Dear PRISE/BLISS/PRIMO 2011,

Thank you for your wonderful submissions to the newsletter and making this summer such a blast. We (and the rest of the PRISE/BLISS/PRIMO community) thoroughly enjoyed reading your fascinating self-introductions, research summaries, and hilarious embarrassing experiences. You guys rock!

Lots of love,
Aili Klein, Kevin Ni, Anji Tang, Roxana Feier
Summer 2011 Newsletter Editors

Lynn Yi

Year: Senior
Concentration: Physics and Math
House: Eliot!
Hometown: Queens, NY

PRISE research project: Screening for Elements of 5'UTRs that Regulate Translation

About Lynn: Originating from New York City, I attended Hunter College High School (the liberal arts counterpart to Stuyvesant), took advantage of the various sources of food in Flushing (the Chinatown of Queens), and got lost in Central Park (the MET and row boats ftw). Starting college, I intended to concentrate in biology, but, after exploring some physics and math classes, decided that I love the all-night pset culture too much to leave. For fun, I teach for the Harvard Educational Studies Program and sing in the Harvard College Madrigal Singers. As a mystery genre fanatic, I spend numerous hours watching Castle and House.

Most embarrassing lab experience: When I was presenting at group meeting, everyone laughed at my "Acknowledgements" slide because I listed my post-doc as "my post-doc."

Fun fact about you: Mr. Leroy Brown is arguably my first love. Inspired by Encyclopedia Brown, as a kid I dreamed of becoming a detective. That might have
something to do with my later scientific pursuits and the many times I play "detective" in the game of mafia.

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**Danielle Ithier**

**Name:** Jeremy Cushman  
**Year:** 2012  
**Concentration:** Physics  
**House:** Pfoho  
**Hometown:** Little Neck, NY

**PRISE Research project:** This summer, I'm working with the ACME collaboration to attempt a measurement of the electric dipole moment of the electron. The electron electric dipole moment (EDM) is an intrinsic property of an electron that relates its potential energy to the strength of an external electric field. For over 50 years experiments have searched for non-zero electric dipole moments in elementary particles. Although no non-zero EDM has yet been detected, various experiments have placed upper limits on its value. The current experimental limit is 13 orders of magnitude greater than the value predicted by the Standard Model, but it is widely believed that an observation of a non-zero EDM is likely if the experimental sensitivity can be improved by just a few orders of magnitude. The observation of a non-zero EDM would imply a violation of parity and time-reversal invariance, and its specific value would eliminate or require modification in certain theories that lie beyond the Standard Model to match the experimental result.

**About Jeremy:** When I'm not spending my evenings doing problem sets, I'm probably playing the violin. I've been playing for over 15 years, and here at Harvard I play in the Harvard-Radcliffe Orchestra (HRO), in the pit orchestra for the Gilbert & Sullivan Players, and in a few chamber groups.

**Most embarrassing lab experience:** I had two 3-digit numbers, an inner diameter and and outer diameter for a circular part. With the grad students watching, it took me 4 tries to subtract one from the other correctly.

**Fun fact about you:** I've performed solo on the violin in eleven different countries on four continents.

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**Year:** 2014  
**Concentration:** Engineering Sciences (Mechanical)  
**House:** Cabot  
**Hometown:** Hooksett, NH

**PRISE research project:** I am working in the Microrobotics Laboratory on wing optimization for a robotic butterfly. The current challenge with Micro Air Vehicles (MAVs), such as the robotic butterfly and other robotic insect models, is reducing the energy needed to sustain flight. We hope that by better understanding the flap-girling techniques butterflies use, we will be able to develop a more energy-efficient flight for MAVs as well as further biologist's understanding of butterfly flight. My main contribution to the project thus far has been looking at the orientation of the forewing and hindwing of butterflies during flight to better understand the effect of shape. This is achieved through analysis of high-speed footage of butterflies in both tethered flight inside a wind tunnel and in free flight.

**About Danielle:** I have been interested in science for as long as I remember and knew I wanted to pursue some type of science/math field in college. During high school I did FIRST Robotics and knew instantly that engineering was the right major for me. I am extremely interested in robotics and I think because of this the Microrobotics Lab is the perfect fit for me! I could definitely see myself continuing to do robotics research in the future (especially if my dream of becoming a Mythbuster does not work out). In addition to robotics I love biking, reading, sports, social activism, trips to Berryline, and watching Fresh Prince reruns. Oh yes, and I am a sucker for watching movies with robots in them!
Catherine Zagroba

Year: 2012  
Concentration: Psychology with a secondary in Economics  
House: Leverett  
Hometown: Ridgewood, NJ

PRIMO research project: I'm working on a project about unions and unemployment. We're looking at how different cities developed economically as a result of the unemployment and unionization they experienced during the Great Depression. So far it seems that cities with higher unemployment during the Great Depression also had higher levels of union activity and these cities continue to have slower economic growth today.

About Catherine: I was born and raised in northern New Jersey (more like the Real Housewives of New Jersey than Jersey Shore). I love baking, playing board games, and taking naps, but what I really love is swimming. I've been swimming since the age of three and some of my fondest memories are of practices and meets over the years. I'm on the varsity swim team here and in my free time, I help coach a swim team in inner-city Boston.

Fun fact: I've never gone to a school with a real mascot (my high school's mascot was the color maroon).

Most embarrassing lab experience: Early this week I performed a task that I have done at least twenty times this summer— I tethered a butterfly by attaching a thin wire to the its thorax so that it could hang from the roof of the wind tunnel and not get sucked towards the back. I was walking in the office where my P.I. and the postdocs were located in order to return some tape before heading down to the wind tunnel when the butterfly detached from the wire! Very embarrassed, I had to grab a net and chase the butterfly for the next ten minutes around the office in order to catch and remove it.

Fun fact: I became a first-degree black belt in shalin kempo karate when I was ten.

Yvette Leung

Year: 2014  
Concentration: Chemical and Physical Biology  
House: MATHER!  
Hometown: Brookville, NY

PRISE research project: Using rodent models of Parkinson's disease to investigate neurodegeneration and novel neuroprotective therapies.

I am conducting research in the Isacson Lab/Neuroregeneration Institute at McLean Hospital. The motivation behind my research is that by the time Parkinson's disease has been diagnosed in a patient, nearly 70% of the neurons that produce dopamine in the brain have already died. As a result, placing a great emphasis on preventative treatments is extremely important. To accomplish this, I have spent this summer characterizing two rodent models of Parkinson's disease that might give us insight into the underlying mechanisms of neuronal degeneration as well as offer opportunities for testing potential therapies that will protect neurons from injury and death. In particular, I am studying

Alison Kraemer
peripheral nervous system dysfunction in a transgenic mouse model in addition to testing the effects of a potential neuroprotective molecule in a rat model of Parkinson's disease.

**About Yvette:** From the moment I started watching *The Magic School Bus*, I have been enthralled by science. As a child, I could often be found plastered to the TV screen after dinner everyday watching either *The Magic School Bus*, Bill Nye the Science Guy, or NOVA. Apparently I also found immense joy in poring through scientific atlases at a young age. As I grew older, my motivation to pursue science continued; I was so motivated to pursue science that I joined the high school research program when I was still in middle school and have been involved in summer research ever since.

Moving on from science, however, I am passionate about playing Ultimate Frisbee, playing the violin, traveling all over the world, and merging my love for science and writing. At Harvard, I'm heavily involved in THURJ, The Harvard Undergraduate Research Journal, and I am also a proud member of the Harvard Pops Orchestra. In my spare time, I volunteer with Harvard MIHNUET and play IM frisbee.

**Most embarrassing lab experience:** One of our lab freezers broke last week and I was attempting to diagnose the problem when I called on our stem cell lab director for help. He proceeded to grab a compressed air bottle and aimed it at the air filter, exclaiming "Die, dust bunnies, die!" I promptly squealed and ran around the lab telling everyone about how I was going to help kill the dust bunnies and save the freezer. Apparently, I did an amazing job killing the dust bunnies but sadly, the freezer died anyway. RIP freezer, RIP.

**Fun fact:** I love traveling abroad! To date, I've been to 25 countries in the world, including Israel, where I conducted research last summer.

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**Peter Freese**
Yet, this is only one of my dreams for my future, as I'm interested in many other things and I notice life tends to take people in unexpected directions. I'm especially interested in the topics of global health (I'm Co-Editor-in-Chief of the young Harvard College Global Health Review), public policy, history of science (that's my secondary field), and evolutionary biology (I studied with the amazing Dr. Andrew Berry at Oxford last summer). I also enjoy playing the flute (I play for the MSO and MIHNUET), eating delicious food (yum, crepes!), and being with my friends and family.

**Most embarrassing lab experience:** So, there was this one time when I nearly burnt the lab down...well, it wasn't that serious but it was certainly embarrassing. It was the end of the day and I was eager to leave lab to get to Dudley House because I was starving, and I was at the bacteria bench inoculating my plates with bacteria. The general protocol requires burning off ethanol from the inoculating loop to sterilize it. Right after I plated the last of my bacteria, I thought that it was a good idea to sterilize the inoculating loop for good measure. After watching the flaming ethanol disappear (or at least, I thought it did), I placed the loop back into the ethanol and, to my horror, the beaker of ethanol caught on fire along with the parafilm covering it. I froze and then proceeded to say rather meekly but loudly to my labmates across the bench, "hey, guys...hey, guys!...HEY, GUYS!" They came over, put the fire out, saved my life and the rest of the lab from destruction then mentioned, "Next time, you should yell 'FIRE! not just 'hey, guys!'" Yeah, so, I felt really stupid after that, but I'm all the smarter for it now, I suppose.

**Fun fact:** I was born in Las Vegas, but moved from there to FL when I was 8 months old. When people hear this, they tend to ask me if my parents eloped in a Las Vegas hotel when they were half coherent and I happened to be the result of it all. Nothing of the sort happened, I assure you, but it always feels cool to say I was born there.

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**Roxana Feier**

**Year:** 2012  
**Concentration:** Applied Math - Biology  
**House:** Leverett. Isn't it great?  
**Hometown:** St. Cloud, MN. The Midwest is an awesome place to grow up!  

**Research project:** My research project is on modeling bacterial conjugation, a method of horizontal gene transfer that is responsible for much of the spread of antibiotic resistance. Previous work in my lab has investigated the mechanism and dynamics of conjugation in continuously mixed liquid medium and the inhibition of conjugation by a bacteriophage (a virus that infects bacteria). My project is to extend this study of conjugation to solid medium since bacteria naturally exist primarily on surfaces. I do a mix of wet lab experiments and modeling/simulation using Matlab thanks to to the help of my brilliant biophysics postdoc!

**About PFreese:** I was always really into math growing up - I was lucky to participate in a math education program through the University of Minnesota starting in 6th grade that allowed me to take condensed high school courses and a couple years of college math courses early. Most high science classes also catered to my quantitative and logical side, but my biology class was particularly engaging and the teacher was amazing, which initially piqued my interest in biology. At Harvard, I continued exploring different science disciplines and although I found out that I don't want to go into pure math, I love that I don't have to abandon my quantitative side and am still able to study science and biology. Outside of class and research, I play flute in the Harvard University Band and Flute Ensemble and I'm a PAF! I also love to go to the gym, watch reality TV, play board games, go to book stores and coffee shops, spend hours reading on the internet, and travel to warm places.

**Fun fact:** I had both of my parents as teachers (mom for 1st grade and dad for 6th grade). Luckily it was before
I was socially conscious so I don't remember it being awkward to call them "Mom" or "Dad".

**Best part about being a PA:** Getting to spend Harvard's money to have fun with you all! Throwing study breaks and helping facilitate the awesome activities you all have come up with are great opportunities to meet the amazing PRISElings and do tons of fun things on campus and in Boston.

**Your favorite experience when you were in PRISE:** Besides the advance screening of Harry Potter? I've really enjoyed going to Six Flags both years - I love how thrill rides give you an exhilarating rush without actually requiring you to take a risk or endanger yourself. And what's better than spending a beautiful day outside with interesting and funny PRISElings?

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**PRISE research project:** I'm working in the Gunawardena lab in the Systems Biology department at HMS. My project is on network reconstruction of biological pathways. Using time-series data for the concentrations of the species involved in a particular pathway, my goal is to recover the interactions between those species. This is accomplished by building upon algorithms initially developed in the context of algebraic geometry, which explains why a math major like myself is doing research at a medical school.

**About Roxana:** After having been pretty serious about math since early middle school, I came to college confident that I would continue into math academia. Early in my junior year, a mid-college crisis kicked in as I decided I want to be closer to the applied end of things. This is how I started exploring mathematical biology through my research this summer, which has been a great compromise between my continuing fascination with math and my desire to do things that are directly relevant to the real world.

I am also excited about astronomy, computer science, math and science education, photography (film and digital), puzzles of various sorts, and board games. My favorite way to procrastinate is by watching videos of cute animals on the Internet.

**Most embarrassing lab experience:** I do theoretical work, so it's kind of hard to mess things up just by sitting in front of the computer all day. However, I would mention that I work in the same room with five other interns: a Romanian, an Italian, a Nigerian, a Kazakh, and just one American. The accents you hear get pretty entertaining.

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**Jenny Lu**

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**PRISE research project:** My current project is to create a lineage tree of cells in a pancreatic tumor. A cell population can be genetically heterogeneous—and this difference is often amplified in cancer systems due to genetic instability. By examining regions in the genome where the mutation rate is higher, for instance microsatellite regions or simple sequence repeats, we can infer the genetic relationship between cells in a given sample. In the future, applying this technique could help clarify certain aspects of tumorigenesis such as the spatial or temporal progression of oncogenic mutations.

**About Jenny:** My interest in science began in high
Fun fact: I am from Transylvania.

Zuzanna Wojcieszak

Year: 2013
Concentration: Psychology, secondary in WGS
House: Eliot
Hometown: Gdańsk (Poland)

BLISS research project: Factors affecting social-cognitive ability. I’m working in Jason Mitchell’s lab for social-cognitive neuroscience, learning Matlab and helping with studies on social functioning of people with autism, the relationship between reading fiction and improving theory of mind, and the influence of aging on social cognition. One of my main projects this summer was a meta-analysis of extant functional magnetic resonance imaging (fMRI) studies of social deficits in autism. We found over thirty separate studies that directly compare brain activity of subjects with autism spectrum disorder (ASD) to healthy populations on a variety of tasks indicating social-cognitive proficiency (e.g. recognizing emotional states from facial and bodily expressions, understanding irony, or responding to social cues, such as directional gaze). The next step will be to compare these studies in order to find consistent activation patterns responsible for the poorer performance on social-cognitive tasks in the autistic population.

About Zuzanna: Though Dan Gilbert would probably say I’m lying (you who went to the Faculty Chat with him last week will know what I mean), I was pretty set on studying psychology quite early on (in junior high). I became involved in psych research at Harvard in my sophomore year, working in Sidanius Lab for Intergroup Relations and Weisz Lab for Youth Mental Health. Research has become a very fun way for me to explore different areas of psychology and hopefully will help me decide what I might want to do in the future. Outside of school when I discovered a love for chemistry. Later on, I also found myself captivated with physics, and now in college I am fascinated with biology. I currently research in the Xie Lab, and I enjoy every minute of it. In addition to science, I love dim sum, dominion, music, totoro, and traveling—and if I’m not labbing or studying, I’m probably doing something related to these things.

Most embarrassing lab experience: I was doing a practice physics lab practical, which involved building a circuit. I spent half an hour figuring out why one of the components (I think it was an amplifier) was not working, only to eventually realize that I had never turned it on in the first place. I said something aloud to the effect of, “I have to turn it on before it will work?!”

Fun fact: I have slight allergies to most fruits.

David Yang

Year: 2013
Concentration: Chemical and Physical Biology
House: Adams
Hometown: I was born in Fuzhou, China but I’ve lived mostly in Carmel, Indiana.

PRISE research project: I’m using a laboratory approach to explore the relationship between protein stability and evolvability.

One current hypothesis in protein evolution states that stable proteins can more readily evolve than less stable variants as increased stability allows proteins to accept a wider number and range of mutations, many of which are destabilizing. Experimental evidence for this hypothesis, though, has been rather limited as traditional laboratory evolution methods are both time- and labor-intensive, often requiring days or longer with frequent human intervention for each round of evolution.
WJH or Northwest Labs, I can often be found rehearsing with Corcaidhearg (Harvard College Irish Dancers; pronounced like core-key-air-egg) or for a theatre show, taking photos for the Yearbook "comp photo board this fall", or studying/playing Tetris/learning to play the piano in Eliot Dining Hall.

**Most embarrassing lab experience:** Nothing too embarrassing, just kind of funny: one of the studies run in SCAN lab looks at effects of aging on social cognition. I was recruiting elderly subjects in Harvard Square (they have to be at least 65 years old) one day and I approached two old-ish looking men. They seemed very interested in the study, but then it turned out they were barely 60. 'So we look THAT old to you?', they asked. We all just laughed and admitted that I'm pretty bad at judging people's ages.

**Fun fact:** When I was 13 years old, I went to a circus camp for the summer and practiced on trapeze.

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**Matt Abrams**

Year: 2014  
**Concentration:** Human Developmental and Regenerative Biology  
**House:** Adams!  
**Hometown:** San Diego

**PRISE research project:** This summer I’m studying neuronal maturation in cortical projection neurons in the developing mouse brain and comparing it to cortical-like neurons generated from the directed differentiation of mouse embryonic stem cells. Cortical Spinal motor Neurons (CSMN), located in layer V of the mammalian sensorimotor cortex, are large pyramidal neurons that project their axons to the spinal cord (critical for fine motor skills). Since mES cells are a potentially unlimited cell source with the theoretical potential of differentiating into all neuronal subtypes, we aim to direct the differentiation of large quantities of mES cells first into regionally-specified neural progenitors and then into the broad class

The Liu Lab, though, has developed a method for laboratory evolution, called phage-assisted continuous evolution (PACE), that allows for dozens of rounds of evolution to occur in a single day without human intervention. I am using PACE to experimentally explore the hypothesis that more stable proteins are more evolvable than their less stable cousins.

**About David:** For most of my childhood, I really didn't like science. I didn’t like my middle school science classes, and I actually sort of hated my high school freshman year biology class (both because of the material and the teacher). It wasn’t until my high school sophomore year, during my first chemistry class, that I started enjoying science.

Outside of science, you can find me following professional sports, especially the Indianapolis Colts; watching too much TV (my new project: The Wire); working with Team HBV (Google us!); and drinking an inordinate amount of coffee.

**Most embarrassing lab experience:** When I first started working in a wet lab, I once needed to autoclave (sterilize using high temperature and pressure) bottles of media. Having never done so before, it didn’t occur to me that the glass bottles may shatter due to pressurization if I didn’t loosen the caps. Thankfully, I decided to ask someone in the lab to check to see if I had correctly put everything into the autoclave before I started the sterilization cycle, and she corrected my potentially disastrous mistake.

**Fun fact:** In the last hour, my Pandora station has played songs by Sublime, the Expendables, Bob Marley, Lifehouse, Five for Fighting, Kansas, The White Stripes, Gnarls Barkley, Kanye West, OneRepublic, The Killers, Jeff Buckley, and Don McLean.

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**Aisha Down**
of neurons that include CSMN. We hypothesize that a combinatorial and multi-stage molecular program can be applied to direct the differentiation of CSMN from mES cells, but only at the appropriate stages of subtype-specific neuronal maturation. Specifically, we are studying how CTIP2 high-expressing CSMN express the following sequence of markers of neuronal maturation at multiple stages of differentiation in the developing mouse embryo, using immunocytochemistry: TuJ1 (immature post-mitotic neurons), DCX (immature migrating neurons), HuC/D (immature and mature neurons), Map2 (somatodentritic neuronal maturation), and NeuN (mature neurons), both in differentiated mES cells and in vivo. The comparison of embryonic CSMN development with mES cell differentiation will potentially enable a more precisely targeted strategy of molecular CSMN programming of mES cells. Ultimately, if large numbers of CSMN are efficiently produced via directed differentiation, potential treatments for ALS might be developed from pharmacologic and small molecule screening using these neurons, or via cell replacement.

**About Matt:** I'm a born and raised Californian that enjoys spending his free time at the beach. Since arriving at Harvard though, it has been very enjoyable learning what it's like to live on the East Coast and have seasons. I like being active. I bike to MGH everyday and go on runs whenever I get the chance. In 6th grade, my teacher was demonstrating the difference between kinetic and potential energy with a rubber band and accidently nailed me straight in the eye. Strangely enough, it was thinking back about that day/teacher when I realized I'd probably want to study science in college.

**Most embarrassing lab experience:** Not the most exciting of answers, but so far this summer I haven't done anything too embarrassing or noteworthy. The first time I ran a gel, I forgot the ethidium bromide, but that's about as embarrassing as it gets for me. One of my roommates for PRISE however, had his phone go off blasting Lady Gaga during lab meeting. Never has his lab seen a darker shade of red.

**Fun fact:** I love to travel. Moreover, I recently obtained my scuba license, and hope to travel around the world surfing and scuba diving in the near future. Within the past year, I've been to Israel, Mexico, and China so I guess I'm off to a pretty good start.

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**Jesus Mario Luevano Jr.**

**Year:** 2014  
**Concentration:** Physics and English  
**House:** Eliot  
**Hometown:** Boulder, CO  

**PRISE research project:** I'm studying baryon acoustic oscillations. *No--wait, don't scroll on.* Ok, so, a bit more than 13 billion years ago, time of the Big Bang, the universe is hot and dense and small. We all know it has to expand--but, as it turns out, our observational data (e-mail me if you want to know more) tells us that it's not just heat and pressure making it expand, it's something else, which goes hugely, exponentially fast, which we call "inflation" and which we right now model as some kind of scalar field of "inflatons" (yes, that's right, we really don't have much of a clue what they are). According to my PI, though, it's not really inflation that's the conundrum, it's stopping it--bringing the universe to a state of the steady expansion we observe today.

Yeah, we're not too sure how to theoretically do that. But ok--now we've made it to a few seconds after the Big Bang. All around us, baryonic matter is beginning to coalesce, maybe even some deuterium is falling out. You might have heard of the cosmological principle--the universe is homogeneous and isotropic. Obviously that's not true on small scales. You and I exist, here and not on Sun. Why? As it turns out, inflation stopped at slightly, infinitesimally different times in different places, and that left the universe with density fluctuations. Since gravity is the dominant force on large scales, matter accumulated more matter, superstructure formed and galaxies and people and apple pie eventually did, too. But recall that the universe is hot soup right now, after the initial blast. Electrons haven't settled down enough to matter-ify, and so the density and pressure from the coupling of photons and electrons, etc., is allowing waves from the density fluctuations to propagate outwards in all directions. It's like throwing a pebble into a pond--the ripples travel outward.

So this happens for, like, 400,000 years. But the universe is expanding all the while, and so it's getting colder--and, at the time when we call the *last scattering surface* forms, the time that we see in space 13 billion light years away travelling outwards--everything is cool enough that electrons form neutral atoms, so the mean free path of a photon soars, and light resounds off towards the horizon. The waves can no longer travel, but their signature is left on all the universe all around us--if you map out the matter distribution of the universe, in telescopic surveys like the Sloan Digital Sky Survey, you'll find that, at any
galaxy, you're much more likely to find a galaxy at 100 Megaparsecs (about 500 million light-years) than at other distances--this corresponds to the wave of matter traveling outward, and we call the peak in the graph of the auto-correlation function the "baryon acoustic peak".

My research involves studying the baryon acoustic peak using different approximations of evolving density fluctuations and comparing them with observational data in order to find a likely model for a density field in the early universe. Once we find a good model for the early density field, we will be able to solve for the dark matter and dark energy constants--and so will be able to compare the density of dark matter and dark energy in the universe to the universe's critical density. This has the potential to tell us something about whether the universe will expand forever (and at what rate) or whether it will eventually collapse in on itself, among other things. Stay tuned.

**About Aisha:** I grew up in a burned-out area of the Rocky Mountains near Boulder, CO. My childhood pasttime was wandering around the lonely hills and charred fallen trees with my tough-as-nails little sister, searching for pieces of rusted cars, or wild raspberries, or shards of quartz we could drag back home into our rock fort. I think we once made a crown out of rusted nails and the corners of someone's seared and abandoned filing cabinet. We found other things, too--mine shafts and blackened pulleys, someone's mustard-yellow ancient VW. It's strange, because I guess something in the emptiness, the cleansed feeling of sky and earth, appealed to me. You could count stars, map trajectories, call out for your echo. My little sister, on the other hand, wished we had a treehouse. So now she's a firefighter and I'm studying physics. We're still both great believers in finding hidden and roasted treasure, though. Funny how these things work.

**Most embarrassing lab experience:** There's a stereotype about astrophysics people that says that we pretty much don't care about precise numbers so much as, we're, ah, within an order of magnitude of the correct answer (or at least within an order of magnitude in the exponent). But in the rare cases where a factor of ten or so is important, I tend to acquit myself horribly. To make things worse, I'm bad at remembering prefixes. So, on my astronomy final, while I was pretty sure that a capital "M" meant "Mega" as in "Megaparsecs", as in "goshdam big", I wasn't really firm on exactly how many zeros "Mega" entailed. I walked up to Prof. Finkbeiner in front of my whole astronomy class and wrote down on my final "10^6 = Mega, right?" He looked
I'm from the Texas-Mexico border, I adamantly avoided playing Mariachi music at home, until I came to Harvard where I am now a proud member of Mariachi Veritas!.) When I do not have a violin bow or multi-pipette in hand I've been known to volunteer as a mentor with STRIVE, plan cultural events with RAZA, or help host the annual Latino Health Conference with LiHC. I am an aspiring Pre...something (most likely Med, but Grad has been growing on me), but that hasn't stopped me from enjoying a good nostalgic Nintendo game every now and then.

Most embarrassing lab experience: When pouring my first gel, I didn't realize just how quickly SDS-polyacrylamide could solidify. That was why it came as a surprise when I attempted to pour my gel, and realized that it had solidified in the beaker... well at least I made a gel.

Fun fact: I am a man of many names, from Jesus to Jesus-Mario, JM, JML, Morty, Remy, Lu Ji Su, Chuy... heck even I've lost track. So feel free to call me by any of the first four, or invent a new one (maybe I'll add it to my list).

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John Capodilupo

Year: 2014
Concentration: Computer Science
House: Quincy
Hometown: Grand Rapids, MI

PRISE research project: Star formation is a difficult theory to formulate. Additionally, scientists have to account for the origin of the observed multiple star systems. Several theories have been proposed and data has been gathering as detector technology has improved. Recently, an observer reported that he saw a lack of substructure in prestellar cores (which could very well go on to form binary stars). My project involves making simulated observations of numeric simulations of these dust clouds containing prestellar cores in an

kinda ill and halfheartedly began pounding his head on the table, which I took as a "yes". Now, whenever I run into him in the hallways of the CfA, he'll stop and chat with me about my research and then say "And how many zeros are in Mega? Good. And Giga? And nano? And Tera? And femto....?"

Fun fact: I'm pretty sure I have the lyrics to half The Lion King soundtrack by heart. Maybe more. Try me.

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Elena Pepe

Year: 2013
Concentration: Psychology
House: Eliot
Hometown: Melrose, MA

BLISS research project: I am working on a few research projects in Ken Nakayama’s psychology lab. Most of the projects going on in the lab have to do with vision and/or faces – I am working on one right now studying the Other Race Effect (we’re looking at mechanisms of face processing to see why/how people are better at remembering and recognizing faces of their own race than faces of other races). I am also doing some coding of non-face tests for use in online batteries.

About Elena: I really like psychology and am considering continuing with research and going to graduate school… although I am also interested in education and archaeology, so we’ll see how all that fits together. Outside of class, I am a tap dancer in Harvard’s TAPS (come to our shows!), a volunteer for the Cambridge After School Program, and an assistant in PBHA’s finance office. I also spend a lot of time around Eliot and co-manage the grille, so if you’re in Eliot on a weekend night, you should stop by the Inferno for some food!

Most embarrassing lab experience: Like others have noted, it’s kind of tough to have an embarrassing experience when you are working at your computer all day, so I guess I’ll stick to a computer related lab story…

So one day I just had this urge to clean out all the dirt in
attempt to reproduce what the observer saw. This way, we can compare and constrain exactly how much current observations can tell us about the accuracy of these star formation theories.

**About John:** I’ve been interested in astrophysics and cosmology ever since I read Stephen Hawking’s *A Brief History of Time*. The crazy ideas of time travel and black holes captured me and I’ve enjoyed learning about the world ever since. In addition to science, I enjoy playing rugby, working out, and programming. I also really enjoy my Italian heritage and can often be found in Boston’s North End.

**Most embarrassing lab experience:** My lab consists of paper, a laptop, and me so not too many embarrassing epic failures can happen. Although, one time I had a perplexing result and showed my mentor who reminded me that I was in radians instead of degrees...

**Fun fact:** I love growing out my beard. In fact, I consecutively participated in no shave November, December, and January.

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**Justin Chew**

**Year:** 2011  
**Concentration:** Neurobiology  
**House (former):** Leverett  
**Hometown:** Reading, MA

**Research Project:** This summer I am participating in the synthetic biology competition iGEM as part of the Harvard team - we are figuring out how to design custom zinc fingers, which are proteins that bind to specific DNA sequences. The DNA sequences they bind to are based in turn on the amino acid sequences that make up the alpha helix binding domains in the protein (you can think of each alpha helix as a "finger" that grips the DNA). By changing the amino acids in each finger, we can change the DNA sequence that the protein binds to. What is the upshot of all of this? Through the ability to design custom zinc fingers, we can target any part of the genome we want with pinpoint precision. By fusing nuclease or polymerases to the zinc fingers, we can insert, delete, activate, or repress genes with pinpoint precision. Of course, there is still a long way to go before this becomes workable, but there are a few promising results in the field that indicate a future where genome editing can become relatively straightforward and routine.

**About Justin:** Like other PRISElings, Bill Nye and The
stress, there is always a small population of HSCs that circulate through blood stream and can engraft on the thymus, spleen, or back on to the bone marrow. Thus, there is an equilibrium between HSCs mobilizing to the blood stream and engrafting back on the bone marrow. However, the specific genes, mechanisms, and pathways that directly regulate these processes remain unknown.

Previous work in my lab has identified the transcription factor Early Growth Response 1 (Egr1) as an important regulator of both HSC proliferation and mobilization, but the way it controls these two functions are unclear. My project this summer is searching for these specific mechanisms. To do so, I compare various phenotypes (including those after stress such as transplantations and macrophage ablations) between wild-type and Egr1-deficient mice to find intrinsic and extrinsic differences that can better elucidate these processes.

**About Edward:** I'm a proud Texan, born and raised in North Dallas, which is also where I had my first experience with science research. I've always been fascinated with science since as I was young and fancied the thought of going into research as I was going up. After graduating high school, I had that chance by working in a neural progenitor lab at University of Texas Southwestern. I had an amazing experience that summer and I've been hooked on research ever since. This is my fourth summer doing research and a full year since I've joined my current lab.

**Most embarrassing lab experience:** RNA and I don't go well together. A year ago I was practicing the main protocol for my experiments: sacrifice 10 mice, extract their bone marrow, stain the bone marrow with fluorescent antibodies, sort the cells for HSCs using fluorescent automated cell sorting, extract the RNA from these cells, convert the RNA into cDNA, and then perform real-time PCR for several genes of interest. After extracting the RNA, I used a spectrometer to check to see if there was anything in the sample at the end. I got a weird reading and concluded that nothing was in there, so, logically, I threw the sample away (my post-doc was gone while I did this). RNA degrades fairly quickly at room temperature. Needless to say, my post-doc was not happy with me when she got back and I told her what I did. I pretty much wasted 10 mice. Thankfully, it was just a practice.

**Fun fact:** Outside of science, my other big passion in my life is music; in fact, I plan on getting a secondary in music. My primary instrument is the euphonium (google it) and I haven't stopped playing it since I first learned in 6th grade. I can also play several instruments - tuba, electric guitar, trombone, and, to lesser extents, trumpet and piano - and can sing decently. Here at Harvard, I'm in the Harvard University Band and Harvard Pops Orchestra playing either euphonium or tuba in both groups. On top of that, I love composing and arranging music including arranging music for the band.

Magic School Bus were actually a huge part of what got me interested in science! Those were (and still are) great shows.

**Most embarrassing lab experience:** Back in 8th grade science class, we were doing an experiment that required us to heat things on glass slides. Most of the other kids just lit their matches and blew them out when they were done, but I had other plans. Being the pyro I have always been, I turned to my lab partner and told him about what a great idea it would be to dump the entire match box into our beaker and light it on fire. The resulting bonfire was really epic, except that the teacher would probably notice the gigantic flames leaping out of the beaker at any second. So, I blew out the fire, causing a huge column of smoke to fill the entire room. Luckily, the sprinklers did not go off, but I was definitely busted. Moral of the story - don't try this at home!

**Fun fact:** Someday I hope to build a gigantic catapult to participate in the annual Punkin Chunkin competition, in which participants attempt to build enormous trebuchet catapults to hurl pumpkins as far as they can downfield (which can be several thousand feet!). Yes, there is indeed a satisfaction to be had watching a pumpkin splat half a mile away (look it up on Youtube). Best part of being a proctor: Meeting another awesome generation of PRISE/BLISS/PRIMO fellows!

**Your favorite experience when you were in PRISE:** The whale watching trip was cool, but organizing a mini-catapult building contest with my co-conspirator Tom was definitely one of my top highlights of that summer. Teaching others how to take a saw to wood to make small siege engines was great, and all of our teams managed to build working catapults. Rest assured, we only fired peanut M&Ms across the courtyard, and everybody emerged completely free of harm due to our safety precautions.

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**Yun Jee Kang**

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**Year:** 2014
**Concentration:** Undecided  
**House:** Dunster  
**Hometown:** Guilderland, NY

**PRISE research project:** I am currently working on ribosome profiling in *C. elegans* using FLAG tagged rpl-18. This will provide us with an overview of protein translation by looking at the sequences bound to by ribosomal proteins. It's a method that has been utilized in yeast, but not as in depth in multicellular organisms, making this an exciting project to be a part of. Right now, I am injecting *C. elegans* to make a transgenic line with these tagged ribosomal proteins - a task I'm finding to be easier said than done...

**About Yun Jee:** I've always enjoyed finding out the why behind things - why is the sky blue, why do darker objects heat up faster, why can't I run through walls like Superman (that last lesson was a painful one). I discovered that with science, I don't have to be content with an "I don't know." I can go find the answer for myself. That's why I find science, and working in a lab, so exciting, and why it's been my favorite subject ever since. In my free time, I like going out to eat with my friends. I love trying new places, so please send any suggestions my way!

**Most embarrassing lab experience:** I was running two experiments simultaneously and a little frazzled. I was rushing to image a gel, and in my hurry, didn't hold onto it tightly enough. The gel slipped from my hand and smashed into a million pieces right in front of my mentor and two of her colleagues. There was gel everywhere. On the bright side, after I cleaned up the mess, I only had to rerun the gel, not the entire experiment.

**Fun fact:** I still don't know how to drive... I blame going to a boarding school... any offers to teach me?