SIP 2013 – MENTORS PROJECTS LIST

Updated: 6/6/2013 1:11 AM

P-Prof G-Grad PD-PostDoc UG-Under Grad PI-Prin Invest AP-Acceptance Packet H-Housing Interest yes,no,maybe R-returning intern PreA-pre-arranged

THE NUMBERS:

TOTAL PROJECTS	**36**	
TOTAL INTERNS	**61**	
Harker interns	22	
Castilleja interns	16	
Astronomy interns	37	
Astronomy projects	22	
Returning interns	11	
Number of schools represented	18	

	MENTORS and (SECONDARY MENTORS)		E-MAIL ADDRESS	FIELD and (LOCATION)	NO. OF INTERNS	M/F	INTERNS	HIGH SCHOOL
1.	***Angie Wolfgang***	G	wolfgang@ucolick.org	Astronomy	2	F F	Victoria Pu Anna Verwillow	Castilleja Castilleja
2.	Baldo Marinovic	PI	bbmarino@ucsc.edu	Oceanography (Long Marine Lab)	2	F M	Krti Tallam (R) Evan Milnes	Alsion Montessori Scotts Valley
3.	David Cowley	PI	cowley@ucolick.org	Astronomy	2	M F	Jason Chu Karina Gunadi	Harker Castilleja
4.	***Elisa Toloba*** (Jingjing Chen, Raja GuhaThakurta)	PD (UG, P)	toloba@ucolick.org chenjj235@gmail.com	Astronomy	2	F F	Samyukta Yagati Anneliese Gallagher	Harker Los Altos
5.	Elisa Toloba (Jingjing Chen, Raja GuhaThakurta)	PD (UG, P)		Astronomy	2	F F	Stephanie Chen (R) Mary Liu	Harker Los Altos
6.	Evan Kirby (Raja GuhaThakurta)	PD (P)	enkirby@gmail.com	Astronomy	4	F M F F	Caroline Debs (R) Andrew Zhang (R) Michelle Guo (R) Zareen Choudhury (R)	Castilleja Harker Irvington Harker
7.	***Guillermo Barro*** (Jon Trump)	PD (PD)	gbarro@ucolick.org	Astronomy	2	F M	Connie Li Robert Eng	Harker Saratoga
8.	***Jessica Werk***	PD	jwerk@ucolick.org	Astronomy	2	F F	Smriti Pramanick (R) Ayesha Bajwa	Castilleja Castilleja
9.	Jonathan Fortney (***Caroline Morley***)	P (G)	jfortney@ucsc.edu cmorley@ucolick.org	Astronomy	2	M F	Matthew Huang (R) Anjini Karthik	Harker St. Francis
10.	***Jonathan Trump***	PD	jtrump@ucolick.org	Astronomy	1	M	Kevin Zhu (R)	Harker

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11.	Jonathan Trump (Hassen Yesuf)	PD (G)	hyesuf@ucolick.org	Astronomy	1	F	Julia Brug	Castilleja
12.	Jonathan Trump (Chris Moody)	PD (G)	cemoody@ucsc.edu	Astronomy	1	F	Courtney Wong	Leland
13.	Katia Obraczka (***Kerry Veenstra, Kevin Abas***)	P (G, G)	katia@soe.ucsc.edu veenstra@soe.ucsd.edu kabas@soe.ucsd.edu	Computer Engineering	2	F M	Sahil Hasan Shreyan Jain	Lynbrook Bellarmine
14.	***Katie Hamren*** (Elisa Toloba, Raja GuhaThakurta, Corinne Rushing, Laura Prichard)	G (PD, P, UG, UG)	khamren@ucolick.org crushing@ucsc.edu ljpricha@ucsc.edu	Astronomy	2	M M	Matthew Chang Avinash Nayak	Mtn View Harker
15.	Katie Hamren (Graeme Smith)	G (P)	graeme@ucolick.org	Astronomy	2	M F	Marvin Qi Namita Ravi	Monta Vista Harker
16.	Nobby Kobayashi (***David Fryauf***)	P (G)	dfryauf@ucsc.edu bmb5220@gmail.com	Electrical Engg (2300 Delaware)	2	F F	Sarika Bajaj Madhuri Nori	Harker Harker
17.	Nobby Kobayashi (***Junce Zhang***)	P (G)	Jzhang37@ucsc.edu juncezhang@gmail.com	Electrical Engg (NASA)	3	M F F	Julian Fletcher-Taylor Megan Xu Sanika Kulkarni (R)	Mentoring Acad Castilleja Presentation
18.	Nobby Kobayashi (***Kate Norris***)	P (G)	kjnorris@ucsc.edu	Electrical Engg (NASA)	3	F M F	Jennifer Dai Brian Tuan Wings Yeung	Harker Harker Castilleja
19.	Nobby Kobayashi	P	nobby@soe.ucsc.edu	Electrical Engg (NASA)	1	M	Kailas Vodrahalli (PreA / Nobby and TangoSystems)	Harker
20.	Paul Thorman - UC Davis (Raja GuhaThakurta)	PD (P)	thorman@physics.ucdavis.edu	Astronomy	1	F	Claire Grishaw-Jones (R)	Santa Cruz
21.	Raja GuhaThakurta (Elisa Toloba)	P (PD)	raja@ucolick.org	Astronomy	2	F F	Shazia Ayn Babul (Pre-A / Raja GuhaThakurta) Lea Sparkman	Sentinel (Vancouver, BC) Castilleja
22.	Raja GuhaThakurta (Claire Dorman, Katie Hamren)	P (G, G)	claire.e.dorman@gmail.com	Astronomy	1	F	Amy Cohn (Pre-A / Raja GuhaThakurta)	Park Tudor (Indianapolis, IN)
23.	Shaowei Chen (***Chris Deming***)	P (G)	shaowei@ucsc.edu cdeming@ucsc.edu	Chemistry	1	M	Albert Zhao	Harker
24.	***Tomer Tal***	PD	tal@ucolick.org	Astronomy	1	M	Daniel Pak	Harker
25.	Tomer Tal	PD		Astronomy	1	M	Vidur Sanandan	Lynbrook
26.	Yat Li	P	yli@chemistry.ucsc.edu	Chemistry	1	F	Kristine Zhang	Saratoga

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							(Pre-A / Yat Li)	
27.	***Elinor Velasquez***	G	elinor2015@gmail.com	Bioinformatics	1	F	Leslie Tzeng	Harker
28.	***Jennifer Trinh*** (Art Ramirez)	G (P)	jtrinh3@ucsc.edu apr@soe.ucsc.edu	Physics (2300 Delaware)	1	M	Nithin Buduma	Lynbrook
29.	***Jennifer Burt*** (Greg Laughlin)	G (P)	jaburt@ucsc.edu laugh@ucolick.org	Astronomy	2	M F	Josh (Aditya) Batra Kiana Borjian	Harker Castilleja
30.	***Alis Deason*** (Connie Rockosi, Raja GuhaThakurta)	PD (P,P)	alis@ucolick.org crockosi@ucolick.org	Astronomy	1	M	Shreyas Parthasarathy	Harker
31.	***John Forbes*** (Mark Krumholz)	G (P)	jforbes@ucolick.org krumholz@ucolick.org	Astronomy	1	M	Rohan Choudhury	Monta Vista
32.	***Elena Rishes*** (Marilyn Walker)	G (P)	erishes@ucsc.edu mawalker@ucsc.edu	Computer Sci (Baskin Engg)	1	M	Adarsh Battu	Harker
33.	***Andrew Bockus*** (Scott Lokey)	G (P)	bockus.andrew@gmail.com slokey@ucsc.edu	Biochemistry	2	F F	Emily Richardson Kavya Tewari	Castilleja Castilleja
34.	***Anna Beaudin*** (Camilla Forsberg)	PD (P)	annaebeaudin@gmail.com cforsber@soe.ucsc.edu	Biomolecular Engg (Baskin Eng)	2	M F	Arjun Goyal Madeline Ditzler	Harker Castilleja
35.	Patrick Robinson (Jen Maresh, Dan Costa, Melinda Conners, Chandra Goetsch)	PI (G, G, P)	robinson@biology.ucsc.edu maresh@biology.ucsc.edu costa@ucsc.edu mgconner@ucsc.edu chandra.goetsch@gmail.com	Ecology and Evolutionary Bio (Long Marine Lab)	2	F F	Sarah Dunn Tara Thakurta	Castilleja Castilleja
36.	Aaron Romanowsky (Jacob Arnold, Elisa Toloba, Raja GuhaThakurta)	P (PD, PD, P)	romanow@ucolick.org jaaarnol@ucolick.org	Astronomy	2	M M	Neel Ramachandran Sony Theakanath	St. Francis Bellarmine

1.	Angie Wolfgang, Graduate Student Title: The Discovery of Thousands of Extrasolar Planets: Quantifying the Human Element Description: NASA's Kepler Mission is a search for Earth-sized planets in Earth-like orbits around Sun-like stars. This discovery is not all the mission aims to accomplish, however: one of its most important goals is to measure how frequently planets of different sizes occur around other stars, referred to as the "planetary occurrence rate". To this end, Kepler has discovered 2712 possible planets (as of March 2013) via a complex combination of automated detection software and human decisions made from visual inspection of the data. Our understanding of the planetary occurrence rate thus hinges on quantifying how these human decisions have impacted Kepler's results. In this project, we will analyze a subset of Kepler's latest data by eye, using the guidelines they have defined for identifying the detected signals which could be due to planets. We will then compare these results with the official results announced by the Kepler team, and search for commonalities among the signals which have been classified differently. After a deeper inspection of the data to understand the origin of these differences, we will integrate this understanding into a new estimate of the planetary occurrence rate to report to the wider scientific community.
2.	Baldo Marinovic, Staff Location: Long Marine Laboratory 100 Shaffer Road, Santa Cruz Title: Krill Population Dynamics in the Central California Pelagic Ecosystem Note to applicants: This project title has not been confirmed. The project, itself, may be different in detail, however along the same general path.
3.	David Cowley, Staff Title: Using SolidWorks to Design Astronomical Telescopes and Instruments Description: DEIMOS Detector Upgrade The DEIMOS detector and dewar system were designed in the late 1990susing ACAD, and most of the drawings exist in paper form. We are planning to upgrade this system and would greatly benefit having the mechanical hardware modeled in SolidWorks. Once modeled, the student might participate with the

	engineers in making changes to the design to accommodate the new detectors, detector electronics, and for parts that are no longer commercially available. When originally designed, DEIMOS had one of the largest mosaic of detectors ever used in an astronomical spectrograph. Ten years later, DEIMOS, using that array, still does ground breaking science regularly. The new array will propel it into the next decade, continuing with forefront position in astronomy.
4.	Elisa Toloba, Postdoctoral Scholar Secondary mentors: Ms. Jingjing Chen (Peking U), Prof. Raja GuhaThakurta Title: Tomography of Sources Detected in the Next Generation Virgo Survey: Substructure in the Milky Way and Background Galaxies Overall description / broad science goal: The Virgo cluster is our nearest rich collection of galaxies. The properties of the cluster are being studied in great detail by many different groups of astronomers around the world. The project mentors are member of the premier Next Generation Virgo Survey (NGVS) team. When attempting to study this cluster, we find that the sample contains different types of stars belonging to our Milky Way galaxy, along with many galaxies that are significantly further away than the Virgo cluster itself. The goal of this project is to characterize the nature of these foreground stars and background galaxies. Analysis procedure: By studying the location of our spectroscopic targets in a color-magnitude diagram, the student will separate them into different categories: three flavors of Milky Way stars - members of the Virgo overdensity substructure, members of the Sagittarius stream (another substructure), and members of the distant outer halo - and background galaxies. She/he will study the spectroscopic and photometric properties of these different categories of NGVS sources.
5.	Elisa Toloba, Postdoctoral Scholar Secondary mentors: Ms. Jingjing Chen (Peking U), Prof. Raja GuhaThakurta Title: Exploring the Nature and Origin of Dwarf Elliptical Nuclei Overall description / broad science goal: The goal of this project is to learn about the origin of the bright nuclei observed at the centers of dwarf elliptical galaxies (dEs) in the Virgo Cluster. One theory for the formation of dE nuclei suggests that these nuclei are effectively "super star clusters" formed by the coalescence of several globular clusters (GCs = smaller groups of stars that orbit around a galaxy) that migrated to the center of the dwarf galaxy.

	Analysis procedure: We have obtained spectra of a sample of 300 globular cluster (GC) candidates around 21 different Virgo Cluster dEs using the Keck telescope. The student will analyze the properties of these GC candidates to separate out true GCs from foreground / background sources. She/he will use the technique of spectral co-addition to analyze the spectroscopic properties of the GCs and compare them to the properties of the 21 dE nuclei.
6.	Evan Kirby, Postdoctoral Scholar (UC Irvine) Secondary mentor: Prof. Raja GuhaThakurta Title: Measuring Barium Isotopes in Stars Description: The elements of the periodic table come in different forms called isotopes. Different isotopes of the same element have the same number of protons but different numbers of neutrons. The distribution of isotopes of a single element can be measured in stars using high-precision spectroscopy. This project involves measuring the amounts of different barium (element #56) isotopes in stars. The isotopic distribution of barium helps us figure out where the star got its barium.
7.	Guillermo Barro, Postdoctoral Scholar Title: An Interactive Web-database for Galaxy Surveys Description: Modern astronomers are like librarians. In the era of the big observatories and large surveys astronomers must handle gigantic data-sets, and they have to face the challenging task of merging all the data before being able to study the properties of stars and galaxies. To improve this situation, the community has devoted a considerable effort to develop flexible databases and interactive tools that speed up the data-mining. In this project, we will create a web-interface (mostly in Java, php and HTML) that will let the user explore a galaxy database in the same way that we use Google Maps to locate stores and find out information about them. We will follow the pioneering effort of the AEGIS collaboration (led by UCSC astronomers) which posted the result of their multi-band survey in google sky.
8.	Jessica Werk, Postdoctoral Scholar Title: Circumnavigating the Galaxy Halo and Exploring the Magellanic Clouds Description: In the nighttime sky of the southern hemisphere, the Magellanic Clouds are striking in their

	beauty. Yet, more than just pretty, bright nebulae, these "dwarf satellites" are some of the closest known galaxies to our own, and therefore serve as good laboratories for studying essential astrophysics. I am currently working on a project to understand the detailed chemical composition of the neutral and ionized gas in the Magellanic Clouds. This project could have a huge impact on our understanding of the chemical composition of galaxies in general by revealing just how much massive stars "self-enrich" their own surroundings. Your role in this work could potentially take many forms, from analyzing optical and ultraviolet spectra of the most massive stars within the Clouds, to researching their rich history in the astrophysical literature, to starting to understand how they have contributed to the chemical composition of our own galaxy's halo gas. We would work together on analyzing optical data taken with a variety of ground-based telescopes, and ultraviolet data taken with the Hubble Space Telescope.
9.	Jonathan Fortney, Professor Secondary mentor: Ms. Caroline Morley Title: Modeling the Atmospheres of Exoplanets Description: We are now in the era where advanced telescopes can detect light emitted by warm planets. The temperature structure and spectra of these atmospheres depend on a number of factors: The amount of stellar light coming from the parent star, the amount of energy coming from the planet's interior, the abundances of molecules in the atmosphere, and wavelengths of light at which these molecules absorb and transmit light. The summer project will involve aspects of the computer modeling of the atmospheres of exoplanets to better characterize their temperature and composition.
10.	Jonathan Trump, Postdoctoral Scholar Title: The Role of Supermassive Black Holes in Quenching and Triggering Star Formation Description: Every galaxy hosts a supermassive black hole in its center, and the masses of each are correlated over several orders of magnitude. This suggests that the mass growth of a galaxy (through star formation) is tightly coupled to the mass growth of its black hole (through accretion of gas and stars). But the physics behind this connection remains mysterious. Do star formation processes tend to efficiently funnel gas into the black hole? And do accreting black holes emit high-velocity winds which rapidly quench star formation? We will investigate the properties of ~100,000 nearby galaxies and their supermassive black holes to reveal the physical links between galaxy star formation and black hole accretion.
11.	Jonathan Trump, Postdoctoral Scholar Secondary mentor: Mr. Hassen Yesuf

	Title: A Near-Infrared Window into Star Formation Around Quasars Description: Quasars are accreting supermassive black holes in the centers of galaxies. Their extreme energy output probably has unusual effects on the galaxies around them, but quasars are so luminous in optical light that they almost entirely outshine the surrounding starlight. This makes it very difficult to measure the properties of their host galaxies. We will use infrared observations from space telescopes to characterize the star formation around nearby quasars. The infrared offers a window into quasar host studies because it is less affected by quasar dilution than optical, UV, or X-ray light. With these unique data we aim to reveal the triggers of extreme supermassive black hole accretion and its effects on nearby star formation.
12.	Jonathan Trump, Postdoctoral Scholar Secondary mentor: Mr. Chris Moody Title: Scattered Light from Quasars: Connecting Deep Observations with State-of-the-Art Computer Simulations Description: Quasars are the most luminous persistent sources in the sky, powered by rapid accretion onto a supermassive black hole in the center of a galaxy. The extreme energy output of a quasar is theorized to cause dramatic impacts on their host galaxies, like rapidly quenching star formation and launching enormous jets. But measuring the properties of a galaxy hosting a quasar is extremely difficult because the luminous quasar outshines the galaxy's starlight. This is true even on large scales, since a galaxy's outskirts can have an efficient "mirror" of gas and dust which scatters a large fraction of quasar light. We will use new, state-of-the-art computer simulations to measure the amount of scattered light in realistic galaxies hosting quasars. We will then connect these simulations to observations of nearby quasars, finally disentangling scattered quasar light from galaxy starlight and revealing if quasars really do have unusual effects on galaxy star formation.
13.	Katia Obraczka, Professor Secondary Mentor: Mr. Kerry Veenstra, Mr. Kevin Abas Title: Campus Transportation Network iPhone Application Description: The Internet Research Group (i-NRG) at UCSC's Baskin School of Engineering is developing a system that aims at improving the UCSC campus transportation network (e.g., campus shuttles). To this end we developed a tracking system that monitors the campus vehicles during their daily operation. The system logs, in real-time, information such as current vehicle route and location. This information is kept

	on a database. For this project, the student will develop an iPhone application that will consult the database and display, using Google maps, current location and route information overlaid atop the UCSC campus map.
14.	Katie Hamren, Graduate Student Secondary mentors: Dr. Elisa Toloba, Prof. Raja GuhaThakurta, Ms. Corinne Rushing, Ms. Laura Prichard Title: Spectroscopic Properties of Carbon Stars in Andromeda Description: Carbon stars are a rare subset of evolved stars that contain enhanced carbon in their atmospheres. They are examples of intermediate-age asymptotic giant branch and their demographics provide insight into the star formation history of their host galaxy over the last few billion years. Their enhanced carbon manifests itself in the form of specific molecular absorption features in the spectra of these stars. Because of their rarity in part, not much is known about these stars' spectra - particularly at red/far-red wavelengths and at moderate to high spectral resolution. Our goal is to use an algorithm to automatically identify carbon star spectra in our sample of thousands of stars in the Andromeda galaxy and characterize their spectra. These Andromeda spectra were obtained with one of the world's most powerful telescope and spectrograph combinations.
15.	Katie Hamren, Graduate Student Secondary mentor: Prof. Graeme Smith Title: Luminosity Functions of Faint Globular Clusters Description: Globular cluster are old populations of stars at the outer edges of the Milky Way. Years ago, they were thought to be simple systems whose stars formed at the same time out of the same material. Today we know that the formation and evolution of globular clusters is very complicated. The specific question we would like to answer is how these clusters have lost stars over their lifetime. Fortunately, we have a simple method to do this: look at the cluster's luminosity function. Our goal is to determine the luminosity function of several globular clusters and compare them to existing data.
16.	Nobuhiko Kobayashi, Professor Secondary mentor: Mr. David Fryauf Location: 2300 Delaware Ave, Santa Cruz Title: Study of Physical Properties of Semiconductor Nanowire Networks for High-speed Photodetectors, Ultra-sensitive Chemical/Biological Sensors and High-efficiency Thermoelectric Power Generators

	Brief description: In this project students will acquire basic knowledge and hands on experience in obtaining optical (photoluminescence and Raman spectroscopy), electrical (current-voltage characteristics), and thermoelectric (Seebeck coefficient and thermal conductivity) properties of a network of semiconductor nanowires grown in our laboratory. The students will use an optical set up including laser light sources and a spectrometer, and an electrical probe station equipped with an optical microscope and a semiconductor parameter analyzer. The students will conduct the study with the view toward applications such as high-speed photodetectors, ultra sensitive chemical/biological sensors, and high-efficiency thermoelectric power generators.
17.	Nobuhiko Kobayashi, Professor Secondary mentor: Mr. Junce Zhang Location: NASA Ames Title: Study of Physical Properties of Metal Oxides for Resistive Switching Devices in Advanced Electrical Memory and Neural Computing Applications Brief description: In this project students will acquire basic knowledge and hands on experience in designing and fabricating resistive switching devices known as "memristors" and obtaining their electrical properties. The students will fabricate the devices using various combinations of metal oxides and electrode materials using atomic layer deposition and sputtering systems in our laboratory. The students will also use an electrical probe station equipped with an optical microscope and a semiconductor parameter analyzer to characterize electrical properties of fabricated devices. The students will conduct the study with the view toward applications in advanced electrical memories and neural computing applications.
18.	Nobuhiko Kobayashi, Professor Secondary mentor: Ms. Kate Norris Location: NASA Ames Title: Study of Optical Properties of Metal Oxides for High-efficiency Planar Optical Waveguide Coupler Transformers in Highly Concentrated Solar Light Applications Brief description: In this project students will acquire basic knowledge and hands on experience in designing and fabricating optical couplers and obtaining their optical properties. The students will design, in both ray optics and wave optics regimes, optical couplers made of various metal oxides available in our laboratory. The students will also fabricate the couplers and characterize their optical

	properties using a set up including a white light source, a spectrometer, and an optical fiber coupled photodetector. The students will conduct the study with the view toward applications in highly concentrated solar light for dayligning and solar thermal power generation.
19.	Nobuhiko Kobayashi, Professor with Ravi Mullapudi, CEO Tango
20.	Paul Thorman, Postdoctoral Scholar (UC Davis) Secondary mentor: Prof. Raja GuhaThakurta, Dr. Alis Deason (UCSC postdoc) Title: Substructure and Density Profile of the Milky Way's Stellar Halo from Deep Lens Survey Data
21.	Raja GuhaThakurta, Professor Secondary mentor: Dr. Elisa Toloba Title: Dwarf Galaxies in a Dense Environment Description: Dwarf galaxies are the most common galaxy type in the Universe. They come in a few different flavors. The ones in the dense Coma cluster of galaxies are inert (i.e., non-star-forming) and belong to a class of galaxies known as "dwarf ellipticals" (dEs). The physical origin of this class of galaxies remains poorly understood. The students will analyze brand new spectroscopic data on Coma dEs obtained with the DEIMOS spectrograph on the Keck II 10-meter telescope (in April this year!). They will also have access to somewhat older imaging data from the Hubble Space Telescope.
22.	Raja GuhaThakurta, Professor Secondary mentors: Ms. Claire Dorman, Ms. Katie Hamren Title: A Study of Dust-reddened Star Clusters in the Andromeda Galaxy
23.	Shaowei Chen, Professor Secondary mentor: Mr. Chris Deming Title: Functional Nanoparticles by Interfacial Engineering This project is focused on the interfacial engineering of nanoparticles by the formation of metal-ligand conjugated bonds. The resulting nanoparticles exhibit effective intraparticle charge delocalization. The emergence of unique optical and electronic properties may be exploited for chemical and biological

	sensing applications.
24.	Tomer Tal, Postdoctoral Scholar Title: The Colors of the Most Massive Galaxies in the Universe Description: A study of the most massive galaxies in the nearby universe from looking at their optical colors. This project will utilize images from the Sloan Digital Sky Survey, the world's most extensive data set of galaxies at low redshift, to trace the color profiles of nearby elliptical galaxies out to an unprecedented radius. A possible extension to this would be a comparison to the colors of similar galaxies that are tens of billions of light-years away using a cutting edge multi-wavelength data set.
25.	Tomer Tal, Postdoctoral Scholar Title: Galaxy Collisions at High Redshift Description: We will identify and measure the signature of recent galaxy mergers at high redshift by quantifying tidal features (the stellar mess that mergers leave behind). We will do so using images from the Hubble space telescope. Such an analysis has not yet been done for galaxies at high redshift and it would provide an important constraint on the merger rate at early cosmic times.
26.	Yat Li, Professor Tentative Title: Development of a Novel Nanostructured Plasmonic Probe for Targeted Chemical and Biomedical Detection with Molecular Specificity
27.	Elinor Velasquez, Postdoctoral Scholar Title: A Virtual Cell for Glioblastoma Description: Glioblastoma, or brain cancer, afflicts one out of four people with cancer. In our project, we are constructing an in-silico brain cell in order to help provide an accurate diagnosis and help with the prognosis of glioblastoma. There are a variety of possibilities for an intern to help with the project based on their scientific interests: Computer programming the cell to evolve, stochastic modeling of biological cellular processes or statistical analysis of the resulting data are among possible areas for student projects.

28.	Jennifer Trinh, Graduate Student Secondary mentor: Prof. Arthur P Ramirez Location: 2300 Delaware Avenue, Santa Cruz Title: Finding Candidate Materials for Topological insulators Description: A new class of materials called topological insulators (TIs) holds promise for robust counter-propagating spin currents, with potential applications in numerous systems, ranging from spintronics to quantum computing and beyond. TIs exhibit rather unusual behavior in that they are insulating in the bulk but conducting on the surfaces, a result of the topological nature of the electronic wavefunction. Due to the relative novelty of this effect and numerous difficulties in isolating/measuring the surface states, there is not yet a protocol for finding and identifying TIs. However, it is known that TIs often possess heavy metal atoms for strong spin-orbit coupling, a narrow band gap (<0.2 eV) to facilitate band inversion, and lattice symmetry for time-reversal invariance. A SIP student working on this project would learn the theory and practice behind a variety of materials measurements techniques in order to characterize TIs, as well as help maintain/improve the current UCSC materials database in an effort to keep track of what samples we have available to us and which would be interesting to investigate. Students may then apply their skills to investigate a candidate material of their choosing.
29.	Jennifer Burt, Graduate Student Secondary mentor: Prof. Greg Laughlin Title: Searching for Jupiter Analogs in the Kepler Dataset Description: The student will take the results from an algorithmic search of the Kepler dataset and work on verifying if tagged light curves actually contain signatures from planetary transits. The light curves marked positive will then be analyzed to determine accurate size/period/eccentricity of the planet(s). Additionally, the student will use preexisting procedures to create model transits that will be injected into real light curves and then run through the search algorithm to assess our detection rate. The student will need some familiarity with IDL and coding for the second part of the project, but the first part of the project will be largely image analysis and web based providing time to pick up coding skills on the side if necessary.
30.	Alis Deason, Postdoctoral Scholar

	Secondary mentors: Prof. Connie Rockosi, Prof. Raja GuhaThakurta Title: The Structure of the Milky Way Halo Description: By measuring the structure of the most distant part of our Galaxy, we can learn about how our Galaxy formed and how other galaxies form. We will do this by counting stars in the Sloan Digital Sky Survey data, and by using the inverse-square law to get the distances to stars whose brightness we know. With these basic data, we can make a 3-D model of the outer parts of our Galaxy and find out how the structure of our Galaxy changes as we look farther away from the center.
31.	John Forbes, Graduate Student Secondary: Prof. Mark Krumholz Title: Building Galaxies Description: Individual galaxies are dynamic evolving systems, but observational astronomers are limited to capturing them at a single point in their lives. To connect observations at different times and to understand what they mean requires a theoretical model. We have built a simple (1 dimensional) but powerful code to simulate how galaxies have evolved over the past 10 billion years. To be really useful, the model needs to be compared to observations. Via this comparison, we can answer questions like 'Under what circumstances does the model fit the data?' 'Where and how does the model fail?', 'What does the model predict about observations that haven't been made yet?', and eventually, 'Do we understand how galaxies grow and evolve, or is there something we're missing?'. In this project, we would like the student to generate simulated galaxies by running the code, calculate observables ("the HI distribution function" in particular), understand what physics determines this function, and compare with both real data and other theoretical predictions. Preferred duration: All summer would be ideal, but even 4 weeks is fine.
32.	Elena Rishes, Graduate Student Secondary mentor: Prof. Marilyn Walker Title: Learning Generation Dictionaries from Product Reviews Description: Language generation systems rely on dictionaries describing the properties of a particular domain. Manual dictionary creation is a costly and lengthy process. The purpose of this research is to mine restaurant user reviews to automatically learn expressions and phrases characteristic of the restaurant domain. The induced domain ontology will be tested in the regeneration experiments. This

	work will build on the unsupervised learning technique introduced by M.Walker and R. Prasad in "Learning to generate naturalistic utterances using reviews in spoken dialog systems", 2006.
33.	Scott Lokey, Professor Secondary mentor: Mr. Andrew Bockus Title: Synthesis, Biological Screening, and Structure-Activity Relationships of Non-Proteinogenic Cyclic Hexapeptide Libraries Description: Combinatorial chemistry and high-throughput screening are indispensable tools used in chemical biology to synthesize diverse chemical libraries and identify potential drug leads. Natural products and their derivatives have historically served as successful drug leads due to their structural complexity and co-evolution within biological systems. Components of natural product scaffolds may serve as beneficial motifs in the development of new biological probes. The focus of this project is to synthesize a natural product-like peptide library and screen it for bioactivity against cancer cells. The project will encompass several aspects of medicinal chemistry such as library design, organic synthesis, compound analysis, principles of screening, deconvolution strategies, and hit optimization. Our efforts have the potential to lead to the discovery of promising new bioactive scaffolds. Preferred duration: 8 weeks.
34.	Anna Beaudin, Postdoctoral Scholar Secondary mentor: Prof. Camilla Forsberg Title: Flk2 Lineage Tracing Reveals a Novel, Developmentally-restricted Hematopoietic Stem Cell Description: Using a recently characterized in vivo lineage tracing model, I have identified a novel fetal hematopoietic stem cell (HSC) that, although capable of supporting reconstitution of the blood system in an irradiated adult recipient, does not reside in the adult bone marrow in situ. This novel fetal HSC exhibits a differential lineage bias and gives rise to unique immune cell subsets that mediate innate immunity. Current aims of my project including understanding the mechanisms regulating lineage bias and long-term persistence of this novel HSC population, as well as pursuing the possibility that this novel HSC may represent the cell-of-origin in pediatric leukemias. Preferred duration: 8 weeks.
35.	Patrick Robinson, Staff Secondary mentors: Ms. Jen Maresh, Ms. Chandra Goetsch, Prof. Daniel Costa

	Location: Long Marine Lab TWO interns Title: Tracking Marine Mammals and Seabird - Patrick's tracking/elephant seal projects Processing light level geolocation tracking data for tagged elephant seals. Flipper tag resighting and census work at ano nuevo state park. Exploring potential causes of at-sea mortality of elephant seals.
36.	Aaron Romanowsky, Professor Secondary mentors: Dr. Jacob Arnold, Dr. Elisa Toloba, Prof. Raja GuhaThakurta Title: Studying a Rare Dwarf Galaxy Cannibalism Event Background: Galaxy cannibalism/merging appears to be an important process through which galaxies grow in mass/size and evolve. There are many examples of ongoing collisions between two large galaxies and many involving the tidal disruption of a small ("dwarf") galaxy by a large one. We have identified a rare case of a dwarf galaxy cannibalizing an even smaller galaxy. Earlier this year, our team obtained spectra of red giant stars associated with the disrupted smaller galaxy in order to better characterize/understand this event. Analysis procedure: The interns will start by checking the extraction window of each slit to make sure its location agrees with the information in the mask design file. They will then assess spectral quality by inspecting spectra and identifying and excluding sections of/entire spectra affected by instrumental and atmospheric artifacts. Next, they will identify and exclude background galaxies. The remaining spectra will then be co-added in groups according to sky position in order to boost the signal-to-noise ratio. Radial velocities will be measured via cross-correlation against existing bright spectral templates. Duration: All summer.