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Research Interests:

On July 4th 2012, the European Organization for Nuclear Research (CERN) announced the discovery of the hypothesized Standard Model (SM) Higgs Boson at the Large Hadron Collider (LHC). The discovery is the culmination of nearly a half-century of precision experimental measurements that have repeatedly confirmed the correctness of the SM. However, further evidence indicates that the SM is incomplete. Questions surrounding the mass value of the Higgs as well as astrophysical evidence for Dark Matter (DM) suggest that new particles and interactions are awaiting discovery at higher energy and may be within the energy reach of the LHC. My research program focuses on developing detector electronics and analysis techniques the aim of leading the path toward answering these key outstanding questions.

Currently, I am working on searches for new particles that will take advantage of the wealth of data being collected by the Compact Muon Solenoid (CMS) experiment during Run 2 of the Large Hadron Collider (LHC) program. Our group is one of the leading contributors to searches for dark matter candidates, partners of the top quark, and supersymmetric particles in CMS. These Run 2 searches are making use of new machine learning methods and will pave the road for the potential discovery of these particles in Run 3 and HL-LHC searches. The experimental challenges of the HL-LHC environment will necessitate various upgrades of CMS sub-detector systems. Therefore, in parallel to my physics analyses efforts, I work on the development of muon detector electronics and the development of the future Level-1 Trigger. Both of these efforts are crucial to optimizing our searches for new phenomena at the TeV scale.

There are openings in my group for students interested in pursuing a PhD in experimental high energy physics at CMS. There are also opportunities for motivated undergraduates to do research with us, hopefully leading to a senior thesis. Interested students should get in touch with me directly at isuarez@bu.edu.

Selected Publications

- [1] CMS Collaboration, "Performance of the CMS muon detector and reconstruction with pp collisions at $\sqrt{s}=13$ TeV" JINST 13 P06015 [1804.04528]
- [2] CMS Collaboration, "Search for top squark pair production in pp collisions at $\sqrt{s}=13$ TeV using single lepton events", JHEP 10 (2017) 019, doi:10.1007/JHEP10(2017)019
- [3] CMS Collaboration, "Searches for pair production of third-generation squarks in $\sqrt{s} = 13$ TeV pp collisions", Eur. Phys. J. C 77 (2017) 327, doi:10.1140/epjc/s10052-017-4853-2
- [4] CMS Collaboration, "Search for High Mass Resonances Decaying into Tau-Lepton Pairs in pp collisions at $\sqrt{s} = 7$ TeV", Phys. Lett. B 716, 82-102, hep-ex/1206.1725, 2013.
- [5] CMS Collaboration, "Evidence for the 125 GeV Higgs boson decaying to a pair of tau leptons", Journal of High Energy Physics as doi:10.1007/JHEP05(2014)104
- [6] J. Gilmore (Texas A-M), J. Haley (Northeastern U.), V. Khotilovich, J.K. Roe, A. Safonov, I. Suarez, S. Yeager, "Very forward muon trigger and data acquisition electronics for CMS: Design and radiation testing", JINST 8 (20), 2013. (2 citation)