each with a mass about 100 $M_{\odot}$), which will eventually become "monster" high-mass stars. Second, MALT90 revealed the clump G0.253+0.016, a.k.a. "the Brick," is a very massive (~10,000 $M_{\odot}$), centrally condensed clump that is likely to be undergoing global collapse. This clump is the coldest, most-massive clump known, and will eventually spawn not a single star, but a cluster of thousands of stars. The group's Atacama Large Millimeter Array (ALMA) images of "the Brick" show a complex filamentary structure and hundreds of dense cores, the early seeds of star formation. Their analysis confirms that turbulence plays a dominant role in determining the structure of the clumps and the stars that eventually form from it.

Jackson and collaborators are now beginning a new survey in the northern hemisphere of dense clumps using the Green Bank Telescope. This survey, called the Radio Ammonia Mid-Plane Survey (RAMPS), will perform a survey of several square degrees of the Northern Galactic Plane using the dense-gas tracing lines of ammonia.

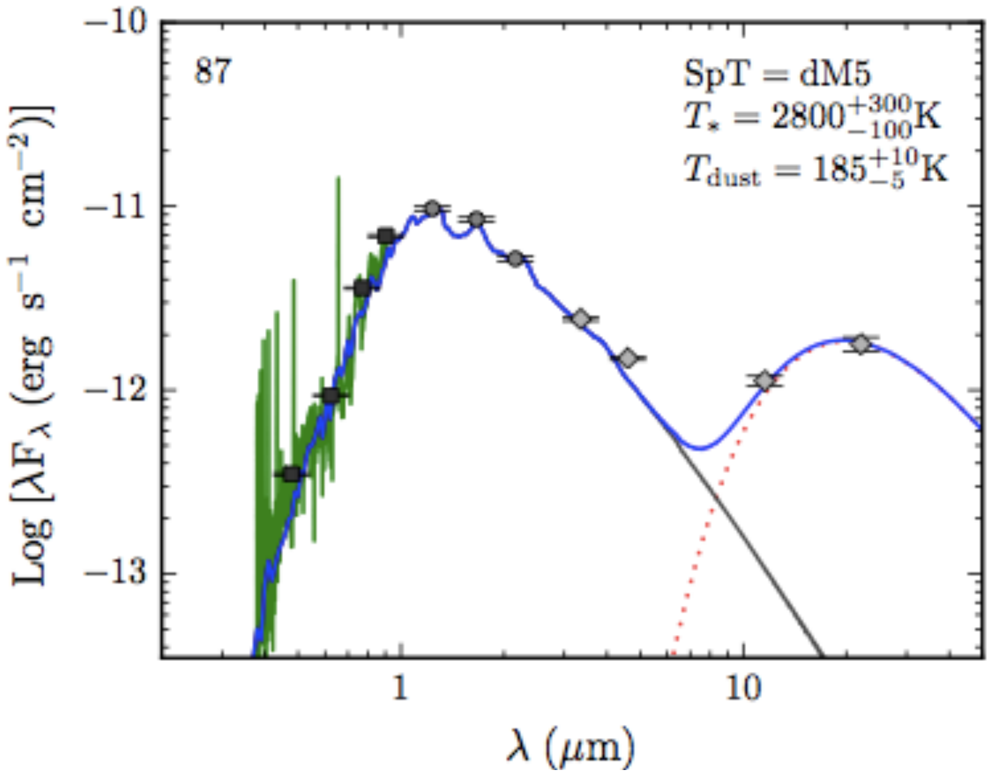



(Left) Australia Telescope Compact Array image of two “monster” cores with masses ~100 $M_\odot$ . The white contours and the blue color scale indicate 3 mm dust continuum flux, the blue contours the GLIMPSE 8 μm continuum flux, and the crosses the positions of $H_2O$, $CH_3OH$, and OH masers. The monster stars are seen as the peaks in the dust continuum emission (Stephens et al. 2015). (Right) Three-color image of G0.253+0.016 (blue is 3.6 μm emission tracing stars, measured by *Spitzer*, green is *Spitzer* 8.0 μm emission tracing the bright Galactic background, while red is ALMA 3 mm emission tracing dust from the cloud's interior; the cloud has an effective radius of 2.9 pc). The position of a water maser is marked, which is evidence for active star formation. The cloud is so cold and dense that it is seen as an extinction feature against the bright IR emission from the Galaxy. Because ALMA sees through to the cloud's interior, Prof. Jackson’s group and collaborators are now able to characterize its internal structure ( from Rathborne et al. 2015).

## *Studies of Low-mass Stars by Professor West and his Research Group*

As part of his NSF CAREER award, Professor West is continuing an observing campaign with the DCT to measure accurate distances to the least massive stars that are within 30 pc of the Sun. While measuring trigonometric parallaxes takes several years, the project has already led to an initial characterization of the LMI distortion correction and resulted in several proper motions measurements of binary stellar pairs, some of which host exoplanets. Postdoctoral Scholar Dr. Julie Skinner has led the research efforts for the LMI program and is now routinely observing remotely at the DCT (from Boston).

One of the highlights from the West group is the discovery of a sample of low-mass stars that have an excess of mid-infrared emission (led by graduate student Chris Theissen and published in 2014 in *The Astrophysical Journal*). These stars are all old (several billion years), and should not have any remaining warm dust left over from their formation (and the formation of planets). The cause of the infrared emission is likely recent collisions of terrestrial planets near the star. This discovery informs the census and stability of low-mass planets around low-mass stars and has spawned a new research direction for Professor West and his group.

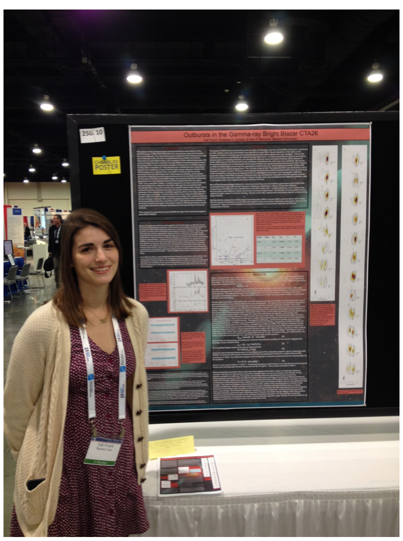



SDSS, 2MASS, and WISE observations of an old low-mass star that shows excess emission of mid-infrared light. The black solid line indicates the predicted stellar flux based on the optical and near-infrared emission. The blue solid line shows the best-fit model for a star plus warm dust disk. This excess emission is likely the signature of recent terrestrial planet collisions around low-mass stars.

# Undergraduate Research and Education

Undergraduate students and now also high-school students (via the RISE program and other opportunities) routinely participate in the research programs led by IAR faculty and research scientists. The IAR considers this to be a very important component to the undergraduate majors program and as important pre-career exposure for the high-school students. Experience in world-class research is key to comprehensive preparation of our students for graduate school or post-graduation employment in the field. In return, undergraduate students support the research programs by helping to analyze the voluminous data obtained in the course of our research.

During FY14 – FY15, 15 undergraduate Boston University students were engaged in research under the direction of supervisors from the IAR faculty and research staff. Most of these involved paid internships sponsored by IAR grants and/or the Boston University Undergraduate Research Opportunities Program. Students also engaged in research through directed study courses, including senior theses for honors. A number of such students obtain significant results. In this case, they often become co-authors of papers in scientific journals and present their results at scientific meetings, especially the semi-annual American Astronomical Society meetings.




Adi Foord (2014 BA in Astronomy-and-Physics) presented her research on the blazar CTA26 at the January 2014 American Astronomical Society meeting in Washington, DC. She performed her research with Professor Marscher and senior research scientist Jorstad, completing a senior distinction thesis.

Professors Opher and West led a successful National Science Foundation proposal to operate a new “Research Experiences for Undergraduates” site-based program during three summers, starting in May 2015. The program, which focuses on studies of cosmic magnetic fields, involves both IAR and Center for Space Physics faculty, as well as postdoctoral fellows and research scientists, as mentors of students who come to Boston University for the summer, in most cases from other colleges and universities. Besides working on research carried out in various research groups in the IAR and CSP, the students attend professional development seminars and informal talks about the physics of cosmic objects by faculty and research staff.

In 2014, Adi Foord (advisors: Marscher and Jorstad) and Kolby Weisenburger (advisor: West) completed senior distinction theses and graduated with BA degrees recognizing that they earned "Distinction in Astronomy." At the 2014 Commencement, Ms. Foord received the College Prize in Astronomy, while Ms. Weisenburger, and Ms. Kelly Blumenthal received IAR Research Prizes.

The use of the Perkins Telescope for professional-quality observations is an important part of the educational mission of the Astronomy Department and IAR. To date, over 100 undergraduates have traveled to Flagstaff to observe with the Perkins Telescope. These include undergraduate non-science concentrators (CAS AS102HP, FY103PM and CAS AS102), undergraduate science concentrators in the honors program (CAS AS203HP), observational astronomy students (CAS AS441), and senior undergraduate students who use their observations as part of their senior honor's thesis (CAS AS401/AS402).

For the past 11 spring semesters, all of the students enrolled in AS441 have participated in field trips either to the Perkins Telescope to use either Mimir or PRISM to collect data for their class projects, or to Goddard Space Flight Center, to see space hardware development and integration. For those going to the Perkins Telescope, the students each spent 2 to 3 nights operating the telescope (weather permitting). This capstone event in the training of our undergraduate astronomy students is extremely popular, and it has been highly effective for aiding the scientific and personal maturation of the students. This unique field trip experience has become a distinguishing high mark for Boston University and its undergraduate students. In addition to using the Perkins Telescope to acquire data for their course work, AS441 students enjoy experiencing some of the unique features of northern Arizona, including day trips to Meteor Crater and/or the Grand Canyon.

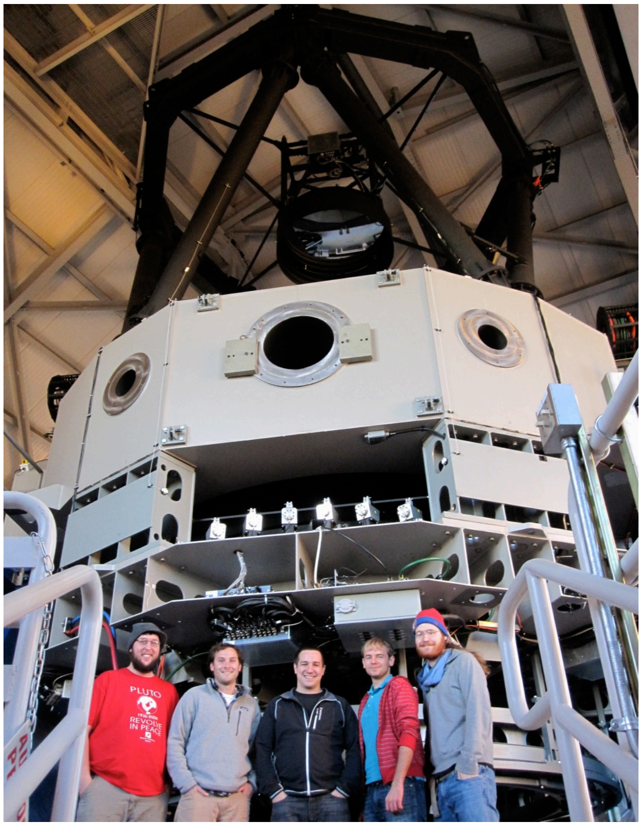
Professor West continued to lead the Boston University Pre-Majors Program (BU Pre-MaP). BU Pre-MaP works with first-year undergraduate students as part of the BU first-year seminar program (FY103). The program is open to all students, but recruits heavily to include students traditionally underrepresented in STEM. As a part of BU Pre-MaP, students obtain mentoring, skills and opportunities for cohort building, and participate in original research. In 2014, BU Pre-MaP completed its third year (including the first trial year in 2012). The last cohort had eight students, and the first student graduated in May 2015. Pre-MaP students traveled to Lowell observatory in April 2015 to use the Perkins telescope and assist graduate student Dylan Morgan with observations on the DCT.

## Graduate Education

During FY14 – FY15, 23 graduate students carried out research in the IAR. One of the IAR graduate students – Patricio Sanhueza (advisor: Jackson) successfully defended his PhD dissertation in FY14 - FY15, while 8 students completed the requirements for their Master of Arts degree in Astronomy. One of these, Karen Williamson (advisors: Marscher and Jorstad) wrote and defended a master's thesis.

The IAR sponsors weekly astrophysics colloquia during the academic year. A pair of 2-credit graduate seminar courses, GRS AS850 and AS851, are associated with the seminar series. In these seminar courses, the graduate students learn to read and critically evaluate papers that have been published in the peer-reviewed literature.

As is the case for undergraduate education, use of the Perkins Telescope and DCT figures prominently in the Astronomy graduate education mission. This includes students enrolled in the required GRS AS710 (Observational Astronomy) course, as well as students who have used the telescope to acquire data for their research related to oral comprehensive examination projects and PhD dissertations.




Graduate students from Professor Blanton's AS710 class visit the Discovery Channel Telescope in Fall 2014.

## Community Life

The IAR is a vibrant, collegial community within BU that is engaged in a wide variety of astrophysical research projects. The IAR members believe that in order to build the strongest research program, it is extremely important to foster personal interactions, both within the IAR itself and within the broader community of astronomers. The most direct method by which the IAR accomplishes this is through the sponsorship of a seminar series. During FY14 – FY 15, the IAR hosted 52 professional colloquia, 47 of which were delivered by astrophysicists from outside Boston University. Graduate students are encouraged to interact directly with the colloquium speakers by attending lunch with the speaker, having their own private question-and-answer session with the speaker after the colloquium, and joining all members of the IAR at the BU Pub after the colloquium for lively exchanges of ideas. Senior members of the IAR interact directly with the colloquium speakers through private and "group" meetings during the visit, in some cases including dinner.

In FY14 and continuing through FY15, postdoctoral associates in the IAR organized a lunch-time seminar series featuring relatively junior scientists. These visitors describe their research programs in a more intimate setting than the IAR seminars. This often leads to lively discussions about the visitor's research.

Together with the Department of Astronomy, the IAR sponsors refreshments after the Friday afternoon graduate Journal Club meetings.  This provides a good opportunity for all graduate students in the Department (not just IAR students) to interact with each other and with their professors in a casual setting.

The IAR co-sponsors two annual musical events on Friday evenings that further foster a sense of community among the faculty, staff, and students. The first, dubbed "Astronomy Unplugged" and organized by IAR Director Marscher, features a party with live popular-style music performed by members of the Boston University astronomy and space physics community and friends. The second is a formal program of classical music, performed in the Tsai Auditorium by members of the Boston University astronomy and space physics community and friends.

## Outreach Activities

Professor Espaillat was an invited speaker at many outreach events aimed at women and underrepresented minorities in STEM.  These include Boston University's GWISE Mentoring Program Kickoff and S.E.T. in the City.  She was also the invited keynote speaker at the University of Michigan's NSF-AGEP Symposium.  Espaillat has also been an active mentor in the Mellon Mays Mentoring Program, which is hosted by the Woodrow Wilson National Fellowship Foundation.

In April, Professor Phil Muirhead and Senior Postdoctoral Associate Bryce Croll won a BU Arts Initiative Grant to hold an art gallery show entitled "The Art of Astrophysics."  Students, staff and faculty will be encouraged to submit artwork to the show that connects creativity with the science of outer space.  The show will be held in January 2016. Information is available at http://astroart.bu.edu/ .

Groups of young members of the Hopi Indian community in Arizona visit the Perkins Telescope at Lowell Observatory on a regular basis. This often occurs when a Boston University astronomer is observing at the telescope, as was the case multiple times in FY13. The participants are provided with an explanation of the observing program and view images being constructed from the current observations with the telescope.

Professor West remains active in the Astronomy & Astrophysics Section of the National Society of Black Physicists (NSBP), the American Astronomical Society Committee for the Status of Minorities in Astronomy, and Boston University's Multicultural Advisory Committee.

Graduate student Jordan Montgomery (at right) showing the big 40-foot long GPIPS data display banner and answering questions after a public evening talk at the Boston Museum of Science by Professor Clemens in August 2013.

In addition to the activities listed above, IAR members engage in numerous other forms of outreach. These include, for example, talking to school children, responding to email communications from school students, and providing information to the media seeking advice on news items relating to astronomy.

### *"Experience: Space Beyond Earth" – Boston University Alumni Event in Flagstaff, Arizona October 11-13, 2014*

Professors Clemens and West worked with members of the Office of Development and Alumni Relations to craft a new pilot program to engage BU alumni with our astronomical assets in Flagstaff and to enable our alumni to have direct and meaningful interactions with forefront researchers. The weekend-long program featured 'Astronomy 101 and 201' formal classroom presentations designed to enable the participants to get the most out of their evening time with the telescope, as well as plenty of informal opportunities to ask Clemens and West questions about astronomy and other topics. Shared meals, receptions, and dedicated hands-on time controlling the Perkins telescope, as well as eye-piece viewing through the 4.3-meter diameter DCT (something many professional astronomers have never done!) delivered an exceedingly high-quality and meaningful program that the participating alumni savored.

Left: Professor Clemens introduces BU alumni to the Perkins Telescope with a safety chat prior to the start of a night of observing. Right: BU alumni, Development Office personnel, and Senior Research Scientist Brian Taylor (at right) on their rim tour of the Grand Canyon, capping a great weekend program.

From the College of Arts and Sciences Newsletter for Spring 2015:

> *The trip, Experience: Space Beyond Earth, was the first in a new series of intensive educational programs offered by the BU Alumni Association. The programs aim to provide alums with access to BU sites and professors and their work worldwide. The 13 alumni on the Arizona trip ranged in age from 22 to 76 and had come from eight states. They shared an alma mater and a desire to learn.*

A more anecdotal summary of the impact of this program can be found in the interview with Gerry Gitner, as related in that Newsletter article: http://www.bu.edu/cas/magazine/spring15/stargazer/

### *Press Releases and Media Coverage*

Members of the IAR are involved in a variety of activities that enrich the lives of people outside the profession of astronomy. Some of this occurs via press releases and other interactions with the popular media. Members of the IAR faculty participated in several press releases during FY14 – FY15 that garnered substantial national and international attention.

Professor Blanton was a co-author of a press release: NGC 5813: Chandra Finds Evidence for Serial Black Hole Eruptions" reporting that a galaxy shows signs of activity – driven by accretion of matter onto a super-massive black hole at its center – that has recurred, with evidence for three such eruptions. The press release is displayed at http://chandra.harvard.edu/photo/2015/ngc5813/ .

Upon request from an official of the Canadian Astronomical Society, graduate student Nicholas MacDonald, along with Professor Marscher and Drs. Jorstad and Joshi, composed a press release on their "Ring of Fire" model for gamma-ray flares in blazars. The press release can be found at: http://people.bu.edu/nmacdona/Press_files/press.pdf .

Professor Espaillat's research on disks around young stars was highlighted in Bostonia, BU Today and the Daily Free Press.

# Sponsored Grants and Contracts

In FY14 – FY15 the IAR managed 31 active research grants, the total funding for which was $6.43M awarded to date. The amount of funds awarded for single and multi-year new grants awarded in FY14 – FY15 totaled $4.80M. This success in securing external funding for research occurred during a time of stringent federal research budgets at the main agencies that fund research in astrophysics, NASA and the National Science Foundation. The tables below list the new and continuing grants awarded to IAR faculty and research staff.

## Major New Grant Activity

New grants awarded to faculty through the IAR in FY14 – FY15 include substantial funding for various observational programs.

Professor Espaillat was a recipient of the NSF CAREER award for her project entitled "Bridging the Gaps – Connecting Theory and Observations of Planet-forming Disks and Addressing Underrepresented Populations in STEM." Prof. Espaillat's team will undertake a multi-faceted approach to address the following two major gaps in astronomy: (1) the gap between theoretical models of disk evolution and observable properties of disk structure in the aim to further understand planet formation and (2) the gap between the postdoctoral transition period and permanent positions, when women are most likely to leave the STEM fields. Prof. Espaillat and her team will bridge these gaps by extracting the most detailed observational constraints to date for theoretical disk models to further our understanding of how planets form out of disks and by creating postdoctoral mentoring programs for women in STEM to increase retention.

A new 3-year NASA Fermi Guest Investigator grant plus a concurrent National Radio Astronomy Observatory award of observing time to Professor Marscher and senior research scientist Jorstad support their program to follow variations in the gamma-ray brightness of blazars measured with data from the Fermi Gamma-ray Space Telescope and relate them to changes seen in the jets imaged in microwaves with the Very Long Baseline Array. Other NASA grants for analysis of visible, UV, and X-ray data from the Swift satellite will support their study of multi-wavelength variations in brightness and polarization from the blazars.

Professor Philip Muirhead won a NASA Exoplanet Research Program award to conduct a coordinated observing program with the 4.3-meter Discovery Channel Telescope and Perkins 72-inch Telescope. Prof. Muirhead's team will precisely measure the sizes and masses of nearby stars in order to determine whether orbiting extrasolar planets are located in the so-called "Habitable Zone": the distance from a star at which a planet could sustain liquid water on its surface.

Professor Dan Clemens has leveraged the recently completed GPIPS project into substantial new multi-year funding from both NSF and NASA to engage in fundamental and follow-on magnetic field studies related to cloud and star formation, including additional deep observations employing both of the Mimir and PRISM instruments on the Perkins telescope.

## New Grants in FY14

| PI | Award Title | Sponsor | Project Start Date | Project End Date | Total Anticipated | Obligated to Date - Total |
|---|---|---|---|---|---|---|
| Blanton, Elizabeth | Cluster And Group Environments Of Radio Galaxies | NSF | 8/1/2013 | 7/31/2016 | $459,314 | $307,194 |
| Espaillat, Catherine | A Clearer View Of Dust Evolution In Proplanetary Disks | JPL | 3/26/2014 | 9/30/2015 | $269,632 | $269,632 |
| Jorstad, Svetlana | Probing the Most Compact Regions of Gamma-Ray Blazar Jets with Millimeter Wave Imaging | NASA | 9/1/2013 | 8/31/2015 | $59,999 | $59,999 |
| Jorstad, Svetlana | Multi-Frequency Observations Of Flaring Gamma-Ray Blazars | NASA | 12/17/2013 | 12/16/2015 | $36,838 | $36,838 |
| Jorstad, Svetlana | Multi-Wavelength Observations Of Blazar Flares | NASA | 5/20/2014 | 5/19/2015 | $29,993 | $29,993 |
| Jorstad, Svetlana | Gamma-ray Blazars in Quiescent vs. Active States | NASA | 5/20/2014 | 5/19/2015 | $29,982 | $29,982 |
| Marscher, Alan | Optical and Millimeter Photo-polarimetry of Bright Gamma-ray Blazars | NASA | 9/1/2013 | 8/31/2014 | $19,994 | $19,994 |
| Marscher, Alan | Testing the Wind-Jet Connection in a Black Hole Transient | Smithsonian Astrophysical Observatory | 7/17/2013 | 1/18/2015 | $10,258 | $10,097 |
| Muirhead, Philip | Using Cassini Data on Saturn to Correctly Interpret Exoplanet Atmosphere Measurements | Massachusetts Institute of Technology | 6/1/2014 | 8/31/2014 | $5,500 | $5,500 |
| West, Andrew | CAREER: Probing the Extremes of Star Formation: A Census of Very Low-Mass Stars and Brown Dwarfs in the Local Neighborhood | NSF | 9/1/2013 | 8/31/2018 | $783,585 | $397,583 |
| West, Andrew | Characterizing the Smallest Extrasolar Planets with Kepler and the Discovery Channel Telescope | Space Telescope Science Institute | 8/1/2013 | 6/30/2014 | $117,897 | $112,677 |
| West, Andrew | Extracting Excellence from Traditionally Underrepresented Populations: Constraining the Formation Mechanism of Low-Mass Dwarfs and BU Pre-MaP | Research Corporation for Science Advancement | 7/1/2013 | 6/30/2016 | $70,000 | $70,000 |
| | | | | | **$1,892,992** | **$1,349,489** |

## Continuing Grants in FY14

| PI | Award Title | Sponsor | Project Start Date | Project End Date | Total Anticipated | Obligated to Date - Total |
|---|---|---|---|---|---|---|
| Bania, Thomas | Deep GLIMPSE: Exploring the Far Side of the Galaxy | JPL | 8/22/2011 | 9/30/2014 | $10,000 | $10,000 |
| Blanton, Elizabeth | X-Ray Cluster Environments Of Radio Sources | NASA | 1/1/2010 | 12/31/2013 | $328,470 | $328,470 |
| Blanton, Elizabeth | A Targeted, Distant (z>0.7) Cluster Survey, Using Bent, Double-Lobed Radio Sources | JPL | 8/19/2011 | 9/30/2014 | $67,060 | $67,060 |
| Brainerd, Tereasa | Theoretical Studies of Weak Gravitational Lensing | NASA | 2/15/2013 | 2/14/2016 | $297,225 | $257,225 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Clemens, Dan | Completing The Galactic Plane Infrared Polarization Survey (GPIPS) | NSF | 8/1/2009 | 7/31/2014 | $906,060 | $905,963 |
| Jackson, James | Herschel Dust Temperatures of High-Mass Star Forming Cores | NASA | 1/19/2012 | 1/18/2016 | $315,130 | $315,130 |
| Jackson, James | Malt 90: A Molecular Multi-Line Survey of High-Mass Star-Forming Cores | NSF | 8/15/2012 | 7/31/2015 | $499,270 | $499,270 |
| Jackson, James | Student Observing Support Application | National Radio Astronomy Observatory | 9/1/2012 | 2/28/2014 | $35,000 | $34,354 |
| Jackson, James | Infrared Dark Clouds | NSF | 8/1/2008 | 7/31/2013 | $649,151 | $649,151 |
| Jorstad, Svetlana | Multi-Frequency Observations of Flaring Gamma-Ray Blazars | NASA | 12/1/2012 | 11/30/2013 | $99,998 | $99,867 |
| Jorstad, Svetlana | Exploration of Gamma-Ray Blazars across the Electromagnetic Spectrum | NASA | 8/1/2011 | 7/31/2013 | $96,962 | $96,962 |
| Marscher, Alan | Thermal Emission from Hot Dust as a Source of Seed Photons for Producing Gamma-rays in Blazars | NASA | 8/1/2011 | 7/31/2014 | $200,000 | $200,000 |
| Marscher, Alan | Continued Comprehensive Monitoring of Gamma-Ray Bright Blazars | NASA | 9/1/2011 | 8/31/2015 | $600,000 | $600,000 |
| Marscher, Alan | Tracking the Evolution of Multi-Waveband Outbursts in Fermi Blazars | NASA | 9/1/2012 | 8/31/2014 | $199,953 | $199,953 |
| Marscher, Alan | Turbulent Extreme Multi-Zone Model for Blazar Variability | NASA | 9/1/2012 | 8/31/2015 | $179,750 | $179,750 |
| Marscher, Alan | Heart of Darkness: High-Resolution X-Ray Spectra of Outflows, ADAFs and Sgr A* | Smithsonian Astrophysical Observatory | 12/1/2012 | 11/30/2014 | $208,994 | $183,353 |
| West, Andrew | Using White Dwarf-M Dwarf Pairs to Probe the Magnetic Activity and Angular Momentum Evolution of Low-Mass Stars | NSF | 9/1/2011 | 8/31/2015 | $429,710 | $429,710 |
| | | | | | **$5,122,733** | **$5,056,218** |

## New Grants in FY15

| PI | Award Title | Sponsor | Project Start Date | Project End Date | Total Anticipated | Obligated to Date - Total |
|---|---|---|---|---|---|---|
| Clemens, Dan | Infrared Mapping of Magnetic Fields in Star-Forming Regions in the Milky Way | NSF | 07/01/2014 | 06/30/2017 | $637,919 | $637,919 |
| Clemens, Dan | Galactic Dust Clouds, Star Formation, and Magnetic Fields | NASA | 01/30/2015 | 01/29/2018 | $383,912 | $129,729 |
| Espaillat, Catherine | CAREER: Bridging the gaps: Connecting theory and observations of planet-forming disks and addressing underrepresented populations in STEM | NSF | 06/01/2015 | 05/31/2020 | $822,205 | $96,789 |
| Espaillat, Catherine | Testing EUV Photoevaporation Models in Young Disks | Space Telescope Science Institute | 03/01/2015 | 02/28/2018 | $50,550 | $50,550 |
| Janes, Kenneth | Stellar Rotation: The First Billion Years - and Beyond | NASA | 09/08/2014 | 09/07/2015 | $39,954 | $39,954 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Marscher, Alan | Continued Monitoring of Gamma-ray Blazars with the VLBA at 43 GHz | NASA | 09/01/2014 | 08/31/2017 | $600,000 | $200,000 |
| Muirhead, Philip | Mass-Radius-Luminosity-Rotation Relationships for M Dwarf Planet-Hosting Stars in Preparation for the TESS, Gala and JWST Era | NASA | 02/25/2015 | 02/24/2018 | $371,932 | $77,000 |
| | | | | | **$2,906,472** | **$1,231,941** |

## Continuing Grants in FY15

| PI | Award Title | Sponsor | Project Start Date | Project End Date | Total Anticipated | Obligated to Date - Total |
|---|---|---|---|---|---|---|
| Bania, Thomas | Deep GLIMPSE: Exploring the Far Side of the Galaxy | JPL | 08/22/2011 | 09/30/2014 | $10,000 | $10,000 |
| Blanton, Elizabeth | Cluster And Group Environments Of Radio Galaxies | NSF | 08/01/2013 | 07/31/2016 | $459,314 | $307,194 |
| Blanton, Elizabeth | A Targeted, Distant (z>0.7) Cluster Survey, Using Bent, Double-Lobed Radio Sources | JPL | 08/19/2011 | 09/30/2014 | $67,060 | $67,060 |
| Brainerd, Tereasa | Theoretical Studies of Weak Gravitational Lensing | NASA | 02/15/2013 | 02/14/2016 | $297,225 | $257,225 |
| Clemens, Dan | Completing The Galactic Plane Infrared Polarization Survey (GPIPS) | NSF | 08/01/2009 | 07/31/2014 | $906,060 | $905,963 |
| Espaillat, Catherine | A Clearer View of Dust Evolution in Proplanetary Disks | JPL | 03/26/2014 | 09/30/2015 | $269,632 | $269,632 |
| Jackson, James | Herschel Dust Temperatures of High-Mass Star Forming Cores | NASA | 01/19/2012 | 01/18/2016 | $315,130 | $315,130 |
| Jackson, James | Malt 90: A Molecular Multi-Line Survey of High-Mass Star-Forming Cores | NSF | 08/15/2012 | 07/31/2015 | $499,270 | $499,270 |
| Jorstad, Svetlana | Probing the Most Compact Regions of Gamma-Ray Blazar Jets with Millimeter Wave Imaging | NASA | 09/01/2013 | 08/31/2015 | $59,999 | $59,999 |
| Jorstad, Svetlana | Multi-Frequency Observations of Flaring Gamma-Ray Blazars | NASA | 12/17/2013 | 12/16/2015 | $36,838 | $36,838 |
| Jorstad, Svetlana | Multi-Wavelength Observations of Blazar Flares | NASA | 05/20/2014 | 05/19/2015 | $29,993 | $29,993 |
| Jorstad, Svetlana | Gamma-ray Blazars in Quiescent vs. Active States | NASA | 05/20/2014 | 05/19/2015 | $29,982 | $29,982 |
| Marscher, Alan | Thermal Emission from Hot Dust as a Source of Seed Photons for Producing Gamma-rays in Blazars | NASA | 08/01/2011 | 07/31/2014 | $200,000 | $200,000 |
| Marscher, Alan | Continued Comprehensive Monitoring of Gamma-Ray Bright Blazars | NASA | 09/01/2011 | 08/31/2015 | $600,000 | $600,000 |
| Marscher, Alan | Tracking the Evolution of Multi-Waveband Outbursts in Fermi Blazars | NASA | 09/01/2012 | 08/31/2014 | $199,953 | $199,953 |
| Marscher, Alan | Turbulent Extreme Multi-Zone Model for Blazar Variability | NASA | 09/01/2012 | 08/31/2015 | $179,750 | $179,750 |
| Marscher, Alan | Optical and Millimeter Photo-polarimetry of Bright Gamma-ray Blazars | NASA | 09/01/2013 | 08/31/2014 | $19,994 | $19,994 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Marscher, Alan | Heart of Darkness: High-Resolution X-Ray Spectra of Outflows, ADAFs and Sgr A* | Smithsonian Astrophysical Observatory | 12/01/2012 | 11/30/2014 | $208,994 | $183,353 |
| Marscher, Alan | Testing the Wind-Jet Connection in a Balck Hole Transient | Smithsonian Astrophysical Observatory | 07/17/2013 | 01/18/2015 | $10,258 | $10,097 |
| Muirhead, Philip | Using Cassini Data on Saturn to Correctly Interpret Exoplanet Atmosphere Measurements | Massachusetts Institute Of Technology | 06/01/2014 | 08/31/2014 | $5,500 | $5,500 |
| West, Andrew | Using White Dwarf-M Dwarf Pairs to Probe the Magnetic Activity and Angular Momentum Evolution of Low-Mass Stars | NSF | 09/01/2011 | 08/31/2015 | $429,710 | $429,710 |
| West, Andrew | CAREER: Probing the Extremes of Star Formation: A Census of Very Low-Mass Stars and Brown Dwarfs in the Local Neighborhood | NSF | 09/01/2013 | 08/31/2018 | $783,585 | $397,583 |
| West, Andrew | Extracting Excellence from Traditionally Underrepresented Populations: Constraining the Formation Mechanism of Low-Mass Dwarfs and BU Pre-MaP | Research Corporation for Science Advancement | 07/01/2013 | 06/30/2016 | $70,000 | $70,000 |
| | | | | | **$5,688,247** | **$5,084,226** |

# List of Scientific Publications by IAR Members

**(IAR members when research was carried out are indicated in bold-face type)**

## Papers Published in Peer-Reviewed Scientific Journals

1) Anderson, L. D., **Bania, T**. **M**., Balser, Dana S., Cunningham, V., **Wenger, T. V.,** Johnstone, B. M., Armentrout, W. P., The WISE Catalog of Galactic H II Regions, *The Astrophysical Journal Supplement*, 212, 1, article id. 1, 18 pp., 2014.
2) Aleksić, J., (182 others), **Jorstad, S., Marscher, A**., (15 others), **Agudo, I.**, et al., MAGIC gamma-ray and multi-frequency observations of flat spectrum radio quasar PKS 1510-089 in early 2012, *Astronomy & Astrophysics*, 569, id.A46, 21 pp., 2014.
3) Andersson, B.-G., Piirola, V., De Buizer, J., **Clemens, D**. P., Uomoto, A., Charcos-Llorens, M., Geballe, T. R., Lazarian, A., Hoang, T., Vornanen, T., Evidence for H2 Formation Driven Dust Grain Alignment in IC 63, *The Astrophysical Journal*, 775, 2, article id. 84, 16 pp., 2013.
4) Bally, J., Rathborne, J. M., Longmore, S. N., **Jackson, J. M**.,Alves, J. F., Bressert, E., Contreras, Y., **Foster, J. B.,** Garay, G.,Ginsburg, A., Johnston, K. G., Kruijssen, J. M. D., Testi, L.,Walsh, A. J., Absorption Filaments toward the Massive Clump G0.253+0.016, *The Astrophysical Journal*, 795, 1, article id. 28, 19 pp., 2014.
5) Bardalez Gagliuffi, D. C., Burgasser, A. J., Gelino, C. R., Looper, D. L., Nicholls, C. P., Schmidt, S. J., Cruz, K., **West, A. A.** Gizis, J. E., Metchev, S., SpeX Spectroscopy of Unresolved Very Low Mass Binaries. II, Identification of 14 Candidate Binaries with Late-M/Early-L and T Dwarf Components, *The Astrophysical Journal*, 794, 2, article id. 143, 19 pp., 2014.
6) Biddle, L. I., …, **Taylor, B. W.**, et al., Warm ice giant GJ 3470b - II. Revised planetary and stellar parameters from optical to near-infrared transit photometry, *Monthly Notices of the Royal Astronomical Society*, 443, 2, p. 1810-1820, 2014.
7) Blasi, M. G., Lico, R., Giroletti, M., Orienti, M., Giovannini, G., Cotton, W., Edwards, P. G., Fuhrmann, L., Krichbaum, T. P., Kovalev, Y. Y., **Jorstad, S.**, **Marscher, A**., Kino, M., Paneque, D., Perez-Torres, M. A., Piner, B. G., Sokolovsky, K. V., The TeV blazar Markarian 421 at the highest spatial resolution, *Astronomy & Astrophysics*, 559, id.A75, 11 pp., 2013.
8) Bochanski, J. J., Willman, B., Caldwell, N., Sanderson, R., **West, A. A.** Strader, J., Brown, W., The Most Distant Stars in the Milky Way, *The Astrophysical Journal Letters*, 790, 1, article id. L5, 6 pp., 2014.
9) Bochanski, J. J., Willman, B., **West, A. A**., Strader, J., Chomiuk, L., Hunting the Most Distant Stars in the Milky Way: Methods and Initial Results, *The Astronomical Journal*, 147, 4, article id. 76, 13 pp., 2014.
10) Carnerero, M.I., …, **Jorstad, S.G.**, …, **Marscher, A.P.**, …, **Taylor, B. W.,** et al., Multiwavelength Behavior of the Blazar OJ 248 from Radio to Gamma-rays, *Monthly Notices of the Royal Astronomical Society*, 450, 3, p. 2677-2691, 2015.
11) **Cashman, L.** R., **Clemens, D. P.**, The Magnetic Field of Cloud 3 in L204, *The Astrophysical Journal*, 793, 2, article id. 126, 10 pp., 2014.

12) Cawthorne, T. V., **Jorstad, S. G.**, **Marscher, A. P.,** Polarization Structure in the Core of 1803+784: A Signature of Recollimation Shocks?, *The Astrophysical Journal*, 772, 1, article id. 14, 10 pp., 2013.

13) Chakravorty, S., Lee, J. C., **Neilsen, J**., The effects of thermodynamic stability on wind properties in different low-mass black hole binary states, *Monthly Notices of the Royal Astronomical Society*, 436, 1, p.560-569, 2013.

14) Clarke, T. E., Randall, S. W., Sarazin, C. L., **Blanton, E**. L., Giacintucci, S., Chandra View of the Ultra-steep Spectrum Radio Source in A2443: Merger Shock-induced Compression of Fossil Radio Plasma?, *The Astrophysical Journal*, 772, 2, article id. 84, 12 pp., 2013.

15) Clarke, T., Mroczkowski, T., Randall, S., Sarazin, C., Intema, H., Giacintucci, S., **Blanton, E**., A Wild Ride for Abell 2443: A High Impact Velocity Merger with a Shock, Cold Front, and Relic, *The X-ray Universe 2014*, edited by Jan-Uwe Ness. Online at http://xmm.esac.esa.int/external/xmm_science/workshops/2014symposium/, id.49, 2014.

16) Cody, A., Stauffer, J., Baglin, A., Micela, G., Rebull, L. M., Flaccomio, E., Morales-Calderón, M., Aigrain, S., Bouvier, J., Hillenbrand, L. A., Gutermuth, R., Song, I., Turner, N., Alencar, S. H. P., Zwintz, K., Plavchan, P.,Carpenter, J., Findeisen, K., Carey, S., Terebey, S., Hartmann, L., Calvet, N., Teixeira, P., Vrba, F. J., Wolk, S., Covey, K., Poppenhaeger, K., Günther, H. M., Forbrich, J., Whitney, B., Affer, L., Herbst, W., Hora, J., Barrado, D., Holtzman, J., Marchis, F., Wood, K., Medeiros G., Marcelo, L. B., Jorge, G., Ed, McQuillan, A., **Espaillat, C**., Allen, L., D'Alessio, P., Favata, F., CSI 2264: Simultaneous Optical and Infrared Light Curves of Young Disk-bearing Stars in NGC 2264 with CoRoT and Spitzer—Evidence for Multiple Origins of Variability, *The Astronomical Journal*, 147, 4, article id. 82, 47 pp., 2014.

17) Davidson, J. A., Li, Z.-Y., Hull, C. L. H., Plambeck, R. L., Kwon, W., Crutcher, R. M., Looney, L. W., Novak, G., Chapman, N. L., Matthews, B. C., **Stephens, I**. **W.,** Tobin, J. J., Jones, T. J., Testing Magnetic Field Models for the Class 0 Protostar L1527, *The Astrophysical Journal*, 797, 2, article id. 74, 18 pp., 2014.

18) Falgarone, E., Hily-Blant, P., Levrier, F., Berthet, M., Bastien, P., **Clemens, D**., Intense velocity-shears, magnetic fields and filaments in diffuse gas, *Highlights of Astronomy*, 16, pp. 388-388, 2015.

19) Fermo, R. L., **Opher, M**., Drake, J. F., Magnetic Reconnection in the Interior of Interplanetary Coronal Mass Ejections, *Physical Review Letters*, 113, 3, id.031101, 2014.

20) **Foster, J. B.,** Arce, H. G., Kassis, M., **Sanhueza, P., Jackson, J. M.**, **Finn, S. C.,** Offner, S., Sakai, T., Sakai, N., Yamamoto, S., Guzmán, A. E., Rathborne, J. M., Distributed Low-mass Star Formation in the IRDC G34.43+00.24, *The Astrophysical Journal*, 791, 2, article id. 108, 17 pp., 2014.

21) **Foster, J. B.,** Rathborne, J. M., **Sanhueza, P., Claysmith, C., Whitaker, J. S., Jackson, J**. **M.**, Mascoop, J. L., Wienen, M., Breen, S. L., Herpin, F., Duarte-Cabral, A., Csengeri, T., Contreras, Y., Indermuehle, B., Barnes, P. J., Walsh, A. J., Cunningham, M. R., Britton, T. R., Voronkov, M. A., Urquhart, J. S., Alves, J., Jordan, C. H., Hill, T., **Hoq, S.**, Brooks, K. J., Longmore, S. N., Characterisation of the MALT90 Survey and the Mopra Telescope at 90 GHz, *Publications of the Astronomical Society of Australia*, 30, id.e038, 25 pp, 2013.

22) Goodman, A. A., Alves, J., Beaumont, C. N.,Benjamin, R. A., Borkin, M. A., Burkert, A.,Dame, T. M., **Jackson, J.**, Kauffmann, J., Robitaille, T., Smith, R. J., The Bones of the Milky Way, *The Astrophysical Journal*, 797, 1, article id. 53, 13 pp., 2014.

23) Gunning, H. C., Schmidt, S. J., Davenport, J. R. A., Dhital, S., Hawley, S. L., **West, A. A.,** Hα Emission From Active Equal-Mass, Wide M Dwarf Binaries, *Publications of the Astronomical Society of the Pacific*, 126, 946, pp.1081-1091, 2014.

24) Hernández, J., Calvet, N., Perez, A., Briceño, C., Olguin, L., Contreras, M. E., Hartmann, L., Allen, L., **Espaillat, C.**, Hernan, R., A Spectroscopic Census in Young Stellar Regions: The σ Orionis Cluster, *The Astrophysical Journal*, 794, 1, article id. 36, 25 pp., 2014.

25) Hill, M. E., Decker, R. B., Brown, L. E., Drake, J. F., Hamilton, D. C., Krimigis, S. M., **Opher, M.**, Dependence of Energetic Ion and Electron Intensities on Proximity to the Magnetically Sectored Heliosheath: Voyager 1 and 2 Observations, *The Astrophysical Journal*, 781, 2, article id. 94, 6pp., 2014.

26) **Hoq, S.**, **Jackson, J. M**., **Foster, J. B., Sanhueza, P.**, Guzmán, A., **Whitaker, J. S., Claysmith, C.,** Rathborne, J. M., Vasyunina, T., Vasyunin, A., Chemical Evolution in High-mass Star-forming Regions: Results from the MALT90 Survey, *The Astrophysical Journal*, 777, 2, article id. 157, 15 pp., 2013.

27) Howard, A. W., Marcy, G. W., Fischer, D. A., Isaacson, H., **Muirhead, P. S.**, Henry, G. W., Boyajian, T. S., von Braun, K., Becker, J. C.,Wright, J. T., Johnson, J. A., The NASA-UC-UH ETA-Earth Program. IV. A Low-mass Planet Orbiting an M Dwarf 3.6 PC from Earth, *The Astrophysical Journal*, 794, 1, article id. 51, 9 pp., 2014.

28) Hull, C. L. H., Plambeck, R. L., Kwon, W., Bower, G. C., Carpenter, J. M., Crutcher, R. M., Fiege, J. D., Franzmann, E., Hakobian, N. S., Heiles, C., Houde, M., Hughes, A. Meredith, L., James W., Looney, L. W., Marrone, D. P., Matthews, B. C., Pillai, T., Pound, M. W., Rahman, N., Sandell, G., **Stephens, I. W.**, Tobin, J. J., Vaillancourt, J. E., Volgenau, N. H., Wright, M. C. H., TADPOL: A 1.3 mm Survey of Dust Polarization in Star-forming Cores and Regions, *The Astrophysical Journal Supplement*, 213, 1, article id. 13, 48 pp., 2014.

29) **Ingleby, L.**, Calvet, N., Hernández, J., Hartmann, L., Briceno, C., Miller, J., **Espaillat, C.**, McClure, M., The Evolution of Accretion in Young Stellar Objects: Strong Accretors at 3-10 Myr, *The Astrophysical Journal*, 790, 1, article id. 47, 15 pp., 2014.

30) **Ingleby, L.**, **Espaillat, C.**, Calvet, N., Sitko, M., Russell, R., Champney, E., Using FUV to IR Variability to Probe the Star-Disk Connection in the Transitional Disk of GM Aur, *The Astrophysical Journal*, 805, 2, article id. 149, 8 pp., 2015.

31) **Jackson, J. M**., Rathborne, J. M., **Foster, J. B., Whitaker, J. S., Sanhueza, P., Claysmith, C.**, Mascoop, J. L., Wienen, M., Breen, S. L., Herpin, F., Duarte-Cabral, A., Csengeri, T., Longmore, S. N., Contreras, Y., Indermuehle, B., Barnes, P. J., Walsh, A. J., Cunningham, M. R., Brooks, K. J., Britton, T. R., Voronkov, M. A., Urquhart, J. S., Alves, J., Jordan, C. H., Hill, T., **Hoq, S.**, Finn, S. C.,Bains, I., Bontemps, S., Bronfman, L., Caswell, J. L., Deharveng, L., Ellingsen, S. P., Fuller, G. A., Garay, G., Green, J. A., Hindson, L., Jones, P. A., Lenfestey, C., Lo, N., Lowe, V., Mardones, D., Menten, K. M., Minier, V., Morgan, L. K., Motte, F., Muller, E., Peretto, N., Purcell, C. R., Schilke, P., Bontemps, Schneider-N., Schuller, F., Titmarsh, A., Wyrowski, F., Zavagno, A., MALT90: The Millimetre Astronomy Legacy Team 90 GHz Survey, *Publications of the Astronomical Society of Australia*, 30, id.e057, 13 pp., 2013.

32) **Janes, K.**, Barnes, S. A., Meibom, S., **Hoq, S.**, Open Clusters in the Kepler Field. II. NGC 6866, *The Astronomical Journal*, 147, article no. 139, 5 pp., 2014.

33) Jones, C., Dickey, J. M., Dawson, J. R., McClure-Griffiths, N. M., Anderson, L. D., **Bania, T**. **M**., H I Absorption toward H II Regions at Small Galactic Longitudes, *The Astrophysical Journal*, 774, 2, article id. 117, 18 pp., 2013.

34) Jordan, C. H., Walsh, A. J., Lowe, V., Voronkov, M. A., Ellingsen, S. P., Breen, S. L., Purcell, C. R., Barnes, P. J., Burton, M. G., Cunningham, M. R., Hill, T., **Jackson, J. M.**, Longmore, S. N., Peretto, N., Urquhart, J. S., MALT-45: a 7 mm survey of the southern Galaxy - I. Techniques and spectral line data, *Monthly Notices of the Royal Astronomical Society*, 448, 3, p.2344-2361, 2015.

35) **Jorstad, S. G.**, **Marscher, A. P.,** Smith, P. S., Larionov, V. M., **Agudo, I.**, Gurwell, M., Wehrle, A. E., Lähteenmäki, A., Nikolashvili, M. G., Schmidt, G. D., Arkharov, A. A., Blinov, D. A., Blumenthal, K., Casadio, C., Chigladze, R. A., Efimova, N. V., Eggen, J. R., Gómez, J. L., Grupe, D., Hagen-Thorn, V. A., Joshi, M., Kimeridze, G. N., Konstantinova, T. S., Kopatskaya, E. N., Kurtanidze, O. M., Kurtanidze, S. O., Larionova, E. G., Larionova, L. V., Sigua, L. A., **Macdonald, N.** R., Maune, J. D., McHardy, I. M., Miller, H. Richard, M., Sol N., Morozova, D. A., Scott, T., Taylor, B. W., Tornikoski, M., Troitsky, I. S., Thum, C., Walker, G., Williamson, K. E., Sallum, S., Consiglio, S., Strelnitski, V., A Tight Connection between Gamma-Ray Outbursts and Parsec-scale Jet Activity in the Quasar 3C 454.3, *The Astrophysical Journal*, 773, 2, article id. 147, 27 pp., 2013.

36) **Joshi, M.**, **Marscher, A. P.,** Böttcher, M., Seed Photon Fields of Blazars in the Internal Shock Scenario, *The Astrophysical Journal*, 785, 2, article id. 132, 18 pp., 2014.

37) **Kay, C.**, dos Santos, L. F. G., **Opher, M**., Constraining the Masses and the Non-radial Drag Coefficient of a Solar Coronal Mass Ejection, *The Astrophysical Journal Letters*, 801, 2, article id. L21, 6 pp., 2015.

38) **Kay, C.**, **Opher, M**., Evans, R. M., Forecasting a Coronal Mass Ejection's Altered Trajectory: ForeCAT, *The Astrophysical Journal*, 775, 1, article id. 5, 17pp., 2013.

39) **Kay, C.**, **Opher, M**., Evans, R. M., Global Trends of CME Deflections Based on CME and Solar Parameters, *The Astrophysical Journal*, 805, 2, article id. 168, 20 pp., 2014.

40) Keane, J. T., Pascucci, I., **Espaillat, C**., Woitke, P., Andrews, S., Kamp, I., Thi, W.-F., Meeus, G., Dent, W. R. F., Herschel Evidence for Disk Flattening or Gas Depletion in Transitional Disks, *The Astrophysical Journal*, 787, 2, article id. 153, 24 pp., 2014.

41) Knutson, H. A., Fulton, B. J., Montet, B. T., Kao, M., Ngo, H., Howard, A. W., Crepp, J. R., Hinkley, S., Bakos, G. Á., Batygin, K., Johnson, J. A., Morton, T. D., **Muirhead, P. S**., Friends of Hot Jupiters, A Radial Velocity Search for Massive, Long-period Companions to Close-in Gas Giant Planets, *The Astrophysical Journal*, 785, 2, article id. 126, 23 pp., 2014.

42) Kozarev, K. A., Evans, R. M., Schwadron, N. A., Dayeh, M. A., **Opher, M**., Korreck, K. E., van der Holst, B., Global Numerical Modeling of Energetic Proton Acceleration in a Coronal Mass Ejection Traveling through the Solar Corona, *The Astrophysical Journal*, 778, 1, article id. 43, 13 pp., 2013.

43) Lico, R., Giroletti, M., Orienti, M., Gómez, J. L., Casadio, C.,D'Ammando, F., Blasi, M. G., Cotton, W., Edwards, P. G.,Fuhrmann, L., **Jorstad, S.,** Kino, M., Kovalev, Y. Y.,Krichbaum, T. P., **Marscher, A. P.,** Paneque, D., Piner, B. G.,Sokolovsky, K. V.,, Very Long Baseline polarimetry and the γ-ray connection in Markarian 421 during the broadband campaign in 2011*, Astronomy & Astrophysics*, 571, id.A54, 13 pp., 2014.

44) Lohfink, A. M., Reynolds, C. S., **Jorstad, S. G.**, **Marscher, A. P.,** Miller, Eric D., Aller, H., Aller, M. F., Brenneman, L. W., Fabian, A. C., Miller, J. M., Mushotzky, R. F., Nowak, M. A., Tombesi, F., An X-Ray View of the Jet Cycle in the Radio-loud AGN 3C120, *The Astrophysical Journal*, 772, 2, article id. 83, 13 pp., 2013.

45) Lu, R., Fish, V. L., Akiyama, K., Doeleman, S. S., Algaba, J. C., Bower, G. C., Brinkerink, C., Chamberlin, R., Crew, G., Cappallo, R. J.,Dexter, M., Freund, R., Friberg, P., Gurwell, M. A., Ho, P. T. P., Honma, M., Inoue, M., **Jorstad, S. G.**, Krichbaum, T. P., Loinard, L., MacMahon, D., Marrone, D. P., **Marscher, A. P.,** Moran, J. M., Plambeck, R., Pradel, N., Primiani, R., Tilanus, R. P. J., Titus, M., Weintroub, J., Wright, M., Young, K. H., Ziurys, L. M., Fine-scale Structure of the Quasar 3C 279 Measured with 1.3 mm Very Long Baseline Interferometry, *The Astrophysical Journal*, 772, 1, article id. 13, 10 pp., 2013.

46) **Macdonald, N. R.**, **Marscher, A. P., Jorstad, S. G., Joshi, M.**, Through the Ring of Fire: Gamma-Ray Variability in Blazars by a Moving Plasmoid Passing a Local Source of Seed Photons, *The Astrophysical Journal*, 804, 2, article id. 111, 11 pp., 2015.

47) **Marscher, A. P**., Turbulent, Extreme Multi-zone Model for Simulating Flux and Polarization Variability in Blazars, *The Astrophysical Journal*, 780, 1, article id. 87, 10 pp., 2014.

48) McClure, M. K., D'Alessio, P., Calvet, N., **Espaillat, C**.,Hartmann, L., Sargent, B., Watson, D. M., **Ingleby, L**., Hernández, J., Curved Walls: Grain Growth, Settling, and Composition Patterns in T Tauri Disk Dust Sublimation Fronts, *The Astrophysical Journal*, 775, 2, article id. 114, 11 pp., 2013.

49) McClure, M. K., D'Alessio, P., Calvet, N., **Espaillat, C**.,Hartmann, L., Sargent, B., Watson, D. M., **Ingleby, L**., Hernández, J., Curved Walls: Grain Growth, Settling, and Composition Patterns in T Tauri Disk Dust Sublimation Fronts, *The Astrophysical Journal*, 775, 2, article id. 114, 11 pp., 2013.

50) Meibom, S., Torres, G., Fressin, F., Latham, D. W., Rowe, J. F., Ciardi, D. R., Bryson, S. T., Rogers, L. A., Henze, C. E., **Janes, K.**, Barnes, S. A., Marcy, G. W., Isaacson, H., Fischer, D. A., Howell, S. B., Horch, E. P., Jenkins, J. M., Sxchuler, S. C., Crepp, J., The same frequency of planets inside and outside open clusters of stars, *Nature*, 499, 55-58, 2013.

51) **Michael, A. T**., **Opher, M**., Provornikova, E., Richardson, J. D., Tóth, G., Magnetic Flux Conservation in the Heliosheath Including Solar Cycle Variations of Magnetic Field Intensity, *The Astrophysical Journal Letters*, 803, 1, article id. L6, 5 pp., 2015.

52) Montet, B. T., Johnson, J. A., **Muirhead, P. S.**, Villar, A., Vassallo, C., Baranec, C., Law, N. M., Riddle, R., Marcy, G. W., Howard, A. W., Isaacson, H., Characterizing the Cool KOIs. VII. Refined Physical Properties of the Transiting Brown Dwarf LHS 6343 C, *The Astrophysical Journal*, 800, 2, article id. 134, 11 pp., 2015.

53) **Montgomery, J. D.**, **Clemens, D**. **P**., Near-infrared Polarimetry of the Edge-on Galaxy NGC 891, The *Astrophysical Journal*, 786, 1, article id. 41, 10 pp., 2014.

54) Morozova, D. A., Larionov, V. M., Troitsky, I. S., **Jorstad, S. G., Marscher, A. P.,** Gómez, J. L., Blinov, D. A., Efimova, N. V.,Hagen-Thorn, V. A., Hagen-Thorn, E. I., Joshi, M.,Konstantinova, T. S., Kopatskaya, E. N., Larionova, L. V.,Larionova, E. G., Lähteenmäki, A., Tammi, J., Rastorgueva-Foi, E., McHardy, I., Tornikoski, M., **Agudo, I.**, Casadio, C.,Molina, S. N., Volvach, A. E., Volvach, L. N., The Outburst of the Blazar S4 0954+658 in 2011 March-April, *The Astronomical Journal*, 148, 3, article id. 42, 9pp., 2014.

55) **Muirhead, P. S.**, Becker, J., Feiden, G. A., Rojas-Ayala, B., Vanderburg, A., Price, E. M.,Thorp, R., Law, N. M., Riddle, R., Baranec, C., Hamren, K., Schlawin, E., Covey, K. R., Johnson, J. A., Lloyd, J. P., Characterizing the Cool KOIs. VI. H- and K-band Spectra of Kepler M Dwarf Planet-candidate Hosts, *The Astrophysical Journal Supplement*, 213, 1, article id. 5, 12 pp., 2014.

56) **Muirhead, P. S.**, **Mann, A. W.**, Vanderburg, A., Morton, T. D., Kraus, A., Ireland, M., Swift, J. J., Feiden, G. A., Gaidos, E.,Gazak, J. Z., Kepler-445, Kepler-446 and the Occurrence of Compact Multiples Orbiting Mid-M Dwarf Stars, *The Astrophysical Journal*, 801, 1, article id. 18, 15 pp., 2015.

57) **Neilsen, J**. The case for massive, evolving winds in black hole X-ray binaries. *Advances in Space Research*, 52, 4, p. 732-739, 2013.

58) **Neilsen, J.**, Coriat, M., Fender, R., Lee, J. C., Ponti, G., Tzioumis, A. K., Edwards, P. G., Broderick, J. W., A Link between X-Ray Emission Lines and Radio Jets in 4U 1630-47?, *The Astrophysical Journal Letters*, 784, 1, article id. L5, 6 pp., 2014.

59) **Neilsen, J**., Nowak, M. A., Gammie, C., Dexter, J., Markoff, S., Haggard, D., Nayakshin, S., Wang, Q. D., Grosso, N., Porquet, D., Tomsick, J. A., Degenaar, N., Fragile, P. C., Houck, J. C., Wijnands, R., Miller, J. M.,Baganoff, F. K., A Chandra/HETGS Census of X-Ray Variability from Sgr A* during 2012, *The Astrophysical Journal*, 774, 1, article id. 42, 14 pp., 2013.

60) Ngo, H., Knutson, H. A., Hinkley, S., Crepp, J. R., Bechter, E. B., Batygin, K.,Howard, A. W., Johnson, J. A., Morton, T. D., **Muirhead, P. S.**, Friends of Hot Jupiters. II. No Correspondence between Hot-jupiter Spin-Orbit Misalignment and the Incidence of Directly Imaged Stellar Companions, *The*

*Astrophysical Journal*, 800, 2, article id. 138, 22 pp., 2015.

61) **Opher, M**., Drake, J. F., On the Rotation of the Magnetic Field Across the Heliopause, *The Astrophysical Journal Letters*, 778, 2, article id. L26, 6 pp., 2013.

62) **Opher, M**., Drake, J. F., Zieger, B., Gombosi, T. I., Magnetized Jets Driven By the Sun: the Structure of the Heliosphere Revisited, *The Astrophysical Journal Letters*, 800, 2, article id. L28, 7 pp., 2015.

63) **Opher, M**., **Prested, C.**, McComas, D. J., Schwadron, N. A., Drake, J. F., Probing the Nature of the Heliosheath with the Neutral Atom Spectra Measured by IBEX in the Voyager 1 Direction, *The Astrophysical Journal Letters*, 776, 2, article id. L32, 5 pp., 2013.

64) Pahari, M., **Neilsen, J**., Yadav, J. S., Misra, R., Uttley, P. Comparison of Time/Phase Lags in the Hard State and Plateau State of GRS 1915+105, *The Astrophysical Journal*, 778, 2, article id. 136, 8 pp., 2013.

65) **Paterno-Mahler, R.**, **Blanton, E**. L., Randall, S. W., Clarke, T. E., American Astronomical Society, AAS Meeting #223, #431.02. *The Astrophysical Journal*, 773, 2, article id. 114, 13 pp., 2013.

66) **Paterno-Mahler, R.**, Randall, S. W., Bulbul, E., Andrade-Santos, F., **Blanton, E. L.,** Jones, C., Murray, S., Johnson, R., Merger Signatures in the Galaxy Cluster A98, *The Astrophysical Journal*, 791, 2, article id. 104, 17 pp., 2014.

67) **Pavel, M. D.**, Marchwinski, R. C., **Clemens, D. P**., The resolved magnetic fields of the quiescent cloud GRSMC 45.60+0.30, *Highlights of Astronomy*, 16, pp. 615-615, 2015.

68) Person, M. J., …, **Taylor, B.**, et al. The 2011 June 23 Stellar Occultation By Pluto: Airborne And Ground Observations, *The Astronomical Journal*, 146, 4, article id. 83, 15 pp., 2013.

69) Pineda, J. S., **West, A. A**., Bochanski, J. J., Burgasser, A. J., The Sloan Digital Sky Survey Data Release 7 Spectroscopic M Dwarf Catalog. III. The Spatial Dependence of Magnetic Activity in the Galaxy*, The Astronomical Journal*, 146, 3, article id. 50, 11 pp., 2013.

70) Plambeck, R. L., Bower, G. C., Rao, Ramprasad, Marrone, D. P., **Jorstad, S. G., Marscher, A. P.,** Doeleman, S. S., Fish, V. L., Johnson, M. D., Probing the Parsec-scale Accretion Flow of 3C 84 with Millimeter Wavelength Polarimetry, *The Astrophysical Journal*, 797, 1, article id. 66, 6 pp., 2014.

71) **Provornikova, E.**, **Opher, M**., Izmodenov, V. V., Richardson, J. D., Toth, G., Plasma Flows in the Heliosheath along the Voyager 1 and 2 Trajectories due to Effects of the 11 yr Solar Cycle, *The Astrophysical Journal*, 794, 1, article id. 29, 9 pp., 2014.

72) **Provornikova, E.,** Richardson, J., **Opher, M**., Toth, G., Izmodenov, V., Study of solar cycle effects in the heliosheath in the model based on SWAN/SOHO and IPS data at 1 AU, 40th COSPAR Scientific Assembly, Held 2-10 August 2014, in Moscow, Russia, Abstract D1.1-21-14, 2014.

73) Raiteri, C. M., Villata, M., D'Ammando, F., Larionov, V. M., Gurwell, M. A., Mirzaqulov, D. O., Smith, P. S., Acosta-Pulido, J. A., **Agudo, I.**, Arévalo, M. J., Bachev, R., Benítez, E., Berdyugin, A., Blinov, D. A., Borman, G. A., Böttcher, M., Bozhilov, V., Carnerero, M. I., Carosati, D., Casadio, C., Chen, W. P., Doroshenko, V. T., Efimov, Yu. S., Efimova, N. V., Ehgamberdiev, Sh. A., Gómez, J. L., González-Morales, P. A., Hiriart, D., Ibryamov, S., Jadhav, Y., **Jorstad, S. G.**, Joshi, M., Kadenius, V., Klimanov, S. A., Kohli, M., Konstantinova, T. S., Kopatskaya, E. N., Koptelova, E., Kimeridze, G., Kurtanidze, O. M., Larionova, E. G., Larionova, L. V., Ligustri, R., Lindfors, E., **Marscher, A. P.,** McBreen, B., McHardy, I. M., Metodieva, Y., Molina, S. N., Morozova, D. A., Nazarov, S. V., Nikolashvili, M. G., Nilsson, K., Okhmat, D. N., Ovcharov, E., Panwar, N., Pasanen, M.,Peneva, S., Phipps, J., Pulatova, N. G., Reinthal, R., Ros, J. A., Sadun, A. C., Schwartz, R. D., Semkov, E., Sergeev, S. G., Sigua, L. A., Sillanpää, A., Smith, N., Stoyanov, K., Strigachev, A., Takalo, L. O., Taylor, B., Thum, C., Troitsky, I. S., Valcheva, A., Wehrle, A. E., Wiesemeyer, H., The awakening of BL Lacertae: observations by Fermi, Swift and the GASP-WEBT, *Monthly Notices of the Royal*

*Astronomical Society*, 436, 2, p.1530-1545, 2013.

74) Ramakrishnan, Venkatessh, León-Tavares, Jonathan,Rastorgueva-Foi, Elizaveta A., Wiik, Kaj, **Jorstad, Svetlana G., Marscher, A. P.,** Tornikoski, M., **Agudo, I.**, Lähteenmäki, A., Valtaoja, E., Aller, M.F.,Blinov, D.A., Casadio, C., Efimova, N.V.,Gurwell, M.A., Gómez, J.L., Hagen-Thorn, V.A., **Joshi, M.,** Järvelä, E., Konstantinova, T.S., Kopatskaya, E.N., Larionov, V.M., Larionova, E.G., Larionova, L.V., Lavonen, N., **MacDonald, N.R.,** McHardy, I.M., Molina, S.N., Morozova, D.A., Nieppola, E., Tammi, .,Taylor, B.W., Troitsky, I.S., The connection between the parsec-scale radio jet and γ-ray flares in the blazar 1156+295, *Monthly Notices of the Royal Astronomical Society*, 445, 2, p.1636-1646, 2014.

75) Randall, S. W., Nulsen, P. E. J., Jones, C., Forman, W. R.,Bulbul, E., Clarke, T. E., Kraft, R., **Blanton, E. L**., David, L.,Werner, N., Sun, M., Donahue, M., Giacintucci, S.,Simionescu, A., A Very Deep Chandra Observation of the Galaxy Group NGC 5813: AGN Shocks, Feedback, and Outburst History, *The Astrophysical Journal*, 805, 2, article id. 112, 17 pp., 2015.

76) Rani, B., Krichbaum, T. P., **Marscher, A. P., Jorstad, S. G.,**Hodgson, J. A., Fuhrmann, L., Zensus, J. A., Jet outflow and gamma-ray emission correlations in S5 0716+714, *Astronomy & Astrophysics*, 571, id.L2, 5 pp., 2014.

77) Rappaport, S., Swift, J., Levine, A., Joss, M., Sanchis-Ojeda, R., Barclay, T., Still, M., Handler, G., Oláh, K., **Muirhead, P**. **S**., Huber, D., Vida, K., M-dwarf Rapid Rotators and the Detection of Relatively Young Multiple M-Star Systems, *The Astrophysical Journal*, 788, 2, article id. 114, 15 pp., 2014.

78) Rathborne, J. M., Longmore, S. N., **Jackson, J. M**., Alves, J. F.,Bally, J., Bastian, N., Contreras, Y., Foster, J. B., Garay, G.,Kruijssen, J. M. D., Testi, L., Walsh, A. J., A Cluster in the Making: ALMA Reveals the Initial Conditions for High-mass Cluster Formation, *The Astrophysical Journal*, 802, 2, article id. 125, 20 pp., 2015.

79) Rathborne, J. M., Longmore, S. N., **Jackson, J**. **M**., **Foster, J. B**., Contreras, Y., Garay, G., Testi, L., Alves, J. F., Bally, J., Bastian, N., Kruijssen, J. M. D., Bressert, E., G0.253+0.016: A Centrally Condensed, High-mass Protocluster, *The Astrophysical Journal*, 786, 2, article id. 140, 14 pp., 2014.

80) Rathborne, J. M., Longmore, S. N., **Jackson, J**. **M**.,Kruijssen, J. M. D., Alves, J. F., Bally, J., Bastian, N.,Contreras, Y., **Foster, J. B.,** Garay, G., Testi, L., Walsh, A. J., Turbulence Sets the Initial Conditions for Star Formation in High-pressure Environments, *The Astrophysical Journal Letters*, 795, 2, article id. L25, 6 pp., 2014.

81) Rioja, M. J., Dodson, R., Jung, T., Sohn, B. W., Byun, D., **Agudo, I.**, Cho, S., Lee, S., Kim, J., Kim, K.,Oh, C. S., Han, S., Je, D., Chung, M., Wi, S., Kang, J., Lee, J., Chung, H., Ryoung Kim, H., Kim, H., Lee, C., Roh, D., Oh, S., Yeom, J., Song, M., Kang, Y., Verification of the Astrometric Performance of the Korean VLBI Network, Using Comparative SFPR Studies with the VLBA at 14/7 mm, *The Astronomical Journal*, 148, 5, article id. 84, 15pp., 2014.

82) Sakai, T., Sakai, N., Furuya, K., Aikawa, Y., Hirota, T., **Foster, J. B., Sanhueza, P., Jackson, J. M.**, Yamamoto, S., ALMA Observations of the IRDC Clump G34.43+00.24 MM3: DNC/HNC Ratio*, The Astrophysical Journal*, 803, 2, article id. 70, 9pp., 2015.

83) Sakai, T.akeshi, Sakai, N.ami, **Foster, J. B., Sanhueza, P., Jackson, J. M**., Kassis, M., Furuya, K., Aikawa, Y., Hirota, T., Yamamoto, S., ALMA Observations of the IRDC Clump G34.43+00.24 MM3: Hot Core and Molecular Outflows, *The Astrophysical Journal Letters*, 775, 1, article id. L31, 6 pp., 2013.

84) **Sanhueza, P., Jackson, J. M**., **Foster, J. B.,** Jimenez-Serra, I., Dirienzo, W. J., Pillai, T. Distinct Chemical Regions in the "Prestellar" Infrared Dark Cloud G028.23-00.19, *The Astrophysical Journal*, 773, 2, article id. 123, 14 pp., 2013.

85) **Savcheva, A. S.**, **West, A. A.,** Bochanski, J. J., A New Sample of Cool Subdwarfs from SDSS: Properties and Kinematics, *The Astrophysical Journal*, 794, 2, article id. 145, 20 pp., 2014.

86) Schaefer, G. H., Brummelaar, T. Ten, Gies, D. R.,Farrington, C. D., Kloppenborg, B., Chesneau, O., Monnier, J. D.,Ridgway, S. T., Scott, N., Tallon-Bosc, I., McAlister, H. A.,Boyajian, T., Maestro, V., Mourard, D., Meilland, A., Nardetto, N.,Stee, P., Sturmann, J., Vargas, N., Baron, F., Ireland, M.,Baines, E. K., Che, X., Jones, J., Richardson, N. D.,Roettenbacher, R. M., Sturmann, L., Turner, N. H., Tuthill, P.,van Belle, G., von Braun, K., Zavala, R. T., Banerjee, D. P. K.,Ashok, N. M., Joshi, V., Becker, J., **Muirhead, P. S**., The expanding fireball of Nova Delphini 2013, *Nature*, 515, 7526, pp. 234-236, 2014.

87) Schmidt, S. J., Hawley, S. L., **West, A. A.** Bochanski, J. J., Davenport, J. R. A., Ge, J., Schneider, D. P., BOSS Ultracool Dwarfs. I. Colors and Magnetic Activity of M and L Dwarfs, *The Astronomical Journal*, 149, 5, article id. 158, 21 pp., 2015.

88) Schmidt, S. J., **West, A. A.** Bochanski, J. J., Hawley, S. L., Kielty, C., Calibrating Ultracool Dwarfs: Optical Template Spectra, Bolometric Corrections, and χ Values, *Publications of the Astronomical Society of the Pacific*, 126, 941, pp.642-659, 2014.

89) Segura-Cox, D. M., Looney, L. W., **Stephens, I. W.**, Fernández-López, M., Kwon, W., Tobin, J. J., Li, Z., Crutcher, R., The Magnetic Field in the Class 0 Protostellar Disk of L1527, *The Astrophysical Journal Letters*, 798, 1, article id. L2, 6 pp., 2015.

90) **Stephens, I. W**., Evans, J. M., Xue, R., Chu, Y., Gruendl, R. A., Segura-Cox, D. M., Spitzer Observations of Dust Emission from H II Regions in the Large Magellanic Cloud, *The Astrophysical Journal*, 784, 2, article id. 147, 19 pp., 2014.

91) **Stephens, I. W., Jackson, J. M., Sanhueza, P., Whitaker, J. S., Hoq, S.**, Rathborne, J. M., **Foster, J. B.**, Interferometric Observations of High-Mass Star-Forming Clumps With Unusual N2H+/HCO+ Line Ratios, *The Astrophysical Journal*, 802, 1, article id. 6, 19pp., 2015.

92) Sullivan, P. W., **Croll, B**., Simcoe, R. A., Precision of a Low-Cost InGaAs Detector for Near Infrared Photometry, *Publications of the Astronomical Society of the Pacific*, 125, 931, pp.1021-1030, 2013.

93) Swift, J. J., Bottom, M., Johnson, J. A.,Wright, J. T., McCrady, N., Wittenmyer, R. A.,Plavchan, P., Riddle, R., **Muirhead, P. S.**, Herzig, E., Myles, J., Blake, C. H., Eastman, J., Beatty, T. G., Lin, B., Zhao, M., Gardner, P., Falco, E., Criswell, S., Nava, C., **Robinson, C.**, Sliski, D. H., Hedrick, R., Ivarsen, K., Hjelstrom, A., de Vera, J., Szentgyorgyi, A., Miniature Exoplanet Radial Velocity Array (MINERVA) I. Design, Commissioning, and First Science Results. *J. Astron. Telesc. Instrum. Syst.,* 1(2), 027002, 2014.

94) Swisdak, M., Drake, J. F., **Opher, M**., A Porous, Layered Heliopause, *The Astrophysical Journal Letters*, 774, 1, article id. L8, 5 pp., 2013.

95) **Theissen, C.** A., **West, A. A.,** Warm Dust around Cool Stars: Field M Dwarfs with WISE 12 or 22 μm Excess Emission, *The Astrophysical Journal*, 794, 2, article id. 146, 28 pp., 2014.

96) Thorstensen, J. R., Taylor, C. J., Peters, C. S., **Skinner, J. N.**, Southworth, J., Gänsicke, B. T., Spectroscopic Orbital Periods for 29 Cataclysmic Variables from the Sloan Digital Sky Survey, *The Astronomical Journal*, 149, 4, article id. 128, 20 pp., 2015.

97) Torres, G., Kipping, D. M., Fressin, F., Caldwell, D. A., Twicken, J. D., Ballard, S., Batalha, N. M., Bryson, S. T., Ciardi, D. R.,Henze, C. E., Howell, S. B., Isaacson, H. T., Jenkins, J. M., **Muirhead, P. S.**, Newton, E. R., Petigura, E. A., Barclay, T., Borucki, W. J.,Crepp, J. R., Everett, M. E., Horch, E. P.,Howard, A. W., Kolbl, R., Marcy, G. W., McCauliff, S., Quintana, E. V., Validation of 12 Small Kepler Transiting Planets in the Habitable Zone, The Astrophysical Journal, 800, 2, article id. 99, 24 pp. ,2015.

98) Vidotto, A. A., Jardine, M., Morin, J., Donati, J. F., **Opher, M**., Gombosi, T. I., M-dwarf stellar

winds: the effects of realistic magnetic geometry on rotational evolution and planets, *Monthly Notices of the Royal Astronomical Society*, 438, 2, p.1162-1175, 2014.

99) Walker, D. L., Longmore, S. N., Bastian, N., Kruijssen, J. M. D.,Rathborne, J. M., **Jackson, J. M**., **Foster, J. B.,** Contreras, Y., Tracing the conversion of gas into stars in Young Massive Cluster Progenitors, *Monthly Notices of the Royal Astronomical Society*, 449, 1, p.715-725, 2015.

100) Wang, Q. D., Nowak, M. A., Markoff, S. B., Baganoff, F. K., Nayakshin, S., Yuan, F., Cuadra, J., Davis, J., Dexter, J., Fabian, A. C., Grosso, N., Haggard, D., Houck, J., Ji, L., Li, Z., **Neilsen, J**., Porquet, D., Ripple, F., Shcherbakov, R. V., Dissecting X-ray-Emitting Gas Around the Center of Our Galaxy, *Science*, 341, 6149, pp. 981-983, 2013.

101) **Williamson, K. E., Jorstad, S. G., Marscher, A. P.,** Larionov, V. M., Smith, P. S., **Agudo, I.,** Arkharov, A. A., Blinov, D. A., Casadio, C., Efimova, N. V., Gómez, J. L., Hagen-Thorn, V. A., **Joshi, M.**, Konstantinova, T. S., Kopatskaya, E. N., Larionova, E. G.,Larionova, L. V., **Malmrose, M. P.**, McHardy, I. M., Molina, S. N., Morozova, D. A., Schmidt, G. D., Taylor, B. W., Troitsky, I. S., Comprehensive Monitoring of Gamma-Ray Bright Blazars. I. Statistical Study of Optical, X-Ray, and Gamma-Ray Spectral Slopes*, The Astrophysical Journal*, 789, 2, article id. 135, 20 pp., 2014.

102) Yanagida, T., Sakai, T., Hirota, T., Sakai, N., **Foster, J. B., Sanhueza, P., Jackson, J. M**., Furuya, K., Aikawa, Y., Yamamoto, S., ALMA Observations of the IRDC Clump G34.43+00.24 MM3: 278 GHz Class I Methanol Masers, *The Astrophysical Journal Letters*, 794, 1, article id. L10, 6 pp., 2014.

103) Yi, Z., Luo, A., Song, Y., Zhao, J., Shi, Z., Wei, P., Ren, J., Wang, F., Kong, X., Li, Y., Du, P., Hou, W., Guo, Y., Zhang, S., Zhao, Y., Sun, S., Pan, J., Zhang, L., **West, A. A**., Yuan, H., M Dwarf Catalog of the LAMOST Pilot Survey, *The Astronomical Journal*, 147, 2, article id. 33, 11 pp., 2014.

104) Zhao, M., O'Rourke, J. G., Wright, J. T., Knutson, H. A., Burrows, A., Fortney, J., Ngo, H., Fulton, B. J., Baranec, C., Riddle, R., Law, N. M., **Muirhead, P. S.**, Hinkley, S., Showman, A. P., Curtis, J., Burruss, R., Characterization of the Atmosphere of the Hot Jupiter HAT-P-32Ab and the M-dwarf Companion HAT-P-32B, *The Astrophysical Journal*, 796, 2, article id. 115, 15 pp., 2014.

## Papers Published in Proceedings of Conferences

1) Acosta Pulido, J. A., Pereyra, A., **Agudo, I.**, Agulli, I., Carnerero, M., Castro Segura, N., Gómez, J. L., **Jorstad, S.**, **Marscher, A**. Near infrared polarimetry of a sample of blazars. The Innermost Regions of Relativistic Jets and Their Magnetic Fields, Granada, Spain, Edited by José L. Gómez, EPJ Web of Conferences, 61, id.06007 (2013).
2) **Blanton, E. L.**, **Paterno-Mahler, R.**, Wing, J. D., Ashby, M. L. N., **Golden-Marx, E.**, Brodwin, M., Douglass, E. M., Randall, S. W., Clarke, T. E., Extragalactic jets as probes of distant clusters of galaxies and the clusters occupied by bent radio AGN (COBRA) survey, Extragalactic jets from every angle, *Proceedings of the International Astronomical Union*, IAU Symposium, 313, pp. 315-320, 2015.
3) Clarke, T., Mroczkowski, T., Randall, S., Sarazin, C., Intema, H., Giacintucci, S., **Blanton, E**., A Wild Ride for Abell 2443: A High Impact Velocity Merger with a Shock, Cold Front, and Relic, *The X-ray Universe 2014*, edited by Jan-Uwe Ness. Online at http://xmm.esac.esa.int/external/xmm_science/workshops/2014symposium/, id.49, 2014.
4) Contreras, Y., Rathborne, J., **Jackson, J**., **Foster, J.**, Longmore, S., MALT90 Team, MALT90: tracing the chemistry and kinematics of molecular clumps within the central molecular zone, *Proceedings of the International Astronomical Union*, 303, pp. 182-184, 2014.
5) de Caneva, G., Barres de Almeida, U., Lindfors, E., Saito, K., Schultz, C., Sitarek, J., Tavecchio, F., Lucarelli, F., Pittori, C., Vercellone, S., Verrecchia, F., Buson, S., D'Ammando, F., Hayashida, M., Lahteenmaki, A., Tornikoski, M., Hovatta, T., Mundell, C., Steele, I., Nilsson, K., **Marscher, A**., **Jorstad, S.,** The FSRQs 3c 279 and PKS 1510-089: Magic Latest Results and Multiwavelength Observations, *International Journal of Modern Physics: Conference Series*, 28, id. 1460176, 2014.
6) **Espaillat, C**., A Herschel View of Dust Evolution in Protoplanetary Disks. Exploring the Formation and Evolution of Planetary Systems, *Proceedings of the International Astronomical Union*, IAU Symposium, 299, pp. 140-144, 2014.
7) **Espaillat, C**., Muzerolle, J., Najita, J., Andrews, S., Zhu, Z., Calvet, N., Kraus, S., Hashimoto, J., Kraus, A., D'Alessio, P., An Observational Perspective of Transitional Disks, *Protostars and Planets VI*, Henrik Beuther, Ralf S. Klessen, Cornelis P. Dullemond, and Thomas Henning (eds.), University of Arizona Press, Tucson, 914 pp., p.497-520, 2014.
8) Evans, R. M., **Opher, M**., Van Der Holst, B., Coronal Mass Ejection Plasma Heating by Alfven Wave Dissipation, *American Astronomical Society*, SPD meeting #44, #104.01, 2013.
9) Gaensler, B. M., **Agudo, I.**, Akahori, T., Banfield, J., Beck, R., Carretti, E., Farnes, J., Haverkorn, M., Heald, G., Jones, D., Landecker, T., Mao, S., Norris, R., O'Sullivan, S., Rudnick, L., Schnitzeler, D., Seymour, N., Sun, X., Broadband Polarimetry with the Square Kilometre Array: A Unique Astrophysical Probe, Proceedings of Advancing Astrophysics with the Square Kilometre Array (AASKA14), 9 -13 June, 2014, Giardini Naxos, Italy. Online at http://pos.sissa.it/cgi-bin/reader/conf.cgi?confid=215, id.103, 2015.
10) Giroletti, M., Orienti, M., D'Ammando, F., Massaro, F., G. Tosti for the Fermi-LAT collaboration, Lico, R., Giovannini, G., **Agudo, I.**, Alberdi, A., Bignall, H., Pandey-Pommier, M., Wolter, A., The connection between radio and high energy emission in black hole powered systems in the SKA era, Proceedings of Advancing Astrophysics with the Square Kilometre Array (AASKA14), 9 -13 June, 2014, Giardini Naxos, Italy, Online at http://pos.sissa.it/cgi-bin/reader/conf.cgi?confid=215, id.153, 2015.
11) Hernández, J., Perez, A., Briceño, C., Calvet, N., Hartmann, L., Mauco, K., Contreras, M., Olguin, L., **Espaillat, C**., Diversity of protoplanetary disks in stellar clusters: The Sigma Orionis Cluster, XIV Latin American Regional IAU Meeting (Eds. A. Mateus, J. Gregorio-Hetem & R. Cid Fernandes),

*Revista Mexicana de Astronomía y Astrofísica (Serie de Conferencias)*, 44, pp. 29-29, 2014.

12) Hodgson, J., Krichbaum, T. P., **Marscher, A**., **Jorstad, S.**, Marti-Vidal, I., Lindqvist, M., Bremer, M., Sanchez, S., de Vicente, P., Zensus, A. J., 5 year Global 3-mm VLBI survey of Gamma-ray active blazars, Proceedings of the 12th European VLBI Network Symposium and Users Meeting (EVN 2014), 7-10 October 2014, Cagliari, Italy. Online at http://pos.sissa.it/cgi-bin/reader/conf.cgi?confid=230, id.28, 2014.
13) **Jorstad, S. G., Marscher, A. P.,** Morozova, D. A., **Bala, V., Agudo, I.**, Gómez, J. L., Lähteenmäki, A., Larionov, V. M., Smith, P. S., Tornikoski, M., The jet of the quasar 4C+21.35 from parsec to kiloparsec scales and its role in high energy photon production. Extragalactic jets from every angle, *Proceedings of the International Astronomical Union*, IAU Symposium, 313, pp. 33-38, 2015.
14) **Jorstad, S.**, **Marscher, A**., Larionov, V., Gómez, J. L., **Agudo, I.**, Angelakis, E., Casadio, C., Gurwell, M., Hovatta, T., Joshi, M., Fuhrmann, L., Karamanavis, V., Lähteenmäki, A., Molina, S., Morozova, D., Myserlis, I., Troitsky, I., Ungerechts, H., Zensus, J. A., The Gamma-ray Activity of the high-z Quasar 0836+71, *The Innermost Regions of Relativistic Jets and Their Magnetic Fields*, Granada, Spain, Edited by José L. Gómez, EPJ Web of Conferences, 61, id.04003, 2013.
15) **Jorstad, S.**, **Marscher, A**., Larionov, V., Gómez, J. L., **Agudo, I.**, Angelakis, E., Casadio, C., Gurwell, M., Hovatta, T., Joshi, M., Fuhrmann, L., Karamanavis, V.,Lähteenmäki, A., Molina, S., Morozova, D., Myserlis, I., Troitsky, I., Ungerechts, H., Zensus, J. A., The Gamma-ray Activity of the high-z Quasar 0836+71, *The Innermost Regions of Relativistic Jets and Their Magnetic Fields*, Granada, Spain, Edited by José L. Gómez, EPJ Web of Conferences, 61, id.04003, 2013.
16) **Joshi, M.**, **Marscher, A**., Böttcher, M., Constraining the location of gamma-ray emission in blazar jets. High-energy emission in Blazars, *The Innermost Regions of Relativistic Jets and Their Magnetic Fields*, Granada, Spain, Edited by José L. Gómez, EPJ Web of Conferences, 61, id.05004, 2013.
17) Kiehlmann, S., Savolainen, T., **Jorstad, S. G.**, Sokolovsky, K. V., Schinzel, F. K., **Agudo, I.**, Arkharov, A. A., Benítez, E., Berdyugin, A., Blinov, D. A., Bochkarev, N. G., Borman, G. A., Burenkov, A. N., Casadio, C., Doroshenko, V. T., Efimova, N. V., Fukazawa, Y., Gómez, J. L., Hagen-Thorn, V. A., Heidt, J., Hiriart, D., Itoh, R., Joshi, M., Kimeridze, G. N., Konstantinova, T. S., Kopatskaya, E. N., Korobtsev, I. V., Kovalev, Y. Y., Krajci, T., Kurtanidze, O., Kurtanidze, S. O., Larionov, V. M., Larionova, E. G., Larionova, L. V., Lindfors, E., López, E., **Marscher, A. P.,** McHardy, I. M., Molina, S. N., Morozova, D. A., Nazarov, S. V., Nikolashvili, M. G., Nilsson, K., Pulatova, N. G., Reinthal, R., Sadun, A., Sergeev, S. G.,Sigua, L. A., Sorcia, M., Spiridonova, O. I., Takalo, L. O., Taylor, B., Troitsky, I. S., Ugolkova, L. S., Zensus, J. A., Zhdanova, V. E., Analyzing polarization swings in 3C 279, *The Innermost Regions of Relativistic Jets and Their Magnetic Fields*, Granada, Spain, Edited by José L. Gómez, EPJ Web of Conferences, 61, id.06003, 2013.
18) Kiehlmann, S., Savolainen, T., **Jorstad, S. G.**, Sokolovsky, K. V., Schinzel, F. K., **Agudo, I.**, Arkharov, A. A., Benítez, E., Berdyugin, A., Blinov, D. A., Bochkarev, N. G., Borman, G. A., Burenkov, A. N., Casadio, C., Doroshenko, V. T., Efimova, N. V., Fukazawa, Y., Gómez, J. L., Hagen-Thorn, V. A., Heidt, J., Hiriart, D., Itoh, R., Joshi, M., Kimeridze, G. N., Konstantinova, T. S., Kopatskaya, E. N., Korobtsev, I. V., Kovalev, Y. Y., Krajci, T., Kurtanidze, O., Kurtanidze, S. O., Larionov, V. M., Larionova, E. G., Larionova, L. V., Lindfors, E., López, E., **Marscher, A. P.,** McHardy, I. M., Molina, S. N., Morozova, D. A., Nazarov, S. V., Nikolashvili, M. G., Nilsson, K., Pulatova, N. G., Reinthal, R., Sadun, A., Sergeev, S. G.,Sigua, L. A., Sorcia, M., Spiridonova, O. I., Takalo, L. O., Taylor, B., Troitsky, I. S., Ugolkova, L. S., Zensus, J. A., Zhdanova, V. E., Analyzing polarization swings in 3C 279, *The Innermost Regions of Relativistic Jets and Their Magnetic Fields*, Granada, Spain, Edited by José L. Gómez, EPJ Web of Conferences, 61, id.06003, 2013.

19) Larionov, V. M., Blinov, D. A., **Jorstad, S. G.**, **Marscher, A. P.,** Villata, M., Raiteri, C. M., **Agudo, I.**, Smith, P. S., Morozova, D. A., Troitsky, I. S., **Clemens, D. P**., Prominent outburst of the blazar CTA 102 in 2012, *The Innermost Regions of Relativistic Jets and Their Magnetic Fields*, Granada, Spain, Edited by José L. Gómez, EPJ Web of Conferences, 61, id.04019, 2013.

20) Lico, R., Casadio, C., Gómez, J. L., Giroletti, M., Orienti, M., Giovannini, G., Blasi, M. G., Cotton, W., Edwards, P. G., Fuhrmann, L., **Jorstad, S.**, Kino, M., Kovalev, Y. Y., Krichbaum, T. P., **Marscher, A**., Paneque, D., Perez-Torres, M. A., Piner, G., Sokolovsky, K. V., Very Long Baseline Polarimetric monitoring at 15 GHz of the TeV blazar Markarian 421, *The Innermost Regions of Relativistic Jets and Their Magnetic Fields*, Granada, Spain, Edited by José L. Gómez, EPJ Web of Conferences, 61, id.07004, 2013,.

21) Lico, R., Giroletti, M., Orienti, M., Gómez, J. L., Casadio, C., D'Ammando, F., Cotton, W. D., Edwards, P., Fuhrmann, L., **Jorstad, S.**, Kino, M., Kovalev, Y., Krichbaum, T. P., **Marscher, A**., Paneque, D., Sokolovsky, K., Piner, B. G., Blasi, M. G., Very Long Baseline Polarimetry and the Gamma-ray connection in Markarian 421 during the broadband campaign in 2011, Proceedings of the 12th European VLBI Network Symposium and Users Meeting (EVN 2014), 7-10 October 2014, Cagliari, Italy, Online at http://pos.sissa.it/cgi-bin/reader/conf.cgi?confid=230, id.25, 2014.

22) **Marscher, A. P**. The Innermost Regions of Relativistic Jets: Wrapping Up the Enigma, *The Innermost Regions of Relativistic Jets and Their Magnetic Fields*, Granada, Spain, Edited by José L. Gómez, EPJ Web of Conferences, 61, id.09001, 2013.

23) **Marscher, A**. **P**., Multi-waveband Behavior of Blazars. *The Innermost Regions of Relativistic Jets and Their Magnetic Fields*, Granada, Spain, Edited by José L. Gómez, EPJ Web of Conferences, 61, id.04001, 2013.

24) **Marscher, A. P.**, Time-variable linear polarization as a probe of the physical conditions in the compact jets of blazars. Extragalactic jets from every angle, *Proceedings of the International Astronomical Union*, IAU Symposium, 313, pp. 122-127, 2015.

25) Morozova, D. A., **Jorstad, S. G.**, **Marscher, A. P.,** Larionov, V. M., Troitskiy, I. S., Blinov, D. A., **Agudo, I.**, Smith, P. S., Multiwavelength Observations of 6 BL Lac Objects in 2008-2012, *The Innermost Regions of Relativistic Jets and Their Magnetic Fields*, Granada, Spain, Edited by José L. Gómez, EPJ Web of Conferences, 61, id.04018, 2013.

26) **Neilsen, J**., Nowak, M. A., Gammie, C., Dexter, J., Markoff, S., Haggard, D., Nayakshin, S., Wang, Q. D., Grosso, N., Porquet, D., Tomsick, J. A., Degenaar, N., Fragile, P. C., Houck, J. C., Wijnands, R., Miller, J. M.,Baganoff, F. K., The 3 Ms Chandra campaign on Sgr A*: a census of X-ray flaring activity from the Galactic center, *Proceedings of the International Astronomical Union*, 303, pp. 374-378, 2014.

27) Nishikawa, K.-I., Hardee, P., Mizuno, Y., Duțan, I., Zhang, B., Medvedev, M., Choi, E. J., Min, K. W., Niemiec, J., Nordlund, Å., Frederiksen, J., Sol, H., Pohl, M., Hartmann, D. H., **Marscher, A**., Gómez, J. L., Radiation from accelerated particles in relativistic jets with shocks, shear-flow, and reconnection, *The Innermost Regions of Relativistic Jets and Their Magnetic Fields*, Granada, Spain, Edited by José L. Gómez, EPJ Web of Conferences, 61, id.02003, 2013.

28) Ramakrishnan, V., Leon-Tavares, J., Rastorgueva-Foi, E.,Wiik, K., **Jorstad, S.**, **Marscher, A**., Tornikoski, M., **Agudo, I.**, Lahteenmaki, A., Valtaoja, E., Aller, M. F., Blinov, D. A., Casadio, C., Efimova, N. V., Gurwell, M. A., Gómez, J. L., Hagen-Thorn, V. A., **Joshi, M**., Järvelä, E., Konstantinova, T. S., Kopatskaya, E. N., Larionov, V. M., Larionova, E. G., Larionova, L. V., Lavonen, N., **Macdonald, N.** R., McHardy, I., Molina, S. N., Morozova, D. A., Nieppola, E., Tammi, J., Taylor, B. W., Troitsky, I. S., Connection between parsec-scale radio jet and gamma-ray flares in the blazar 1156+295, Proceedings of the 12th European VLBI Network Symposium and Users Meeting (EVN 2014), 7-10 October 2014, Cagliari, Italy, Online at http://pos.sissa.it/cgi-

bin/reader/conf.cgi?confid=230, id.15 , 2014.

29) Randall, S. W., Nulsen, P. E. J., Jones, C., Forman, W. R., Clarke, T. E., **Blanton, E. L**., Unraveling AGN feedback and ICM physics with deep Chandra X-ray observations of the galaxy group NGC 5813. Extragalactic jets from every angle*, Proceedings of the International Astronomical Union*, IAU Symposium, 313, pp. 277-282, 2015.

30) Rani, B., Krichbaum, T. P., **Marscher, A**., **Jorstad, S.**, Hodgson, J., Fuhrmann, L., Zensus, A. J., Perplexing correlations between Gamma-ray emission and parsec-scale jet orientation variations in the BL Lac object S5 0716+714, Proceedings of the 12th European VLBI Network Symposium and Users Meeting (EVN 2014), 7-10 October 2014, Cagliari, Italy, Online at http://pos.sissa.it/cgi-bin/reader/conf.cgi?confid=230, id.120, 2014.

31) Rojas-Ayala, B., Boisse, I., **Muirhead, P. S.**, Binks, A., Dittmann, J. A., Donati, J., Fleming, S. W., Lesage, A., Morin, J., Raetz, S., Portraying the Hosts: Stellar Science From Planet Searches, 18th Cambridge Workshop on Cool Stars, Stellar Systems, and the Sun, *Proceedings of the conference held at Lowell Observatory*, 8-14 June, 2014. Edited by G. van Belle and H.C. Harris., pp.39-58, 2015.

32) **Sanhueza, P., Jackson, J**. **M**., **Foster, J. B**., Chemistry and the ``Prestellar'' Nature of the IRDC G028.23-00.19. New Trends in Radio Astronomy in the ALMA Era: The 30th Anniversary of Nobeyama Radio Observatory, Proceedings of a Symposium held in Hakone, Japan 3-8 December 2012. *ASP Conference Series*, 476, San Francisco: Astronomical Society of the Pacific, p.337, 2013.

33) Troitskiy, I. S., Morozova, D. A., **Jorstad, S. G.,** Larionov, V. M., **Marscher, A. P., Agudo, I.**, Blinov, D. A., Smith, P. S., Multiwavelength Observations of 6 FSRQ in 2008-2012, Multiwavelength AGN Surveys and Studies, Proceedings of the International Astronomical Union, IAU Symposium, 304, pp. 249-251, 2014.

34) Troitskiy, I. S., Morozova, D. A., **Jorstad, S. G.**, **Marscher, A. P.,** Larionov, V. M., Blinov, D. A., **Agudo, I.**, Smith, P. S., Multiwavelength polarization observations of the γ-ray bright quasar PKS 0420-014, *The Innermost Regions of Relativistic Jets and Their Magnetic Fields*, Granada, Spain, Edited by José L. Gómez, EPJ Web of Conferences, 61, id.07008, 2013.

35) Vidotto, A. A., **Opher, M**., Jatenco-Pereira, V., Gombosi, T. I., Interactions between exoplanets and the winds of young stars, *Physics at the Magnetospheric Boundary*, Geneva, Switzerland, Edited by E. Bozzo, P. Kretschmar, M. Audard, M. Falanga, C. Ferrigno, EPJ Web of Conferences, 64, id.04006, 2014.

36) **West, A. A**. Weisenburger, K. L., Irwin, J., Charbonneau, D., Dittmann, J., Berta-Thompson, Z. K., Age, Activity and Rotation in Mid and Late-Type M Dwarfs from MEarth, Magnetic Fields throughout Stellar Evolution*, Proceedings of the International Astronomical Union*, IAU Symposium, 302, pp. 176-179, 2014.

## Abstracts of Papers and Posters Presented at Meetings

1) **Blanton, E**., Deep Chandra Observations of Feedback and Sloshing in Clusters of Galaxies, 15 Years of Science with Chandra, Talks from the Chandra Science Symposium held 18-21 November, 2014 in Boston, MA., id.2, 2014.

2) Aller, M. F., Hughes, P. A., Aller, H. D., Hovatta, T., **Jorstad, S. G., Marscher, A. P.,** Ramakrishnan, V., The Role of Multiple Shocks in the Production of GeV Gamma-ray Flaring in the Blazar 1156+295, American Astronomical Society, AAS Meeting #224, #221.09, 2014.

3) Balser, D. S., Anderson, L. D., **Bania, T. M.**, Wenger, T., The GBT HII Region Discovery Survey: Galactic Structure, American Astronomical Society, AAS Meeting #225, #142.12, 2015.

4) Bhatta, G., Ostrwoski, M., Stawarz, L., Zola, S., Jableka, D., Bachev, R., Benitez, E., Dhalla, S. M.,Cason, A., Carosati, D., Damljanovic, G., Frasca, A.,Hu, S. M., **Jorstad, S. G.,** Kurtanidze, O., Larionov, V., Leto, G., **Marscher, A. P.,** Moody, J., Ohlert, J., Rizzi, N., Sadun, A. C.,**Sasada, M.**, Sergeev, S., Strigachev, A., Vince, O.,Webb, J. R., Whole Earth Blazar Telescope. 5-day photo-polarimetric WEBT Campaign on Blazar S5 0716+714 - a Study of Microvariabiltiy in Blazar, American Astronomical Society, AAS Meeting #225, #120.04, 2015.

5) **Blanton, E. L.**, **Paterno-Mahler, R.**, Wing, J., Ashby, M., Brodwin, M., A Targeted, Distant Galaxy Cluster Survey Using Bent, Double-Lobed Radio Sources, American Astronomical Society, AAS Meeting #224,#206.05, 2014.

6) **Blumenthal, K., Brainerd, T. G.**, Multiple Deflections in Galaxy-Galaxy Lensing, American Astronomical Society, AAS Meeting #223, #245.02, 2014.

7) Bochanski, J. J., Willman, B., Caldwell, N., Sanderson, R. E., **West, A. A.** Strader, J., Brown, W. R., Fritz, T., Kallivayalil, N., Hunting the Most Distant Stars in the Milky Way, American Astronomical Society, AAS Meeting #225, #342.19, 2015.

8) Bottom, M., **Muirhead, P. S.**, Swift, J. J., Zhao, M., Gardner, P., Plavchan, P. P., Riddle, R. L., Herzig, E., Johnson, J. A., Wright, J. T., McCrady, N., Wittenmyer, R. A., Design, motivation, and on-sky tests of an efficient fiber coupling unit for 1-meter class telescopes, *Proceedings of the SPIE*, 9147, id. 91472E 7, 2014.

9) **Brainerd, T**. Orientations of Bright Galaxies within their Dark Matter Halos. Probes of Dark Matter on Galaxy Scales, AAS Topical Conference Series Vol. 1, Proceedings of the conference held 14-19 July 2013 in Monterey, *CA, Bulletin of the American Astronomical Society*, 45, #7, #201.01, 2013.

10) **Brainerd, T**., **Wenger, T., Agustsson, I.** Cosmic Magnification in the Sloan Digital Sky Survey. Probes of Dark Matter on Galaxy Scales, AAS Topical Conference Series Vol. 1, Proceedings of the conference held 14-19 July 2013 in Monterey, *CA, Bulletin of the American Astronomical Society*, 45, #7, #303.06, 2013.

11) Briceño, C., Calvet, N., Anderson, K., Ali, B., D'Alessio, P., McClure, M., Hernández, J., **Espaillat, C**., **Ingleby, L**., Hartmann, L., Megeath, T., Stutz, A. Herschel PACS photometry of 4-10 Myr old T Tauri stars in the Orion OB1b association. *Protostars and Planets VI*, Heidelberg, July 15-20, 2013, Poster #2B046, 2013.

12) Briceño, C., Calvet, N., Anderson, K., Ali, B., D'Alessio, P., McClure, M., Hernández, J., **Espaillat, C**., **Ingleby, L**., Hartmann, L., Megeath, T., Stutz, A., Herschel PACS photometry of 4-10 Myr old T Tauri stars in the Orion OB1b association, *Protostars and Planets VI*, Heidelberg, July 15-20, 2013, Poster #2B046, 2013.

13) **Clemens, D. P**., **Cashman, L.**, **Hoq, S.**, **Montgomery, J.**, **Pavel, M. D.**, The Galactic Plane Infrared Polarization Survey (GPIPS): Final Calibration and Full Data Release, American Astronomical Society, AAS Meeting #224, #220.06, 2014.

14) **Dalba, P.** A., **Muirhead, P. S.**, Hedman, M. M., Fortney, J. J., Nicholson, P. D., Modeling Exoplanet Transmission Spectra with Solar System Objects, American Astronomical Society, AAS Meeting #224, #122.12, 2014.

15) Dhital, S., **West, A**. A., Stassun, K. G., Law, N. M., Massey, A. P., Probing Binary Formation Theories with the Largest Catalog of Ultra-wide, Low-mass Binaries, *Protostars and Planets VI*, Heidelberg, July 15-20, 2013, Poster #1K078, 2013.

16) Eastman, J. D., Swift, J., Beatty, T. G., Bottom, M., Johnson, J., Wright, J., McCrady, N., Wittenmyer, R. A., Riddle, R. L., Plavchan, P., **Muirhead, P. S.**, Blake, C., Zhao, M., Photometric commissioning results from MINERVA, American Astronomical Society, AAS Meeting #225, #337.09, 2015.

17) Evans, R. M., **Savcheva, A. S.**, Zink, J. L., Muglach, K., Kozarev, K. A., **Opher, M**., van der Holst, B., The Interaction of Solar Eruptions and Large-Scale Coronal Structures Revealed Through Modeling and Observational Analysis, American Geophysical Union, Fall Meeting 2014, abstract #SH11D-05,

2014.

18) Favia, A., **West, A. A**., A Sample of Fast Moving M Dwarfs in the Milky Way, American Astronomical Society, AAS Meeting #224, #322.14, 2014.
19) Feiden, G. A., **Mann, A. W.**, Gaidos, E., Confronting predictions of stellar evolution theory: the case of single field M dwarf stars, American Astronomical Society, AAS Meeting #225, #112.07, 2015.
20) Fermo, R. L., **Opher, M**., Drake, J. F., Magnetic Reconnection in Interplanetary Coronal Mass Ejection, American Geophysical Union, Fall Meeting 2014, abstract #SH22A-02, 2014.
21) **Foord, A.**, **Jorstad, S. G.**, **Marscher, A**. **P**., Outburst in the Gamma-ray Bright Quasar CTA26, American Astronomical Society, AAS Meeting #223, #250.10, 2014.
22) **Foster, J.,** Rathborne, J., **Jackson, J**., Longmore, S., **Whitaker, S., Hoq, S.** The Millimeter Astronomy Legacy Team 90 GHz Survey (MALT90) and ALMA. New Trends in Radio Astronomy in the ALMA Era: The 30th Anniversary of Nobeyama Radio Observatory, Proceedings of a Symposium held in Hakone, Japan 3-8 December 2012, *ASP Conference Series*, 476. San Francisco: Astronomical Society of the Pacific, p.127, 2013.
23) **Golden-Marx, E.**, **Blanton, E. L.**, **Paterno-Mahler, R.**, **Wing, J.,** Ashby, M., Brodwin, M., Optical Follow-Up Observations for the High-z COBRA (Clusters Occupied by Bent Radio AGN) Survey, American Astronomical Society, AAS Meeting #225, #252.21, 2015.
24) Grant, S., Calvet, N., Megeath, S. T., Fischer, W. J., Kim, K., Ali, B., **Ingleby, L.**, McClure, M., Hsu, W., Briceno, C., Herschel Observations of Protoplanetary Disks in Lynds 1641: Far IR Constraints on the Dust Distribution, American Astronomical Society, AAS Meeting #225, #449.10, 2015.
25) Green, P. J., Anderson, S. F., Morganson, E., Eracleous, M., Shen, Y., Brandt, W. N., Ruan, J. J., Schmidt, S. J., Badenes, C., **West, A. A.,** The Time Domain Spectroscopic Survey: Spectroscopic Variability Investigations Within SDSS-IV/eBOSS, American Astronomical Society, AAS Meeting #225, #433.02, 2015.
26) Haggard, D., Baganoff, F. K., Ponti, G., Heinke, C. O., Yusef-Zadeh, F., Roberts, D. A., Cotton, W. D., Gillessen, S., Genzel, R., Markoff, S., Nowak, M., **Neilsen, J**., Schulz, N. S., Rea, N., Sensitive X-ray and Radio Monitoring of the Sgr A*/G2 Encounter, American Astronomical Society, AAS Meeting #223, #238.03, 2014.
27) **Harrison, B.**, **Brainerd, T. G.**, Simulations of Galaxy-Galaxy Lensing by SDSS Galaxies, American Astronomical Society, AAS Meeting #225, #255.04, 2015.
28) Hernández, J., Pérez, A., Calvet, N., Olguin, L., Contreras, M E., Briceño, C., Allen, L., **Espaillat, C**. A Spectroscopic Census of the young sigma Orionis cluster, *Protostars and Planets VI*, Heidelberg, July 15-20, 2013. Poster #1K082, 2013.
29) **Hoq, S.**, **Clemens, D. P.**, High-Mass Star Formation in IRDCs: The Role of Magnetic Fields, American Astronomical Society, AAS Meeting #224, #220.08, 2014.
30) **Jorstad, S. G., Marscher, A. P., Macdonald, N. R.**, **Bala, V.,** Three Gamma-ray Active Periods in the Quasar PKS1510-089 and their Connection with the Parsec Scale Jet Behavior, American Astronomical Society, AAS Meeting #224, #221.08, 2014.
31) **Kay, C.**, dos Santos, L. F. G., **Opher, M**., ForeCAT: Using CME Deflections to Constrain their Mass and the Drag, American Geophysical Union, Fall Meeting 2014, abstract #SH43B-4210, 2014.
32) **Kay, C.**, **Opher, M**., Do all CMEs deflect to the background magnetic minimum by 4Rs?, 40th COSPAR Scientific Assembly, Held 2-10 August 2014, in Moscow, Russia, Abstract E2.1-17-14, 2014.
33) **Kay, C.**, **Opher, M.**, Do all CMEs deflect to the background magnetic minimum by 4Rs?, American Astronomical Society, AAS Meeting #224, #303.05, 2014.
34) **Kay, C.**, **Opher, M.**, Implications of CME Deflections on the Habitability of Planets Around M Dwarfs, American Astronomical Society, AAS Meeting #224, #120.24, 2014.

35) **Kraemer, K. E.**, Sloan, G. C, **Clemens, D. P.**, Lagadec, E., Barry, D. J, Goes, C. W., Stellar Variability in the M2 and M3 Globular Clusters, American Astronomical Society, AAS Meeting #224, #223.11, 2014.
36) Kraus, S., Ireland, M., Sitko, M., Monnier, J., Calvet, N., **Espaillat, C**., Grady, C., Harries, T., Hoenig, S., Russell, R., Kim, D., Swearing, J., Werren, C., Wilner, D., Resolving the gap and AU-scale asymmetries in pre-transitional disks with multi-wavelength interferometry. *Protostars and Planets VI*, Heidelberg, July 15-20, 2013, Poster #2B051, 2013.
37) **Macdonald, N. R.**, **Marscher, A. P., Jorstad, S. G., Joshi, M.**, Through the Ring of Fire: A Study of the Origin of Orphan Gamma-ray Flares in Blazars, American Astronomical Society, AAS Meeting #224, #410.02, 2014.
38) **Malmrose, M.** P., **Marscher, A. P., Jorstad, S. G.,** The NIR to UV Spectral Energy Distributions of Gamma-Ray Bright Blazars, American Astronomical Society, AAS Meeting #225, #204.02, 2015.
39) **Malmrose, M.** P., **Marscher, A. P., Jorstad, S. G.**, The Interplay of the NIR to UV Spectral Energy Distributions of Gamma-Ray Bright Blazars, American Astronomical Society, AAS Meeting #224, #221.14, 2014.
40) **Marscher, A. P., Jorstad, S. G.,** Larionov, V. M., **Agudo, I.**, Smith, P. S., Time-variable Linear Polarization as a Probe of the Compact Jets of Blazars, American Astronomical Society, AAS Meeting #224, #221.19, 2014.
41) Massey, A. P., Dhital, S., **West, A. A.** Stassun, K. The Baryon Oscillation Spectroscopic Survey SLoWPoKES Catalog. American Astronomical Society, AAS Meeting #225, #138.09, 2015.
42) McCrady, N., Johnson, J., Wright, J., Wittenmyer, R. A., Blake, C., Swift, J., Eastman, J. D., Plavchan, P., Riddle, R. L., **Muirhead, P.S .**, Bottom, M., Zhao, M.,Beatty, T. G., MINERVA: A Dedicated Observatory for Detection of Nearby Low-Mass Exoplanets, American Astronomical Society, AAS Meeting #225, #258.25 , 2015.
43) **Michael, A.**, **Opher, M**., Provornikova, E., Toth, G., Magnetic Dissipation Effects on the Flows within the Heliosheath, American Geophysical Union, Fall Meeting 2014, abstract #SH11B-4041, 2014.
44) Montet, Benjamin, Johnson, J. A., **Muirhead, P**. **S**., Shporer, A., Howard, A., Baranec, C., Albert, L., Robo-AO Collaboration, LHS 6343: Precise Constraints on the Mass and Radius of a Transiting Brown Dwarf Discovered by Kepler, American Astronomical Society, AAS Meeting #223, #334.03, 2014.
45) **Montgomery, J.**, **Clemens, D. P**., K-band Polarimetry of NGC 891, American Astronomical Society, AAS Meeting #224, #222.04, 2014.
46) **Morgan, D. P., West, A. A.,** Examining Flare Rates in Close M Dwarf + White Dwarf Binary Pairs, American Astronomical Society, AAS Meeting #224, #322.12, 2014.
47) **Morgan, D. P., West, A. A.,** Becker, A. C. Examining Flare Rates in Close M dwarf + White Dwarf binary pairs. American Astronomical Society, AAS Meeting #225, #229.02, 2015.
48) **Morgan, D. P., West, A. A**., Dhital, S., Garcés, A., Catalán, S., Quantifying an Age-Activity Relation using Wide White Dwarf - M Dwarf Binary Pairs, American Astronomical Society, AAS Meeting #223, #441.14, 2014.
49) Mroczkowski, T., Clarke, T. E., Randall, S. W., Sarazin, C. L., **Blanton, E**. **L**., Giacintucci, S., Intema, H., ZuHone, J. A., X-ray and Radio Results for Abell 2443, a Sloshing Galaxy Cluster Hosting an Ultra-Steep Spectrum Radio Source, American Astronomical Society, AAS Meeting #223, #431.02, 2014.
50) **Muirhead, P**. **S**. Planets Orbiting M Dwarf Stars: The Most Characterizable Terrestrial Exoplanets are also the Most Abundant, American Astronomical Society, DPS meeting #45, #307.01, 2013.
51) **Muirhead, P. S.**, **Hall, Z. J., Veyette, M. J.,** HiJaK: the high-resolution J, H and K spectrometer, *Proceedings of the SPIE*, 9147, id. 91477T 20 pp., 2014.

52) **Muirhead, P. S.**, **Mann, A. W.**, Vanderburg, A., Morton, T. D., Kraus, A. L., Ireland, M. J., Swift, J. J., Feiden, G. A., Gaidos, E., Gazak, J. Z., The Occurrence of Compact Multiple Exoplanetary Systems Orbiting Mid-M Dwarf Stars, American Astronomical Society, AAS Meeting #225, #420.02, 2015.
53) **Neilsen, J.**, The 3 megasecond Chandra campaign on Sgr A*: a census of x-ray flaring activity from the galactic center, 40th COSPAR Scientific Assembly, Held 2-10 August 2014, in Moscow, Russia, Abstract E1.2-1-14, 2014.
54) **Neilsen, J.**, Coriat, M., Fender, R., Lee, J. C., Ponti, G., Tzioumis, A., Edwards, P., Broderick, J., A Link Between X-ray Emission Lines and Radio Jets in 4U 1630-47?, American Astronomical Society, AAS Meeting #224, #204.05, 2014.
55) Ngo, H., Knutson, H. A., Hinkley, S., Crepp, J. R., Batygin, K., Howard, A. W., Johnson, J. A., Morton, T. D., **Muirhead, P. S**., Cold Friends of Hot Jupiters: AO Survey. American Astronomical Society, DPS meeting #45, #113.01, 2013.
56) Ngo, H., Knutson, H. A., Hinkley, S., Crepp, J. R., Bechter, E. B., Batygin, K., Howard, A. W., Johnson, J. A., Morton, T. D., **Muirhead, P. S**., Friends of hot Jupiters II: No correspondence between hot Jupiter spin-orbit misalignment and the incidence of directly imaged stellar companions, American Astronomical Society, AAS Meeting #225, #420.05, 2015.
57) **Opher, M**., Drake, J. F., Zieger, B., Gombosi, T. I., Global Field Orientation Across the Heliopause As a Result of Regions of Reconnection, American Geophysical Union, Fall Meeting 2014, abstract #SH11B-4043, 2014.
58) **Opher, M**., Drake, J., On the Rotation the Interstellar Magnetic Field Ahead of the Heliopause, 40th COSPAR Scientific Assembly, Held 2-10 August 2014, in Moscow, Russia, Abstract D1.1-19-14, 2014.
59) **Paterno-Mahler, R.**, **Blanton, E. L.**, Randall, S. W.,Andrade-Santos, F., Ashby, M., Brodwin, M., Bulbul, E., Clarke, T. E., **Golden-Marx, E.**, Johnson, R., Jones, C., Murray, S. S., Wing, J., Radio Galaxies in Galaxy Clusters: Feedback, Merger Signatures, and Signposts, American Astronomical Society, AAS Meeting #225, #418.02, 2015.
60) **Paterno-Mahler, R.**, Randall, S. W., Bulbul, E., Santos, F. A, Jones, C., Murray, S. S., **Blanton, E. L.,** Johnson, R., Merger Signatures in the Galaxy Cluster Abell 98, American Astronomical Society, AAS Meeting #224, #222.02, 2014.
61) Piskorz, D., Knutson, H. A., **Muirhead, P. S.,** Batygin, K., Crepp, J. R., Hinkley, S., Howard, A. W., Johnson, J. A., Morton, T. D., Cold Friends of Hot Jupiters: NIRSPEC Survey, American Astronomical Society, DPS meeting #45, #113.02, 2013.
62) Price, E., Rogers, L., Johnson, J., Shporer, A., Morton, T., Crepp, J. R., Swift, J., **Muirhead, P. S**., Characterizing the Hot Kepler Objects of Interest. American Astronomical Society, AAS Meeting #225, #257.31, 2015.
63) Provornikova, E., Richardson, J., **Opher, M**., Toth, G., Izmodenov, V., Study of solar cycle effects in the heliosheath in the model based on SWAN/SOHO and IPS data at 1 AU, 40th COSPAR Scientific Assembly, Held 2-10 August 2014, in Moscow, Russia, Abstract D1.1-21-14, 2014.
64) Randall, S. W., Nulsen, P., Clarke, T. E., Forman, W. R., Jones, C., Kraft, R. P., **Blanton, E. L**., Unraveling ICM Physics and AGN Feedback with Deep Chandra X-ray Observations of the Galaxy Group NGC 5813, American Astronomical Society, AAS Meeting #224, #222.05, 2014.
65) Rani, B., **Marscher, A**., **Jorstad, S.**, Hodgson, J., Krichbaum, T., Fuhrmann, L., Zensus, A., Probing the jet acceleration region - S5 0716+714 - a case study, 40th COSPAR Scientific Assembly, Held 2-10 August 2014, in Moscow, Russia, Abstract E1.5-38-14., 2014.
66) Rogers, Leslie, Price, E., Shporer, A., Crepp, J. R., Swift, J., **Muirhead, P. S**., Johnson, J. A., Characterizing the Hot Kepler Objects of Interest, American Astronomical Society, AAS Meeting #223, #131.02, 2014.
67) Savcheva, A., **West, A. A.**, Bochanski, J. J., A New Sample of Cool Subdwarfs from SDSS: Properties

and Kinematics, American Astronomical Society, AAS Meeting #224, #322.15, 2014.

68) Schwadron, N., Kasper, J. C., Mewaldt, R. A., Moebius, E., **Opher, M**., Spence, H. E., Zurbuchen, T., Interstellar Mapping and Acceleration Probe (IMAP) - Its Time Has Come!, American Geophysical Union, Fall Meeting 2014, abstract #SH21D-01, 2014.

69) **Stephens, I.**, Looney, L., Kwon, W., Fernandez Lopez, M., Hughes, A. M., Mundy, L. G., Crutcher, R., Li, Z., Rao, R., Segura-Cox, D., Spatially Resolved Magnetic Field Structure in the Disk of a T Tauri Star, American Astronomical Society, AAS Meeting #225, #211.04, 2015.

70 Swearingen, J. R., Sitko, M. L., Whitney, B.,Grady, C. A., Wagner, K. R., Champney, E. H.,Johnson, A. N., Warren, C. C., Russell, R. W., Hammel, H. B., Lisse, C. M., Cure, M., Kraus, S., Fukagawa, M., Calvet, N., **Espaillat, C.**, Monnier, J. D., Millan-Gabet, R., Wilner, D. J., Modeling Planet-Building Stellar Disks with Radiative Transfer Code, American Astronomical Society, AAS Meeting #225, #349.12, 2015.

71) Swearingen, J., Sitko, M. L., Whitney, B., Wagner, K., Champney, E. H., Johnson, A. N., Warren, C. C., Russell, R. W., Grady, C. A., Hammel, H. B., Lisse, C. M., Cure, M., Kraus, S., Fukagawa, M., Calvet, N., **Espaillat, C**., Monnier, J. D.,Millan-Gabet, R., Wilner, D. J., Modeling Planet-Building Stellar Disks with Radiative Transfer Code, American Astronomical Society, AAS Meeting #223, #350.18, 2014.

72) Swift, J., **Muirhead, P. S**., Johnson, J. A., Gonzales, A., Shporer, A., Plavchan, P., Lockwood, A.,Morton, T., Kepler's Cool Eclipsing Binaries. American Astronomical Society, AAS Meeting #223, #215.02, 2014.

73) Swisdak, M. M., Drake, J. F., **Opher, M**., Magnetic Reconnection in the Heliospheric Current Sheet: The Implications of the Different Environments Seen by the VoyagerSpacecraft, American Geophysical Union, Fall Meeting 2014, abstract #SH11B-4048, 2014.

74) **Theissen, C.**, **West, A**. **A**., SDSS M-dwarfs with WISE Signatures of Infrared Excess: Evidence of Warm Circumstellar Material in Low-Mass Field Populations, American Astronomical Society, AAS Meeting #223, #441.16, 2014.

75) **Theissen, C.**, **West, A. A.,** WISE Infrared Excess Detections for SDSS M Dwarfs: Cool Field Stars with Evidence of Warm Circumstellar Material, American Astronomical Society, AAS Meeting #224, #322.10, 2014.

76) **Veyette, M.**, **Muirhead, P.**, **Mann, A**., Accurate Alpha Abundance and C/O of Low-mass Stars, American Astronomical Society, AAS Meeting #225, #138.11, 2015.

77) **Weisenburger, K. L., West, A. A. Janes, K.,** Dhital, S., Planets in Wide Binaries from Kepler: Ages, Stability and Evolution of Planetary Systems. American Astronomical Society, AAS Meeting #224, #102.09, 2014.

78) **Weisenburger, K. L., West, A**. **A., Janes, K**., Dhital, S., Wide Binaries in the Kepler Field: Using Rotation Periods to Constrain Gyrochronology Models and Planetary Occurrence Rates, American Astronomical Society, AAS Meeting #223, #155.15, 2014.

79) **West, A. A.,** Boston University Pre-Majors Program (BU Pre-Map): Promoting Diversity through First-Year Undergraduate Research, American Astronomical Society, AAS Meeting #224, #320.04, 2014.

80) **West, A. A.,** Boston University Pre-Majors Program (BU Pre-Map): Promoting Diversity through First-Year Undergraduate Research. American Astronomical Society, AAS Meeting #225, #233.04, 2015.

81) **West, A. A.**, Davenport, J. R. A., **Dhital, S.**, **Mann, A.**, **Massey, A. P**., A Photometric (griz) Metallicity Calibration for Cool Stars, American Astronomical Society, AAS Meeting #224, #404.04, 2014.

82) **West, A. A**., Davenport, J. R., **Mann, A**., **Massey, A. P., Dhital, S.**, A Color-Metallicity Relation for SDSS M Dwarfs, American Astronomical Society, AAS Meeting #223, #441.15, 2014.

83) Wilson, T. L., **Bania, T. M.**, Balser, D. S., NGC 1976 in the Radio Range with the Green Bank Telescope, American Astronomical Society, AAS Meeting #225, #109.05, 2015.
84) Wright, J., Johnson, J. A., McCrady, N., Swift, J., **Muirhead, P**. S., Zhao, M., Plavchan, P., Bottom, M., Wittenmyer, R. A., MINERVA: Small Telescopes, Small Planets, American Astronomical Society, AAS Meeting #223, #148.31, 2014.
85) Zhang, S., Barriere, N., Tomsick, J., Baganoff, F. K.,Dexter, J., **Neilsen, J**., NuSTAR Team, Sagittarius A* X-ray Flares Simultaneously Detected by NuSTAR And Chandra, American Astronomical Society, AAS Meeting #223, #438.02, 2014.
86) Zhu, Z., Stone, J., Rafikov, R., Bai, X., **Espaillat, C**. Particle Trapping at Planet-Induced Gap Edges and Vortices. *Protostars and Planets VI*, Heidelberg, July 15-20, 2013, Poster #2S055, 2013.
87) **Zieger, B., Opher, M**., Toth, G., The Multi-fluid Nature of the Termination Shock, American Geophysical Union, Fall Meeting 2014, abstract #SH22A-02, 2014.

## Miscellaneous Scientific Publications

1) **Agudo, I.**, Thum, C., Gomez, J. L., Wiesemeyer, H., VizieR Online Data Catalog: 3.5 and 1.3mm polarimetric survey of AGN, VizieR On-line Data Catalog: J/A+A/566/A59, 2014.
2) Anderson, L. D., **Bania, T. M.,** Balser, D. S., Cunningham, V., Wenger, T. V., Johnstone, B. M., Armentrout, W. P., VizieR Online Data Catalog: The WISE catalog of Galactic HII regions (Anderson+, 2014), *VizieR On-line Data Catalog: J/ApJS/212/1*, Originally published in: 2014ApJS.212..1A, 2014.
3) Blasi, M. G., Lico, R., Giroletti, M., Orienti, M., Giovannini, G., Cotton, W., Edwards, P. G., Fuhrmann, L., Krichbaum, T. P., Kovalev, Y. Y., **Jorstad, S.**, **Marscher, A**., Kino, M., Paneque, D., Perez-Torres, M. A., Piner, B. G., Sokolovsky, K. V. VizieR Online Data Catalog: 43GHz observation of the blazar Mrk 421 (Blasi+, 2013), VizieR On-line Data Catalog: J/A+A/559/A75, Originally published in: 2013A&A.559A.75B , 2013.
4) **Brainerd, T. G.**, **Agustsson, I.,** The Spatial Distribution of Spectroscopically Selected Satellite Galaxies, American Astronomical Society, AAS Meeting #225, #255.20, 2015.
5) **Brainerd, T. G**., **Blumenthal, K.,** Effects of Multiple Weak Deflections on the Galaxy-Galaxy Lensing Signal, American Astronomical Society, AAS Meeting #224, #318.12, 2014.
6) Caldwell, D. A., Torres, G., Kipping, D. M., Ballard, S., Batalha, N., Borucki, W. J., Bryson, S., Ciardi, D. R., Crepp, J. R., Everett, M., Fressin, F., Henze, C., Horch, E., Howard, A., Howell, S. B., Isaacson, H. T., Jenkins, J. M., Kolbl, R., Marcy, G. W., McCauliff, S. D., **Muirhead, P. S.**, Newton, E., Petigura, E., Twicken, J. D., Quintana, E. V., Barclay, T., Validation of Twelve Small Kepler Transiting Planets in the Habitable Zone, American Astronomical Society, AAS Meeting #225, #438.02, 2015.
7) **Cashman, L.**, **Clemens, D. P.**, Testing for Helical Magnetic Fields in the Orion Molecular Cloud Integral-Shaped Filament, American Astronomical Society, AAS Meeting #224, #220.07, 2014.
8) Covey, K. R., **West, A. A.**, Bochanski, J. J., Hawley, S. L., The Hammer: An IDL Spectral Typing Suite, *Astrophysics Source Code Library*, record ascl:1405.003, 2014.
9) Edelson, R., McHardy, I., **Jorstad, S., Marscher, A.**, Hovatta, T., Vaughan, S., Upcoming Kepler monitoring of OJ 287, *The Astronomer's Telegram*, #7056, 2015.
10) **Muirhead, P**. **S**., Becker, J., Feiden, G. A., Rojas-Ayala, B.,Vanderburg, A., Price, E. M., Thorp, R., Law, N. M., Riddle, R., Baranec, C., Hamren, K., Schlawin, E., Covey, K. R.,Johnson, J. A., Lloyd, J. P., VizieR Online Data Catalog: Cool KOIs. VI. H- and K- band spectra (Muirhead+, 2014), VizieR On-line Data Catalog: J/ApJS/213/5, Originally published in: 2014ApJS.213..5M, 2014.