Spring 2015

JHU Department of Biophysics
Undergraduate Newsletter

Senior Profiles

The Spring issue each year highlights our graduating seniors. Congratulations to the Biophysics class of 2015!

Rachel Wolinsky

Rachel grew up just off a farm in Rural Western Pennsylvania, about 40 minutes outside of Pittsburgh. Aside from academics, she rode horses and triple jumped for the track and field team. After a traumatic knee injury as a high school freshman, Rachel fell in love with medicine and also ended up with three Achilles tendons as a result of reconstructive surgery. Once deciding to come to Hopkins, she chose biophysics almost immediately because of its small size and intellectual challenge. She knew she desired to become a physician, but wanted a slightly atypical route and therefore strayed away from Biology, Neuroscience, and Public Health. Biophysics is perfect because it fuses the major sciences and gives the freedom to pursue a wide variety of scientific interests. Her favorite class at Hopkins was *Human Gross Anatomy* because it directly relates to her career goals and was very engaging.

For her undergraduate research Rachel has spent the past three semesters working with Dr. Thomas Brushart, the Director of Hand Surgery in the Department of Orthopedics at the Johns Hopkins Medical Institute. She found the position in his research lab after sending out some emails to various members of that department. Their projects focus on peripheral nerve regeneration.

Moving to Baltimore was a drastic change of pace for Rachel. But over the past four years, she has really adapted to the city and will certainly miss it next year.

Rachel will be working for Americorps at the Outdoor Odyssey Leadership Academy in Western Pennsylvania starting in the fall. She will be concurrently applying to medical school, hoping to begin in the fall of 2016.

Joel Pally

Joel Pally is from Hartford, Connecticut. In addition to biophysics, he is a social policy minor. He decided to become a biophysics major his freshman year after talking to people in the major and realizing how awesome they were and how in love they were with the major Also, he thought biophysics classes sounded way cooler than the engineering ones.

Joel loves biophysics for many reasons. First, the biophysics department is a tight knit community. Students in this major really bond and get to know one another. The professors do an excellent job creating courses that are unique and compelling. The classes are small and discussions are common and encouraged. Biophysics is also incredibly in interdisciplinary. You learn to think holistically about problems. No two classes are alike and there is an opportunity to learn a variety of valuable skills.

If Joel had to choose a favorite class it would probably have to be Dr. Bertrand Garcia Moreno's *Bioenergetics*. Dr. Moreno is an incredible lecturer and really knows how to engage a class and get students to think through problems. For example, the students didn't just memorize the mechanisms of ion transport; instead we learned to use our knowledge of the transport system to infer a mechanism.

Joel conducted his undergraduate research with Dr. Elijah Roberts in the Jenkins Department of Biophysics. His project was focused on creating a computational model for actin polarization in

The T. C. Jenkins Department of Biophysics Undergraduate newsletter is published twice yearly. The articles are predominantly written by current Biophysics majors and alumni. Announcements about the major are included, too. The Newlsetter is coordinated by Prof. Karen Fleming, Biophysics Director of Undergraduate Studies. Contact her at Karen.Fleming@jhu.edu to contribute articles. Previous issues can be found at http://biophysics.jhu.edu/undergraduate_newsletter.html

Yeast Cells. Joel got into this because he had taken a couple of computation classes and he reached out Dr. Roberts because he was interested in learning more about modeling cellular systems. Joel's advice for anyone considering the major would be to just talk to someone in the major, and he says he would be surprised if they couldn't convince you to do it!

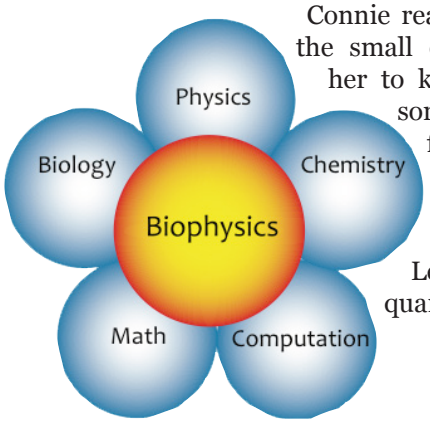
Joel's favorite aspect of Baltimore has been volunteering and interning for the Thread Mentoring Program. There are always things to do in Baltimore and there is such a diversity of cool and interesting people outside of just Hopkins students.

After graduation, Joel will be working as an assistant researcher on a different kind of computational modeling project in the sociology department, where he will be modeling the paths children in Baltimore take through the public education system. Joel hopes to eventually work in the areas of income inequality and labor and employment policy.

Connie Chang

Connie comes from San Jose, California. In addition to majoring in biophysics, she has also picked up two minors: computer science and theater arts.

Connie decided on biophysics right after she was accepted to Johns Hopkins. Because her strengths were in math and science, she wanted to study physics but wasn't interested in the areas offered by the physics department. When she found biophysics, she thought the combination of biology and physics was perfect for it involved her favorite science and found the biological applications to be relevant to human life.



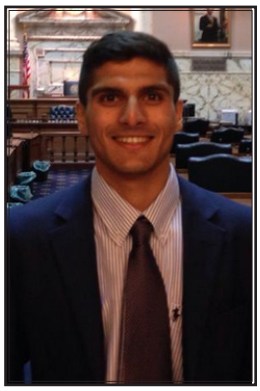
Connie really enjoyed the intimacy of the small department, which allowed her to know her peers and professors better. Her favorite class from the department has been *Spectroscopy and Its Application in Biophysical Reactions* with Dr. Juliette Lecomte. Introducing her to quantum mechanics, Connie says that the course fascinated her with how particles behave and how their properties could be applied to study organic molecules. In addition, she also liked *Introduction to Computing* with Dr. Carolyn Fitch because it introduced her to computer programming. She liked learning how to write useful scripts, which led her to pursue the minor in computer science.

Connie worked in Dr. Mario Amzel's lab at the Johns Hopkins medical campus during her sophomore year. Her research project was on the structure of mTOR, an essential protein playing a variety of roles in different pathways. Connie found the project after looking online at the biophysics research at both Homewood and JHMI. She sent emails to the labs that interested her, and Dr. Amzel offered her a position.

Although the city is known for crime and bad weather, Connie will still miss Baltimore for its city atmosphere. She likes how easy it is for her to go downtown (for free!) and visit the Hippodrome Theatre for shows.

After graduation, Connie hopes to work as a software developer, taking advantage of her Computer Science minor to make interactive technology.

Aravind Krishnan



Aravind was born in Paris, France but has lived all over the world, including places like China, India, Canada, Venezuela, and the United States.

He decided to major in biophysics after taking the freshman seminar course. The tight knit nature of the department with the cutting edge technology and research made the decision a no-brainer. His favorite thing about the major has to be his fellow students. The degree of camaraderie he has experienced in biophysics is unmatched by any other major or department at Hopkins. One of the best things about biophysics at Hopkins is that no class is an individual struggle, but rather a mutual effort to succeed!

Advanced Seminar in Structural Virology with Bertrand Garcia Moreno was by and far Aravind's favorite class. The entirety of the class was discussion and response based and incredibly relevant. It revolutionized the way he looked at viruses and gave him both a scientific and social context to the spread of disease. It was a small class so individual attention was a given. Aravind strongly recommends all potential majors to sit in on an advanced seminar course for a day to get a taste of the major.

His current research project is with Dr. Elijah Roberts here in Jenkins. The lab works on computationally modeling the "shmooing" process that yeast undergo prior to mating. The work is highly technical and taught him a lot about the rigors of computational analysis. Aravind got involved in this research by doing something very simple: emailing Dr. Roberts and asking him if he could join.

Aravind's advice for new students would be to talk to upperclassmen about smart scheduling. Your experience at Hopkins should be a balance of work and leisure if you want to make the most out of it; oftentimes there's no logic in taking a significant number of high-intensity courses in one semester. Leave time to explore, to grow, and to converse, as those are vital skills in your academic and professional development. Also keep an open mind! Biophysics is compatible in so many different fields that it never hurts to explore options other than basic science.

An interesting fact about Aravind is that he hasn't had a single slice of pizza since coming to college (how's that for college stereotypes!).

In the coming year, Aravind is applying to medical school. His gap year plans include continuing his work with the Weight Management Center at the Johns Hopkins School of Medicine while continuing his Congressional work in healthcare policy. Biophysics equipped him with the ability to pursue these avenues!

Rasmi Jasti

Rasmi Jasti is from Ashburn, Virginia, a suburb of Washington D.C. She was actually considering biophysics, even before she arrived at Johns Hopkins University. Once she started taking the classes and met the professors and others in the major, she knew it was what she wanted to major in for sure. Biophysics has taught her new ways to approach medical problems and innovative medical technologies. In a way, it has taught her a new way of thinking about biological systems. She loves the fact that biophysics is such a tight knit group of people. It creates a great environment for learning, and you can form close relationships with both your professors and peers.

Rasmi did her undergraduate research in the Department of Cardiology at the Johns Hopkins School of Medicine. She worked in the lab of Dr. Daniel Judge, a cardiologist, to find potential gene targets in treating Arrhythmogenic Right Ventricular Dysplasia. During her search for a lab to work in, she shortlisted labs both at the School of Medicine and at Homewood and emailed them expressing her interest. After having short conversations about their work, she chose the one that she was most interested in. She decided on Dr. Judge's lab because she has a strong interest in cardiology and genetics.

Outside of her academic endeavors, Rasmi enjoys playing tennis. She loves to spend her time exploring all there is to do around Baltimore.

Rasmi will be going to medical school after graduation with the goal of becoming a surgeon.

Jeff Granja

Jeff is from Seal Beach, CA and is graduating as a double major in biophysics and chemistry. He decided he wanted to major in biophysics because he was interested in physics and chemical applications to biology. This interest was solidified after freshman spring when he took Dr. Barrick's *Biophysical Chemistry* class because he really enjoyed learning biophysical techniques.

Jeff's favorite parts of the major were the teachers in the

department and how they worked hard to effectively teach the material to the students. After sophomore year he began research with Dr. Joel Tolman in the Department of Chemistry on selective single transition cross polarization. This will be a tool that can effectively evaluate the expectation value of the irradiation of a multi-spin coupled system.

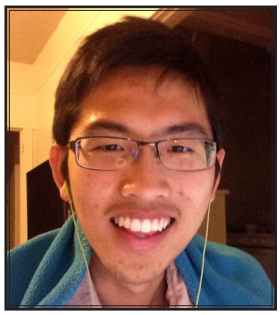
Jeff's favorite part of living in Baltimore has been the resources available to pursue his goals, whether it be go to outdoor climbing or to the medical campus for research. One of his favorite activities is to rock climb at Earth Treks in Timonium, just up the road. His advice to anyone seeking guidance in determining their major is to find something that you truly enjoy and be open to the possibilities it allows. For him, taking *Biophysical Chemistry* led him to taking *Physical Chemistry* and pursuing majors in both biophysics and chemistry.

Jeff's plans after graduation are to continue research with Dr. Tolman hoping to put further use of his work as an undergraduate. Jeff is applying to Medical School for the 2016 cycle.

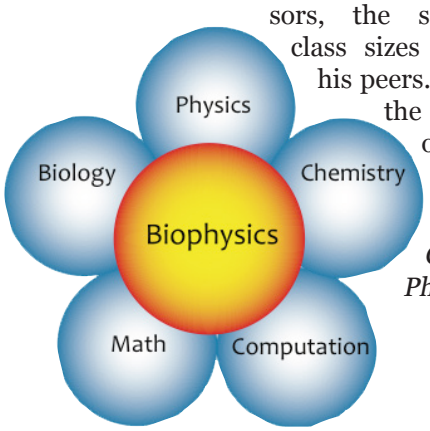
Eddie Kong

Eddie grew up in Guatemala City and says it's an awesome place.

He decided to major in biophysics late into his freshman year. Biophysics was the perfect combination of biology, physics and math that he yearned for and ultimately gave him the flexibility and power to do anything he wanted later on.



His favorite things about the major were the professors, the small class sizes and his peers. To this day, he still misses the time he spent with everyone.



His favorite class was *Cellular and Molecular Physiology* with Dr. Richard Cone. It was fascinating. Take it and you'll see why! He also really enjoyed *Biophysical Chemistry* with Dr. Doug Barrick and *Computational Biology* with Dr. Patrick Fleming. The material was interesting but the best part was that the professors made learning the material fun.

Eddie's undergraduate research was with Dr. Richard Cone in the Vagina Lab in the Jenknis Department of Biophysics. Believe it or not, Eddie says that it's even more intriguing than it sounds. He emailed Dr. Cone and began working on experiments to determine the acidification mechanism in different *Candida* strains that cause yeast infections. Eddie strongly believes that the research component of the biophysics major is an invaluable learning experience for everybody.

An interesting fact about Eddie is that you can find him on YouTube giving a presentation to the U.S. Dept. of State during a conference call to save fish.

Eddie wants new majors to know that there is more to Baltimore than meets the eye. It slowly grew on Eddie over the years - not necessarily because of the plethora of hidden (and scrumptious) restaurants, the historical gems around the city or the surprisingly relaxing pace of the city - but because of the people you'll meet during your time in Baltimore over the next few years. They're truly wonderful.

Eddie's advice for new majors is to recommend that you get to know your professors and your peers. This major is rigorous, flexible and one of the best majors for pre-meds. Work hard, but take it easy; have a balanced life and you will succeed. It's not only for pre-meds though because during his time in the Biophysics department he found something else that overtook his desire to become a doctor.

Shortly after his May graduation, Eddie will be working as a full stack software engineer in the startup scene at the Bay area. However, not even he knows what will to come after that.

Elmer Rho

Elmer grew up in a small town in Washington after attending middle school education in Korea and high-school in Missouri.

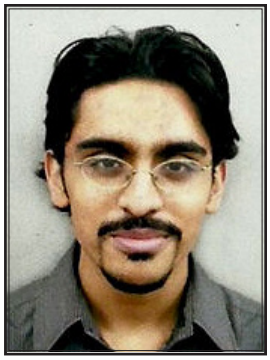
After reading through research articles, he realized that having an interdisciplinary set of skills was necessary for efficiently communicating with people and to do research so he decided to have biophysics as his major. This gave him the aptitude to understand and be flexible across different disciplines. His favorite class was *Biophysical Chemistry* taught by Dr. Doug Barrick. He said that it was great class to go from theoretical to practical modeling skills.

Since his sophomore year, Elmer worked in the Synthetic Cell Biology laboratory under the guidance of Dr. Takanari Inoue at the Institute for Basic Biomedical sciences at the JHMI. Elmer developed genetically encoded tools, which he utilized to understand and uncover biological phenomenon. Currently, the goal is to develop artificial cells using chemical dimerization methods with these biomolecular tools.

Elmer's favorite aspect of living in Baltimore is the fact that Chipotle is walking distance from campus.

After graduating, Elmer is planning to do a summer internship and to go to graduate school. He is also hoping to do some traveling with his family.

Nirvan Sengupta



Nirvan Sengupta is from Prince Georges County, MD. He decided to become a biophysics major the summer before he got to Hopkins. He couldn't pick between biology and physics, but then he found biophysics, which was a perfect combination of his interests. His favorite aspect of biophysics is that it has helped him understand life and evolution on an intuitive level. Now, he says, diffusion and binding coefficients are as natural to him as understanding why water flows downhill. Nirvan's favorite class was Dr. Doug Barrick's Biological Physics. It's an intense class that covers a lot of awesome material.

For his research, Nirvan studied viral evolution in response to anti-viral medicines. It was a bioinformatics project, and he worked with the director of the high-performance computing cluster at the Bloomberg School of Public health. To find this project, he got in touch with a number of professors at JHSPH and eventually narrowed it down to Dr. Fernando Pineda.

His favorite part of living in Baltimore was the diversity that comes with any big city and the hometown feeling that comes with not-too-big cities. An interesting fact about Nirvan is that he can jam on any drum from anywhere in the world.

His advice for new students is to become a biophysics major because there is no better way to prepare for research in biology-related fields or to prepare to be a doctor.

After graduation, Nirvan is taking a break from his previously intended career path as a scientist, doctor, or engineer to do something he's always wanted to do but won't be able to do any other time in my life: he's joining the U.S military by applying to be an officer in the marine corps. He assures everyone that he will still represent JHU Biophysics – the Few, the Proud.

Kudos!

Congratulations to junior Quenton Bubb, who won a prestigious UNCF/Merck undergraduate research scholarship! Quenton was one of only fifteen undergraduates to receive this award. Read more about it in the hub: http://hub.jhu.edu/2015/04/02/bubb-merck-undergraduate-research-award.

More Kudos!

AY 2014-2015 PURA awardees in Biophysics include Vikas Daggubati, Andrea Theodoru, Camilla Villasante and Cyrus Zhou.

Spring 2015 DURA awardees include junior Shawn Costello.

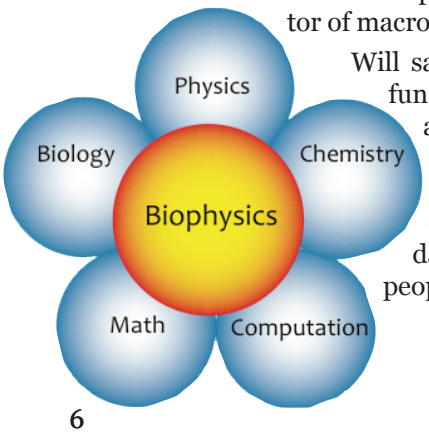
Congratulations to Rachel Wolinsky for being selected for Phi Beta Kappa. Rachel is also the 2015 Detlev Bronk Awardee for Outstanding Scholarship in Biophysics

Alumni Spotlight: Will Chang

William Chang has been working with João Xavier (xavierlab.org) in the Computational Biology Department at Memorial Sloan Kettering for the past 4 years. The lab is mostly an experimental microbial lab, but Will is an outlier in that he works on theoretical models of cancer. He is in the Physiology, Biophysics, and Systems Biology program at Weill Cornell, with which MSK is affiliated. After learning a lot about molecular mechanisms as an undergraduate at JHU he became interested in what happens when collectives of molecules or cells act together. He tried out computational biology and found out he really liked programming, so he stuck to that.

João has been very generous about letting Will be independent and basically decide everything about both of his projects. These followed the general rule of applying mathematical models from ecology to interactions between cancer cells and stromal cells, particularly tumor-associated macrophages. For the first project, he created a self-propelled particle model (similar to models used to simulate bird flocking) to test whether cell-cell coupling between migrating tumor cells could enhance the effect of pro-invasive migration factors from stromal cells. For the second Will made a Lotka-Volterra type population dynamics model to reproduce the growth patterns of glioblastoma, which depends heavily on macrophages, as well as treatment with an inhibitor of CSF-1 receptor which is a major regulator of macrophage behavior and survival.

Will says that it has all been very fun, but very theoretical, so for a postdoc he is looking for ways to infer these kinds of interaction models from cell experiments or sequencing data, which it seems many people are becoming interested in as resolution of sequencing and profiling increases.



JHU Biphi ΦΦ Group on Facebook

Current and prospective majors and alumni: Be sure to add yourself to the BiPhi ϕϕ Facebook page, where you can see first hand the fourier transform of a cat.

Spring Party and Poster Session

Wednesday, Apr 29, 2019 4:30-6:00 PM, UTL Atrium. Thai food will be served; we will welcome our newly declared majors, and we will recognize our seniors!

Graduation Reception for Seniors & Parents

Wednesday, May 20, 2015 3:30-5:00 PM, UTL Atrium. Biophysics Reception for seniors and their parents. Student accomplishments will be recognized, and awards will be announced.

"My favorite thing about the Biophysics major has to be my fellow students. The degree of camaraderie I have experienced in Biophysics, I feel, is unmatched by any other major or department at Hopkins."

Aravind Krishnan,

JHU Biophyics'15