

# **NSF REU in Integrated Nanomanufacturing – an Introduction to Prof Bifano’s Laboratory and the Project Dynamic Surface Interferometry**

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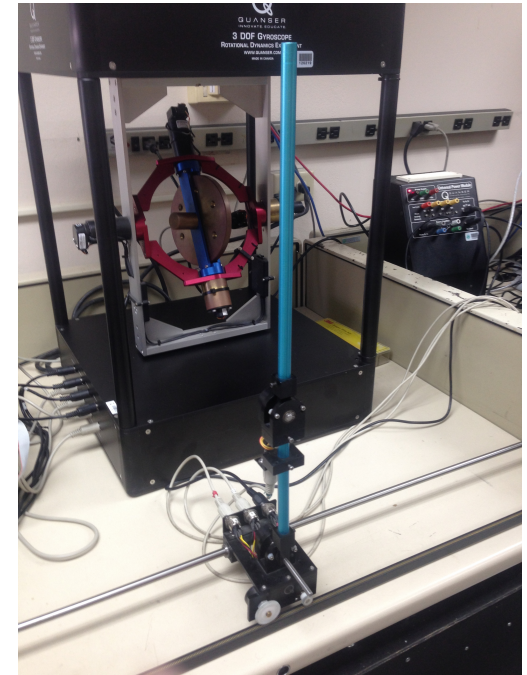
# My Story

- **High School:**  
Colegio Santa Cruz, Trujillo Alto P.R.
- **College Process:**  
Applied and attended University of Puerto Rico- Bayamon for two years.  
Performed transfer program to University of Puerto Rico- Mayagüez
- **Current Major:**  
Electrical Engineering
- I received an email from one of my professors to apply for REU.



# What Influenced Me?

- What influenced my decision to go into this field was an interest in science and technology, also a desire to move my family forward.
- Now that I am in the field I enjoy it but it has been hard to decide what I want to specialize in. There are so many options.

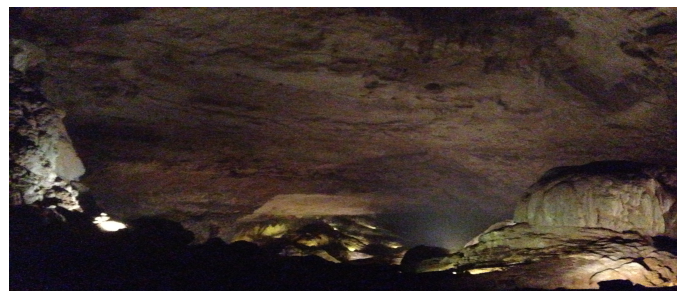


## Previous Experience

- **Engineering Intern – Puerto Rico Aqueduct & Sewer Authority.**
  - Performance analysis on motors and pumps
  - Optimize equipment performance, specifications and order system



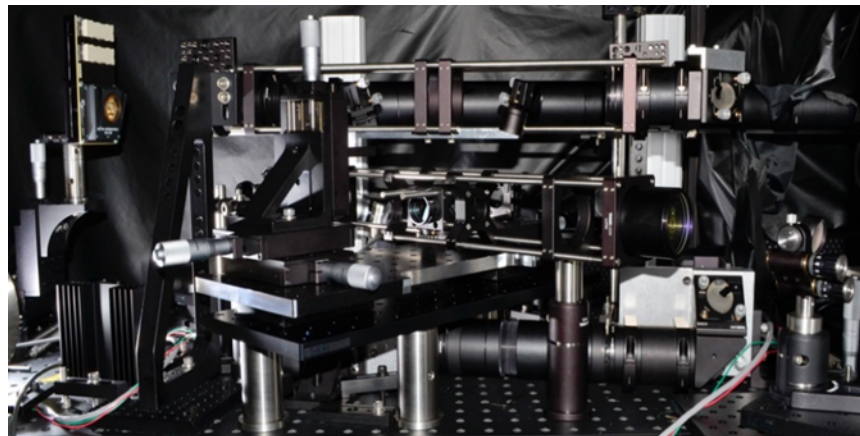
- **IAP (Industrial Affiliates Program)- Undergraduate Research**
  - Design of an assistance robot for picking up the trash inside caves to make the task less dangerous and more cost efficient.





# This Summer's Research Experience

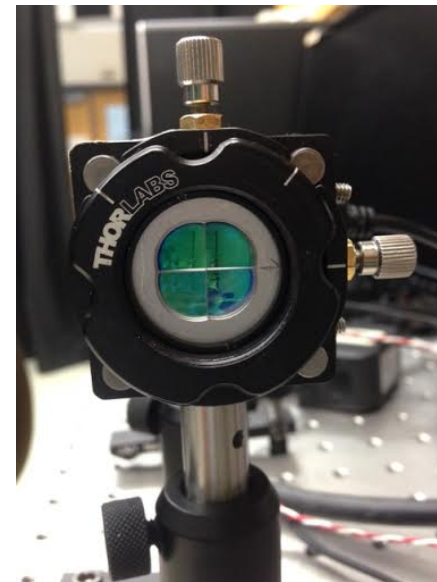
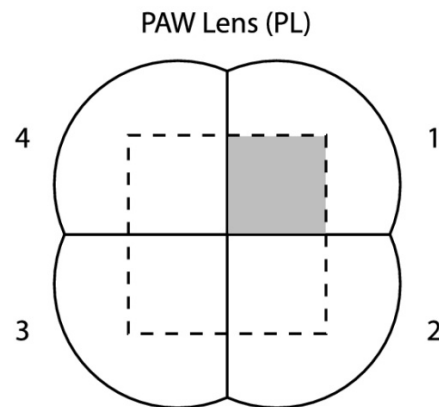
- Precision Engineering Research Laboratory (PERL) on the 7<sup>th</sup> floor of the Photonics Center
- At first it was hard to understand optics terms. I learn something new everyday.
- I'm looking to have an experience I would have not been able to obtain anywhere else where I can gain useful research and project management tools that will help me in the future.
- I though I wanted to go into industry but this experience so far has made me start to reconsider my options.



# Summer Research Goals

## Dynamic Surface Interferometry

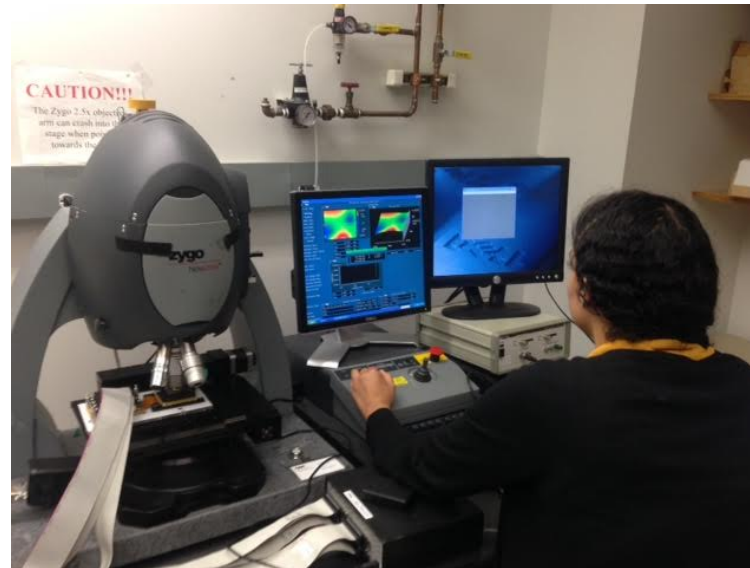
- Build, with Sarah Taoudi, a partitioned aperture wavefront (PAW) reflective optical surface mapping instrument that will be able to measure topography at high speed on any continuous surface with nanometer-scale precision
- We began constructing the microscope that included a PAW lens to be able to perform PAW imaging.



# Summer Research Goals

## Presently

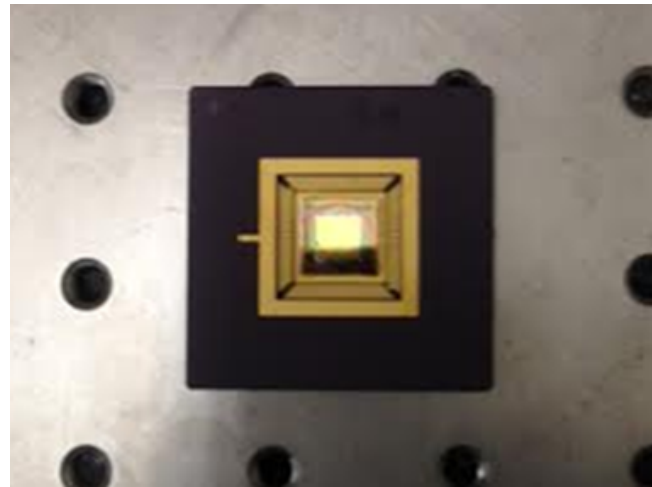
- We are working on getting the best possible image with the PAW microscope.
- These images present the surface height of the object we are observing.
- We are comparing these images with the ones we acquire using the Zygo NT 600 Dynamic Interferometer. Which gives a more precise image.



# Summer Research Goals

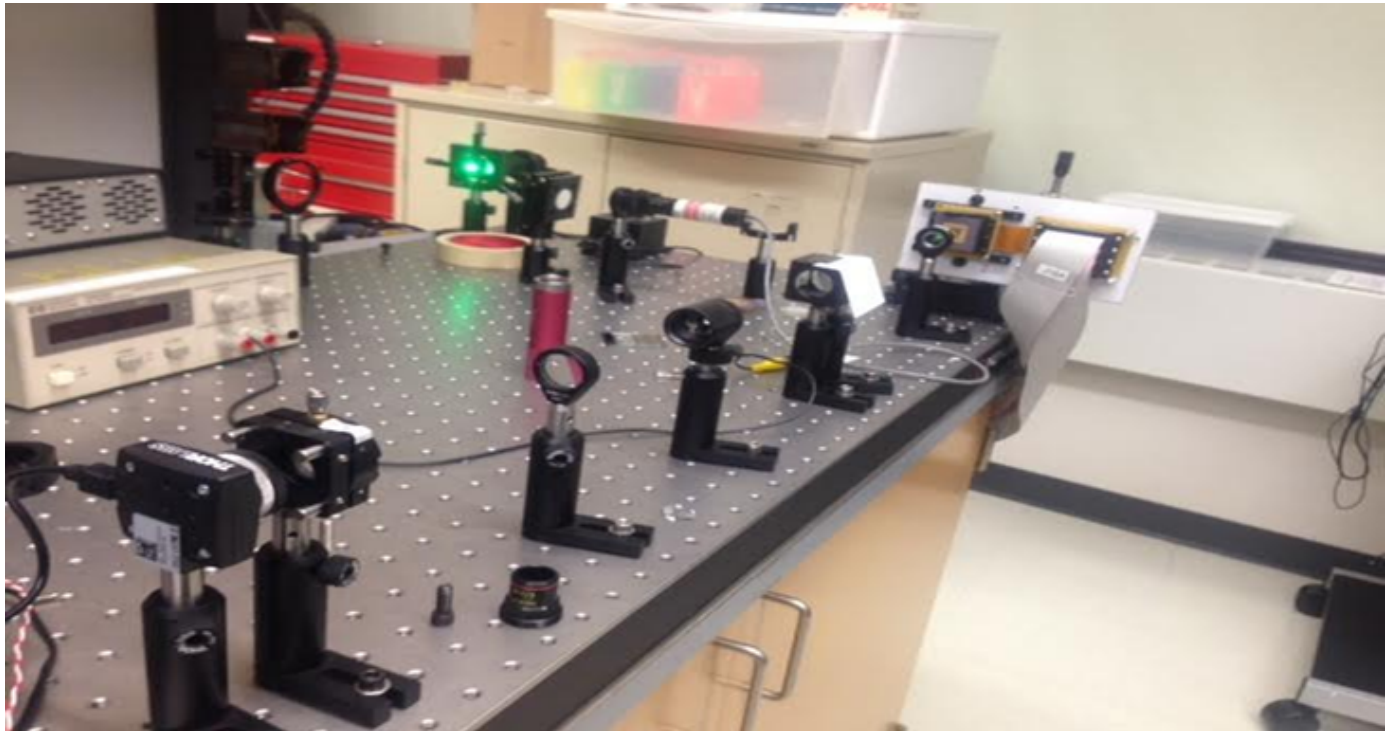
## Goal of the project

- Successfully build a good prototype of the PAW reflective optical mapping instrument for Thorlabs to consider it as a possible commercial product.
- Measure the mechanical response of a small deformable mirror (DM) segment that can be moved by applying voltage to one or more of three underlying electrostatic actuators.





# The Instrument So Far.



**Boston University** Photonics Center  
Research Experiences for Teachers



**Boston University** Photonics Center  
Research Experiences for Undergraduates



## REU, 4 Weeks Later...

- Feel welcomed, people here want to help.
- I never felt like a stranger, everyone welcomed me with open arms and are there to help with anything you need.
- By the second week I already felt settled and part of a lab group. All my questions have been answered and my desire to learn is only growing.



## Thanks and Welcome !!

