





There are two topics in this week's Photon Snacks: working in a research lab and inviting you to do a survey about future topics for this column In Light Bytes.

Working in a Research Lab

I have talked to a few of you about working in research labs at The University of Arizona, especially those in the Wyant College of Optical Sciences. Let me offer some advice, but understand that there is no firm, complete answer. First, in which areas of optics are you most interested? Once you answer this question, it makes it a lot easier to narrow down the researchers who you should consider contacting. Note that in Optical Sciences, there are four main research areas:

- Optical Engineering (most applied): examine and develop different uses of light with instruments like lenses, spectrometers and interferometers; they build the practical devices that put light to use;
- Image Science: investigates the ways that image quality can be defined, measured and optimized; it touches and improves the visualization of everything from healthy bones to unstable atmosphere to millennia-old geological formations;
- Photonics: is the science of the dual nature of light, emphasizing that it is both particle and wave at once; it covers the research and application of light from ultraviolet to the infrared; and
- Optical Physics (most fundamental): Optical physics concentrates on the inspection, manipulation and control of electromagnetic radiation in relation to matter, focusing on the discovery and application of new phenomena. Optical physicists use and develop light sources that span the electromagnetic spectrum from microwaves to X-rays.

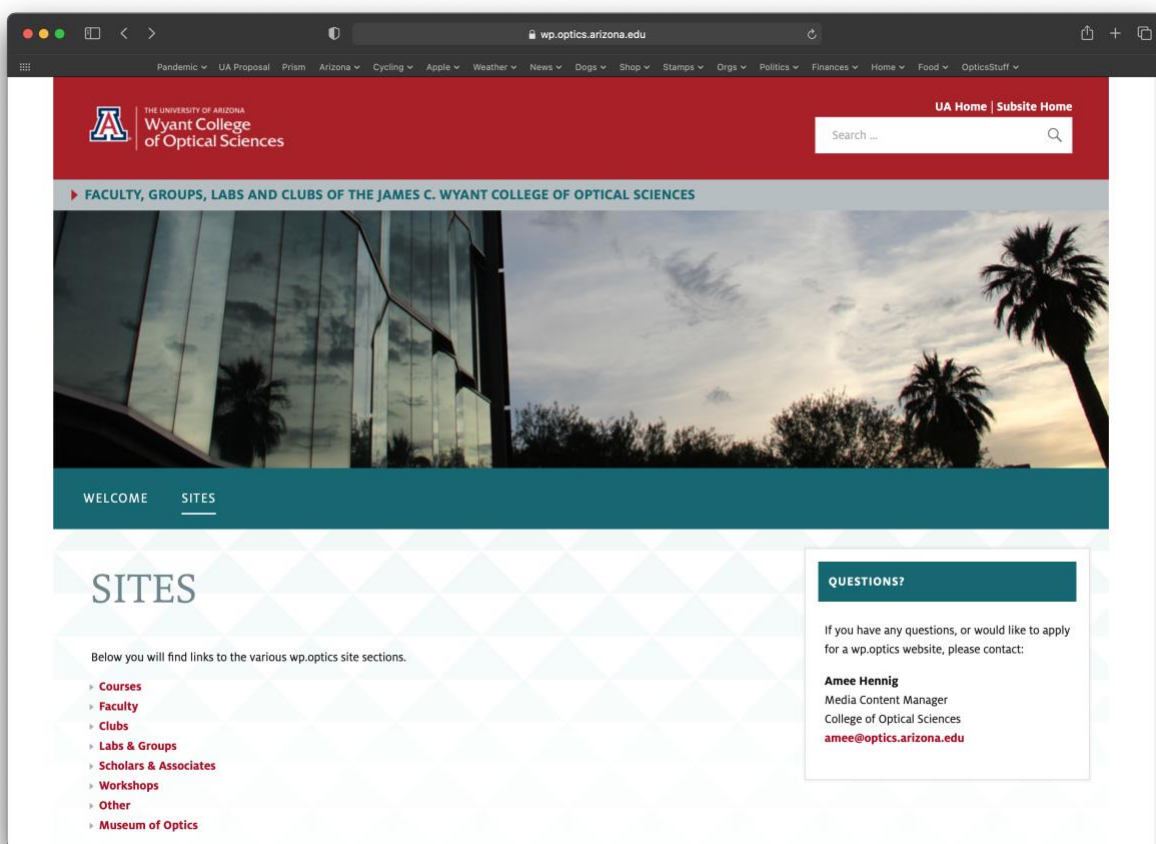
	<p>OPTICAL ENGINEERING</p> <p>Optical engineers examine and develop different uses of light with instruments like lenses, spectrometers and interferometers; they build the practical devices that put light to use.</p> <p>View the Latest in Optical Engineering ▶</p>
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	<p>IMAGE SCIENCE</p> <p>Image science investigates the ways that image quality can be defined, measured and optimized; it touches and improves the visualization of everything from healthy bones to unstable atmosphere to millennia-old geological formations.</p> <p>View the Latest in Image Science ▶</p>

Of course, there are many sub-fields within each of these four divisions within Optical Sciences, and it expands into many more if you consider research units outside of optics.

Second, you must find the researchers in your areas of interest. There are over 100 individuals who you can work with if you restrict your attention to the field of optics on campus. Most of them are in the College, but there are also several researchers in other units around campus, including: Physics (especially in the area of optical physics), Chemistry (especially in the areas of

analytical and physical chemistry), Engineering (especially in the areas of Mechanical, Electrical, Materials Science, Biomedical, and Environmental), Astronomy, and Radiology. I can also say there are other units across campus where you could do optics research – I have been surprised where undergraduate and graduate students have done optics during their studies. Note that while many of the researchers, including professors, research scientists, postdocs, and others, have appointments or joint appointments in Optical Sciences, not all of them do. As long as you are studying light, or better, radiation, in some form, you are doing optics. So, do some internet searches including the search terms University of Arizona and your areas of interest. You can also visit the sites for the respective units. Restricting your attention to the College, look at the following and the links therein:

- Main college research site: <https://www.optics.arizona.edu/research/faculty-specialties> (note an update to this site is in the works) and
- The individual group research site: <https://wp.optics.arizona.edu/sites/> (select Faculty and Labs & Groups therein; note that this site is the best place to find out about current research in the College).



Third, you **must** research the researcher. Learn more about the research that has been done, is currently being done, and where they expect to go. You accomplish such by reviewing their website(s), reading their published papers, and you can even talk to the students already

working in their group. By doing this step, you will dramatically increase the likelihood that you get an offer to work in the group.

Fourth, get your resume up to date. You may want to take advantage of Student Engagement and Career Development at <https://www.career.arizona.edu/jobs/resumes> who can review and make suggestions for your resume and letter(s) to potential researchers. Additionally, members from the Career office have presented at Community Speakers, especially before Industrial Affiliates' events.

Fifth, contact the researcher(s) for whom you are interested in working. Typically, this is done with an email. Keep the email short, but include the following (this is your letter):

- The area of research in which you are interested,
- Aspects about the researcher's work that you find engaging,
- Why are you interested in it,
- Which year of study you are currently taking, and
- Include your resume.

You may also want to include your availability to meet and the timeframe you are trying to find a position. This email may lead to an interview, in person or online. When being interviewed, this is your time to learn more about the lab, what is expected of you (often a joint process because of your interests and what is needed to be done), get a tour of the lab, and meet people in the lab. Big caveat: researchers can be slow to respond sometimes. They get busy, and your email can fall off the inbox on their screen. Contact them again after no more than a week, stop by their office, give them a call, or whatever you deem is the best way to get an answer (without being too pushy). Note that some researchers may offer you a volunteer position. During this volunteer time you will be able to see if you are interested in the research while they are looking at your overlap in the lab. You could call it the "kicking the tires" phase. It is up to you if you will accept such a role.

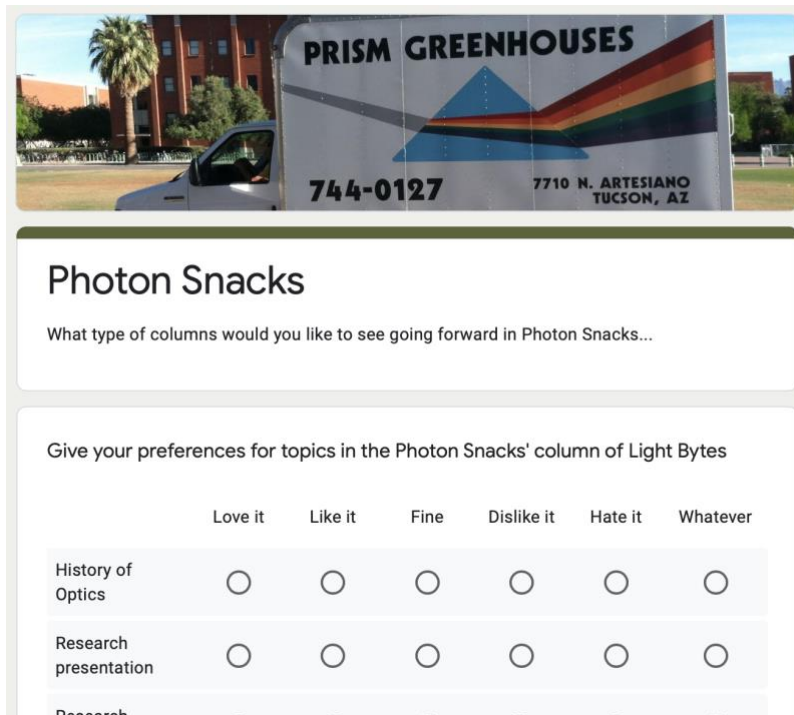
In conclusion, there are many opportunities to do optics research on campus. Conducting research can lead to a better understanding of optics, teach you about graduate school, introduce you to many people within the College, provide opportunities to present your research at conferences or within papers, and give you a little more spending money in your pocket or help defray your college expenses. We in the Academic Programs office can help with a number of the steps delineated above. I especially am happy to meet with you to talk about the research that is being conducted within the College, and where your interests overlap with the faculty. I know the general studies of the faculty, but, honestly, I know no more than around 30% of the specifics. There is just too much amazing research being conducted behind all the lab doors within the College. My parting words are: during your interview, remember the researchers **love** to talk about their work and what they have found recently. They **love** to chat about it – a 30-minute meeting can easily turn into an hour when one of your professors gets going on about their work.

Photon Snacks Suggestions

This is the third Photon Snacks column, and while there are a million ideas for topics, I want to make sure that I write items that interest you. So, I developed a survey in Google Forms at: <https://forms.gle/ibC9LhPemeniJwhv9>. There are three questions:

- Give your preferences for topics in the Photon Snacks' column of Light Bytes,
- Suggested columns in the above or any other topic areas, and
- Suggested individuals (and topics) who could write a column - including you!

I will keep this survey open “forever” so that if your opinion changes over time or you have suggestions for authors and/or topics, you can submit them. I plan to continue Photon Snacks on a weekly basis when classes are in session in the Fall and Spring semesters, so all of your input is greatly appreciated.



The image shows a Google Form titled "Photon Snacks" with a background image of a white truck with "PRISM GREENHOUSES" branding. The truck also displays the phone number "744-0127" and the address "7710 N. ARTESIANO TUCSON, AZ". The form contains the following text and structure:

Photon Snacks
What type of columns would you like to see going forward in Photon Snacks...

Give your preferences for topics in the Photon Snacks' column of Light Bytes

	Love it	Like it	Fine	Dislike it	Hate it	Whatever
History of Optics	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Research presentation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Research	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Photon Snacks is a column for Light Bytes edited by John Koshel, Associate Dean for Undergraduate Affairs in the Wyant College of Optical Sciences. You can find the previously written articles at <https://wp.optics.arizona.edu/jkoshel/photon-snacks/>. Additionally, make suggestions for articles (or even write one!) by emailing jkoshel@optics.arizona.edu or by visiting the survey anytime at <https://forms.gle/ibC9LhPemeniJwhv9>.