The University of Rochester SPIE Student Chapter
June 2017 – May 2018

The chapter was established on 19 June 2009

Total Student Members: 66
Total Alumni: 14

Elected officers for the 2017-2018 year:

President: Anthony Yee
Vice President: Trevor O'Loughlin
Treasurer: Di Xu
Secretary: Robert Draham
Web Administrator: Daniel Nikolov
Communication Officer: Sara Gearhart

Outreach Committee:
Jose Perez (Chair)
Trevor O'Loughlin
Ashan Ariyawansa

Undergraduate Committee:
Raymond Yu (Chair)
David Lippman
Demetrious Dowell
Evan Villafranca
Kai Williams

Faculty Advisor: Prof. Jannick P. Rolland
1 ACTIVITIES

This year we held three meetings for our chapter:

1. General Interest Meeting: September 22, 2017;
2. “Members Only” Super Late Holiday/Welcome Back Meeting, January 19, 2018;

Newly Elected Officers for 2017-2018:
    President: Di Xu
    Vice President: Ashan Ariyawansa
    Secretary: Sara Gearhart
    Treasurer: Nicholas Takaki
    Communications Officer: Kaitlin Dunn
    Web Admin: Robert Draham

We are proud to report that 50% our officers for the 2017-2018 term is composed of women and underrepresented minorities.

Additional events from throughout the year are described in the following sections.

1.1 Summer student colloquium series

As tradition, we continued the annual Student Summer Colloquium series in the summer of 2017. We believe the series constitutes an excellent opportunity for practicing scientific presentations and for fostering discussion and collaboration between student researchers in various departments of the university. The talks were held in a relaxed environment in the form of a brown-bag lunch seminar with the SPIE student chapter providing snacks and refreshments. Presentations were promoted by putting up posters on campus and sending email reminders to students and faculty in various departments.

Figure 1: Prof. Miguel Alonso’s opening colloquium talk.
This year we kicked off the series with a talk by Prof. Miguel Alonso from our own Institute of Optics. His talk was immensely popular as the room was filled to the point of standing only. It was a great way to garner interest in the following student talks. We had more interest in student talks than normal and were able to fill up every week in the summer to have a nine week summer colloquium from June to August. There was solid attendance in all of the student talks following and many people volunteered to give talks. Thanks to everyone who participated in the colloquium series, and special thanks to all the speakers who have given excellent presentations throughout the summer:

<table>
<thead>
<tr>
<th>Speaker</th>
<th>Talk title</th>
</tr>
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<tbody>
<tr>
<td>Prof. Miguel Alonso</td>
<td>Can [optical device]&lt;sub&gt;n&lt;/sub&gt; perform [seemingly unphysical task]&lt;sub&gt;n&lt;/sub&gt;</td>
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<tr>
<td>Robert Pettit</td>
<td>Coherent control of single electron spins in levitated optomechanics experiments</td>
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<tr>
<td>Shaival Buch</td>
<td>Multimode Fibers - Trying to navigate through the maze of optical nonlinearity</td>
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<tr>
<td>Kevin Liang</td>
<td>Effects of Groove Structures on the MTF</td>
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<tr>
<td>Anthony Vella</td>
<td>Optimization of a birefringent mask for bottle field generation and single-shot polarimetry</td>
</tr>
<tr>
<td>Rui Luo</td>
<td>Self-referenced temperature sensing with a lithium niobate microdisk resonator</td>
</tr>
<tr>
<td>Yang Zhao</td>
<td>Low-coherence Interferometer Measuring Absolute Thickness and Topography with High Accuracy</td>
</tr>
<tr>
<td>Katelynn Sharma</td>
<td>Polarization-Dependent Coherence Measurements</td>
</tr>
<tr>
<td>Trevor O'Loughlin</td>
<td>Increasing the Signal-to-Noise Ratio in Midwave IR Detectors</td>
</tr>
<tr>
<td>Kaitlin Wozniak</td>
<td>Properties and Safety of Femtosecond Photo-modification of Cornea and Hydrogel</td>
</tr>
<tr>
<td>Nick Takaki</td>
<td>Some Mathematics of Orthogonal Bases for Freeform Surface Description</td>
</tr>
<tr>
<td>Andres Guevara-Torres</td>
<td>Imaging Translucent Neurons and Blood Cells in the Living Mouse Retina with Continuous Wave Infrared Light</td>
</tr>
<tr>
<td>Aku Antikainen</td>
<td>A New Mathematical Method to Determine the Modes of Elliptical Waveguides</td>
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1.2 Outreach

2017-18 UR SPIE Outreach activities (July 2017 to June 2018)

1. Ask a Scientist at Brighton Farmers Market

Dates: June 25th and September 24th, 2017 (Sunday morning)
Location: Brighton Farmer’s Market, 1150 S Winton Rd, Rochester, NY
Type of event: Pop-up exhibit with optics demos

The Brighton Farmers Market offered to provide a table during their summer market, which was called "Ask a Scientist." The goal was to capitalize on the energy from local teach-ins and the March for Science to provide educational outreach on an ongoing basis. Scientists from all backgrounds and levels were welcome and encouraged to participate. The UR SPIE student chapter participated twice in this activity with the following optics demos:

- Making water beads “invisible” by placing them in a beaker with water, which was the same refractive index.
- A giant 3-ft Fresnel lens
- Diffraction grating glasses (part of SPIE educational kits)
- Pinhole cameras

It was an exciting opportunity to get many young (and some not so young) minds excited about optics. This is now a yearly event, and we will be back at the Farmer's Market this 2018.

Figure 2: Ashan, Katelynn, and Greg explaining optics at the Brighton Farmers Market
2. Solar Eclipse at UR

**Date:** August 21st, 2017  
**Location:** Hajim Science & Engineering Quad, University of Rochester, Rochester NY  
**Type of event:** Pop-up exhibit with solar telescope and poster

On Monday, August 21st, a total solar eclipse crossed the United States from coast to coast for the first time since 1918.

While Rochester didn’t get a total eclipse, the UR SPIE Chapter could not miss out on such a special occasion and welcomed an enthusiastic crowd of students, teachers and more in the Engineering Quad to observe the solar eclipse. While, clouds made our viewing of the eclipse significantly more difficult, the event was a joy for UR students and the Rochester community.

Our event included the following activities and amenities:

- Looking through a solar telescope
- Giving away free eclipse viewing glasses - required for safety! These were kindly provided by SPIE (Tasha Chicovsky contacted us about the opportunity to get free eclipse glasses)
- Poster that talked about eclipse science, the anatomy of the sun, safe viewing tips and described the optics used in the solar telescope.
- Some chips and drinks

We wish there were another eclipse happening in Rochester every year. We will do this again during the next eclipse on April 8, 2024 if it's not snowing.

*Figure 3:* Eryn looking at the eclipse through the solar telescope before the clouds got in the way.
3. Rochester Mini Maker Faire

Date: November 18\textsuperscript{th}, 2017
Location: Riverside Convention Center, Rochester, NY
Type of event: Pop-up exhibit with optics demos

Maker Faire is an event created by \textit{Make} magazine to "celebrate arts, crafts, engineering, science projects and the Do-It-Yourself (DIY) mindset". Apart from the flagship Maker Faires, \textit{Make} magazine also assists independent event organizers in producing small-scale Maker Faire events in local communities, with Rochester hosting its 4th Mini Maker Faire in 2017.

The UR SPIE student participated in this event by showcasing the following optics demos:

- Infrared camera
- Diffraction grating glasses
- A virtual reality headset demo
- A “laser sounds” demo, in which audio was transmitted wirelessly using a red laser emitter and a photodetector.

We will be participating once again in the 2018 Maker Faire.

\textbf{Figure 4}: Trevor and Abd-Elrahman Qoutb at the Rochester Mini Maker Faire explaining infrared light.
4. International Day of Light

**Date:** May 16th, 2018  
**Location:** Rochester Museum and Science Center (RMSC), Rochester, NY  
**Type of exhibit:** Pop-up exhibit with optics demos provided by RMSC  

May 16th was the International Day of Light. Members from our UR SPIE Chapter presented optics demos to school children and parents alike visiting the Rochester Museum and Science Center. These demos were provided by RMSC. This outreach was aimed at 1st - 5th graders, helping museum staff facilitate the following activities:

- **Optics kits:** Playing with lasers, lens, mirrors  
- **Filtered Light:** Talking about how we see things in space using different lenses/filters  
- **Incandescent light bulb:** Demonstration on building an incandescent light bulb using pencil graphite  
- **Irridescence and thin films:** Creating rainbow-colored thin films by placing drops of nail polish on water  
- **VR headset demo**

We look forward to working with the RMSC in future outreach activities.

*Figure 5:* Everyone having a good time at the RMSC helping out during the International Day of Light.
Improvements and new activities for the 2018/19 year

- **Girls Scouts of Western New York's STEM-A-Palooza Event:** Girls Scouts organize this event every spring (usually April), but we couldn’t attend this 2018 Spring due to time availability issues with SPIE Outreach committee members. We will make sure to attend next year.

- **More school outreach:** We didn’t do any outreach visits to local schools this year, and we hope we can organize some of them for the 18/19 year.

### 1.3 Recreational activities

For members only, we organized the following activities:

- We have continued the joint RIT and UofR student chapter monthly happy hours. But since September 2017 a second set of happy hours has been organized by the UofR student chapter. So RIT organizes their happy hour on the second Thursday of the month, and UofR organizes theirs on the last Thursday of the month. This has been a great change to relax and socialize, in addition to promoting further collaboration between our chapters.

- On February 22, 2018, we organized a jointly organized UofR and RIT SPIE Student Chapter Happy Hour at Radio Social. Radio Social is a bowling alley with other lawn games and food. We played a bit of large jenga while we waited for everyone to show up and then has a couple rounds of bowling with food. We were glad to network with other local students and a good time was had by all.

![Figure 6: Local chapters unite for food, fun, and optics!](image)
1.4 Guest speakers, networking, and professional development

- In October 2017 our chapter members had the chance to attend a talk by Thomas Germer from the National Institute of Standards and Technology (NIST). We co-sponsored the colloquium and helped to advertise. Dr. Germer gave a talk on “Measuring and Modeling the Polarization of Light Scattered from Surfaces”. Several of our officers had the change to have dinner with him and a couple other professors.

![Figure 7: Thomas Germer presenting his work on polarization](image)

- Also in October 2017, the members of our chapter had the privilege of meeting the current SPIE President Elect, Dr. Jim Oschmann, and SPIE Director of Education and Community Service, Krisinda Plenkovich, as they were visiting Rochester for the SPIE Optifab conference. We hosted a lunch for Jim to meet members of our chapter as well as take some lab tours with professors at the university. We greatly enjoyed fruitful discussions with Dr. Oschmann on his career.

![Figure 8: SPIE Treasurer, Di Xu, giving Jim Oschmann and Anthony Yee a lab tour.](image)
Our undergraduate committee this year began an interview prep session each semester with the help from the university's career center. The Institute of Optics has a once a semester Industrial Associates (IA) event where companies come to interview students and provide a summer internship or full-time job. We felt it is important for students to be well prepared to interview and network with industry members, which is why we started this event. This event happens is a couple weeks before each IA event. We hosted one in October 2017 as well as March 2017. It is primarily focused to undergraduates, masters, and soon to be graduating PhD students.

Figure 9: Dr. Arenberg giving his colloquium

In November 2017, we hosted a colloquium by Dr. Jon Arenberg from the Northrop Grumann Aerospace Systems. This visit was sponsored by SPIE’s visiting lecture program, and the talk was titled “The Adventures of an Industrial Physicist: A Curated Tour”. The talk was very well received, and Dr. Arenberg was able to meet with many students and faculty from the Institute of Optics. Dr. Arenberg has a chance to visit the Laboratory for Laser Energetics as well as meet with the Directory of the Institute of Optics and four faculty and research engineers at the school. He had time to have dinner and lunch with students.
This year we were able to schedule two company tours. The first one was in November 2017, where 10 SPIE student members visited Apollo Optical Systems in Rochester, NY. Apollo Optical specializes in Single Point Diamond Turning (SPDT) and injection molding of polymer optics and plastic optics in prototype and production volumes. It was founded by Michael Morris, a previous U of R professor. The tour was organized by the graduate Geometrical Optics professor, Dr. Dale Buralli, who works there.

The second company tour was in April 2018, where 18 students visited Corning, Inc. in Corning, NY. Corning is one of the world’s leading innovators in materials science, with a 167-year track record of life-changing inventions. Corning applies its unparalleled expertise in glass science, ceramics science, and optical physics, along with its deep manufacturing and engineering capabilities, to develop category-defining products that transform industries and enhance people's lives.
We took an all-day trip down to Corning, to take tours of the research labs at Corning. We toured labs working on wireless communications, quantum communication, laser processing, precision finishing, metrology, and displays. After that the students had lunch with a panel of Corning managers, where they could ask career choices and anything else. After lunch the students each gave a 1-2 minute pitch to introduce themselves which led up to a networking session with Corning scientists. This was a two hour networking session where students and Corning employees had a chance to chat about their careers and work interests. The tour received very positive reviews.

1.5 SPIE conferences
In August 2017, Anthony Yee used the Officer Travel Grant to attend SPIE Optics + Photonics in San Diego, CA. He participated in the Student Leadership Workshop. He networked with a lot of students at the workshop, but also was able to network with many professionals and industry representatives while there.
In April 2018, Anthony Yee, Samuel Steven, and Nick Takaki, had the opportunity to attend Photonics Europe in Strasbourg, France, through the SPIE student travel grant. They attended this conference as part of an augmented reality (AR) optical design challenge supported by companies working in this field. They had a chance to attend some of the student networking events like the lunch with an expert lunch, where they met many students from around the world, as well as experts and professors. Since the competition was sponsored by AR companies, they also had a chance to network with many managers and employees at the companies. Unfortunately they did not win the competition, but they had a good time visiting France and networking with people from all over.

Figure 14: Sam, Anthony, and Nick in Strasbourg, France.

2 Financial Information

<table>
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<td><strong>Ending Balance</strong></td>
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3 Future Directions

The University of Rochester SPIE Student Chapter is one of the largest student chapters with 80 members (66 students and 14 alumni). We plan to keep increasing the membership by engaging more the undergraduate and master's-level student population, which is growing quickly at the Institute of Optics, and more generally at the University of Rochester. Planned activities and goals for the next year are as follows:

- Di Xu will use the Officer Travel Grant to attend Optics and Photonics and the Student Chapter Leadership Workshop as well as present a chapter poster at the Student Chapter Exhibit Mixer in San Diego in August 2018.
- We will continue to organize visits to local companies involved in optics. We plan to organize one visit in the fall and one in the spring. The process of selecting and contacting potential companies to visit is currently underway.
- We will continue our annual Summer Colloquium Series. Each week will feature up to two 20-minute talks and we will be encouraging more participation from younger students whose research is less developed. We are also hoping to get speakers from other departments who do research with optics. This year’s series will begin with a talk by Prof. Jennifer Kruschwitz, titled “Specialized Color Targets for Spectral Reflectance Reconstruction of Magnified Images”. At the end of the series, awards will be given to the two best student speakers.
- We plan to organize an event or a series of events focused on mental health awareness. Currently the resources available at the university are geared more toward undergraduate students. Through this event(s), our goal is to raise mental health awareness and to help improve mental health wellbeing with a focus on graduate students.
- We will continue to take advantage of the visiting lecturer program and are in the process of selecting this year’s speaker.
- We will continue to organize social and networking events to help foster connections for our members.
- We will continue working with the RIT student chapter to organize joint events. RIT has invited our chapter to their monthly social gathering. We have set up our own monthly social at about two weeks apart from RIT's and have invited them to join us.
- We have been very active in outreach and we plan to continue our efforts in this respect, building on contacts we have made through the Outreach Committee. We will also work closely with the Physics-Optics-Astronomy Library to organize outreach events on-campus.