

University of California High-Performance AstroComputing Center



The First Three Years: 2010–2012

The University of California High-Performance AstroComputing Center (UC-HiPACC), based at the University of California, Santa Cruz, is a consortium of the University of California campuses and three Department of Energy laboratories: Lawrence Berkeley National Laboratory, Lawrence Livermore National Laboratory, and Los Alamos National Laboratory.

UC-HiPACC supports or co-sponsors activities in computational astronomy to further collaborations in fundamental research. It also raises awareness of computational astronomy through education and public outreach, especially the pioneering research throughout the UC system.

UC-HiPACC was founded in January 2010 with a five-year grant from the University of California. This report summarizes the Center's principal programs, activities, and achievements during its first three years, 2010–2012.



University of California High-Performance AstroComputing Center The First Three Years: 2010–2012

As computing power continues to increase rapidly, the most difficult problems in astrophysics are now coming within reach of physics-based computer simulations. Collectively, the faculty and laboratories throughout the University of California system arguably comprise the largest and most powerful computational astrophysics group in the world. The purpose of the University of California High-Performance AstroComputing Center (UC-HiPACC) is to realize the full potential of UC's world-leading computational astrophysics systemwide.



the new telescopes and supercomputers. Finally, UC-HiPACC is fully aware of an obligation to return value to California and to the public. Its outreach activities include developing educational materials made available through websites, planetarium shows, videos, and other media, and distributing visualizations from astrophysical simulations that are both beautiful and educational.

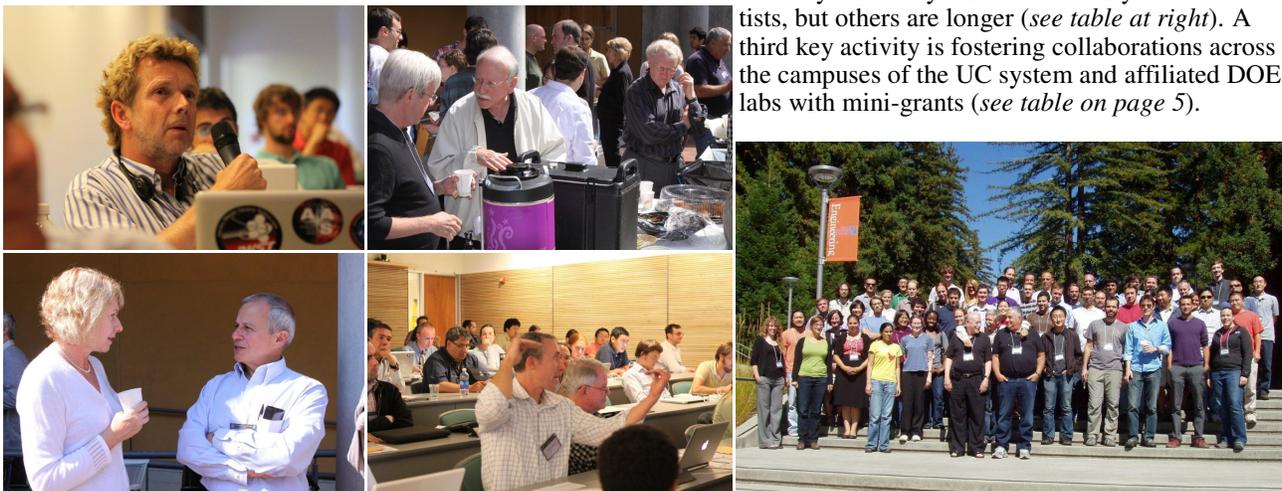
How? First, UC-HiPACC is multidisciplinary. It links theoretical and observational astrophysicists, physicists, earth and planetary scientists, applied mathematicians, and computer scientists across all UC labs and on all campuses, to take advantage of California's leadership in computers and related fields. Second, UC-HiPACC is collaborative. It fosters researchers' interaction both with one another and with rapidly increasing observational data, through mini-grants for travel, support for working groups and meetings, and other mechanisms. Third, UC-HiPACC is enabling. It empowers researchers to utilize efficiently new supercomputers with hundreds of thousands of processors—both to understand astrophysical processes through simulation, and to analyze the petabytes (and soon exabytes) of data that will flow from

Support for UC-HiPACC, totaling \$350,000 per year for five years, comes from the office of the University of California Vice President for Research and Graduate Studies, Steven Beckwith, through the Multicampus Research Programs and Initiatives (MRPI) competition.

UC-HiPACC's Key Activities

One of UC-HiPACC's most important activities is sponsoring an annual advanced international summer school on computational astronomy for graduate students and postdoctoral fellows. Held every year since 2010, the schools have attracted many of the best young astrophysicists from the UC system, the United States generally, and leading foreign centers. UC-HiPACC also sponsors or co-sponsors working meetings in northern and southern California, which bring together astrophysicists with computer scientists and engineers to extend the state of the art in computation and data analysis. Many meetings last only a few days and involve only a few scientists, but others are longer (*see table at right*). A third key activity is fostering collaborations across the campuses of the UC system and affiliated DOE labs with mini-grants (*see table on page 5*).

All photos in this report are by Trudy E. Bell except as noted.



Plenty of time is allotted for formal and informal collaborations at working meetings supported by UC-HiPACC. Discussion images are from the 2011 Galaxy Workshop, and group photo is from the 2012 Galaxy Workshop, both held at UC Santa Cruz. **ON COVER:** Images from 2011 Galaxy Workshop, 2012 Computational Astronomy Journalism Boot Camp, 2011 and 2012 advanced International Summer Schools on AstroComputing.

UC-HiPACC Meetings and Schools Held 2010-2012 and Scheduled for 2013

Dates	Name of Meeting	Meeting Location/s	Total Budget \$K	UC-HiPACC Contribution \$K	Other Sources of Funds	Participants	No. of Faculty	No. of Students
2010								
June 28-30	Enzo User Workshop	UCSD/SDSC	15	5	UCSD, NSF	45		
July 26-August 13	ISSAC 2010: Galaxy Simulations	UCSC	129	84	NSF (\$20K), reg. fees		10	59
August 16-20	Santa Cruz Galaxy Workshop	UCSC	17	6	reg. fees	120		
December 16-17	The Future of AstroComputing	UCSD/SDSC	77	72	UCSD (\$5K)	40		
2011								
July 18-29	ISSAC 2011: Explosive Astrophysics	UCB/LBNL	59	37	DOE (\$15K), reg. fees		14	28
August 8-12	Santa Cruz Galaxy Workshop	UCSC	9	4	reg. fees	86		
2012								
June 14-16	The Baryon Cycle	UCI	20	10	UCI/CGE	130		
June 23-27	Computational Astronomy Journalism Boot Camp	UCSC/NASA/CAS	43	43	none	20	15	
July 9-20	ISSAC 2012: AstroInformatics	UCSD/SDSC	90	70	DOE (\$10K), reg. fees		11	34
August 13-17	Santa Cruz Galaxy Workshop	UCSC	11	5	reg. fees	95		
August 18-20	AGORA kickoff workshop	UCSC	11	11		52		
2013 (planned)								
July 22-August 9	<i>ISSAC 2013: Star and Planet Formation</i>	<i>UCSC</i>	<i>125</i>	<i>80</i>	<i>grants, reg. fees</i>		<i>TBD</i>	<i>TBD</i>
August 12-16	<i>Santa Cruz Galaxy Workshop</i>	<i>UCSC</i>	<i>10</i>	<i>5</i>	<i>reg. fees</i>	<i>TBD</i>		
August 16-23	<i>AGORA workshop</i>	<i>UCSC</i>	<i>15</i>	<i>10</i>	<i>reg. fees</i>	<i>TBD</i>		

AGORA = Assembling Galaxies of Resolved Anatomy; CAS = California Academy of Sciences; CGE = Center for Galaxy Evolution; DOE = Department of Energy; ISSAC = International Summer School on AstroComputing; NASA = NASA Ames Research Center; NSF = National Science Foundation; SDSC = San Diego Supercomputer Center. All participants in the journalism boot camp were professional science journalists. *Numbers in italics are future estimates.*

Advancing Education

From its inception, the intention of UC-HiPACC's annual advanced **International Summer School on AstroComputing (ISSAC)** for graduate students and postdoctoral fellows is to empower young astronomers with data-intensive methods for comparing massive observational data with massive theoretical outputs. Besides their educational value, ISSACs are increasing awareness of UC's excellence and leadership in computational astrophysics.

Each year ISSAC meets at a different UC-HiPACC venue and focuses on in-depth study of a special topic. All relevant computer codes with sample inputs and outputs are made available to all the participants on a powerful computer, on which all the students have working accounts so that they can learn to use the codes during workshop sessions. Slides and videos of the ISSAC lectures are posted on the UC-HiPACC website for scientists and the general public worldwide.

ISSAC 2010 at UC Santa Cruz, organized by Anatoly Klypin (New Mexico State University) and Joel Primack (UCSC) on **Galaxy Simulations**, featured 10 lecturers and 59 graduate students and postdocs. Faculty and student expenses were partially supported by a grant from the National Science Foundation. UC-HiPACC provided supercomputer accounts for students on the Triton system at the San Diego Supercomputer Center (SDSC), plus relevant codes and outputs.

ISSAC 2011 at UC Berkeley and the Lawrence Berkeley National Laboratory, directed by Peter Nugent and Dan Kasen (UC Berkeley and LBNL) on **Computational Explosive Astrophysics**, concentrated on the modeling of core collapse and thermonuclear supernovae, gamma-ray bursts, neutron star mergers, and other energetic transients. With the help of a grant from the Department of

Energy, all travel and lodging was reimbursed for the 14 lecturers and 28 students, who were provided with supercomputing accounts and time on the Hopper supercomputer at LBNL's National Energy Research Scientific Computing (NERSC) Center.

ISSAC 2012 at UC San Diego and the San Diego Supercomputer Center focused on **AstroInformatics**—data mining for computational astronomy, directed by Alex Szalay (Johns Hopkins University) and hosted by Michael Norman (UCSD). There were 11 lecturers and 34 students. UC HiPACC covered lodging and some travel expenses; there was also a grant from the DOE. Faculty and students were given supercomputing accounts on SDSC's brand new Gordon supercomputer.

ISSAC 2013, to be held at UC Santa Cruz and directed by Mark Krumholz (UCSC), will focus on **Star and Planet Formation**. Applications are now being accepted.

Enabling Research

In all three years (2010, 2011, and 2012), UC-HiPACC has co-sponsored the annual **Santa Cruz Galaxy Workshop** at UCSC each August, co-organized by Primack and Hebrew University Professor of Physics Avishai Dekel. In 2012, the five-day Galaxy Workshop attracted 95 participants from over 25 institutions worldwide, including from five UC campuses.

UC-HiPACC has also sponsored or co-sponsored special one-time conferences. In December 2010, UC-HiPACC organized a major conference on **The Future of AstroComputing** at UC San Diego and the San Diego Supercomputer Center, for two major purposes: to clarify the big issues for the next five years in astrophysical computation and data, and to bring leaders in the field together to meet with key computational astrophysicists, especial-

ly from the University of California and other West Coast institutions including Stanford University. Earlier that year, UC-HiPACC co-sponsored an **Enzo User Workshop** at UC San Diego on the cosmology simulation code Enzo. In June 2012, UC-HiPACC co-sponsored the **Baryon Cycle Conference** with the Southern California Center for Galaxy Evolution at the Beckman Center of the National Academies at UC Irvine. In the three-day conference, 130 theorists and observers (including ones from seven UC campuses) focused on the cycle of gas through galaxies and the intergalactic medium across cosmic time.

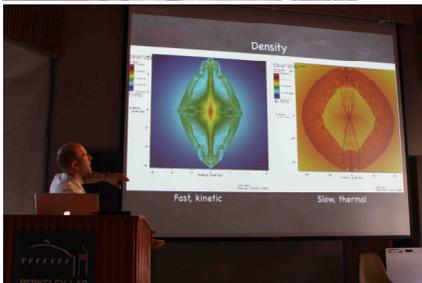
In August 2012, as a major new research initiative, UC-HiPACC sponsored the kickoff workshop for a **multi-year galaxy simulation comparison project**. Over three days, 52 leading cosmologists and computational astrophysicists from more than 20 leading institutions worldwide agreed to compare how nine leading simulation codes model the evolution of galaxies at high resolution. The participants agreed to use the same initial conditions, UV background, and gas cooling, and the same analysis code (yt). The participants set up 13 working groups addressing key technical and scientific aspects of the comparisons, many of them led by postdoctoral astrophysi-

cists or junior faculty members. The analysis focused on comparing both the performance of the codes and the astrophysical results, including comparing the results with astronomical observations. In October, the project was officially named **AGORA** (acronym for Assembling Galaxies of Resolved Anatomy—but also a Greek word meaning a meeting place). A web conference on November 16 was widely attended, including by international participants. A second AGORA workshop is scheduled at UCSC on August 16–23, 2013.

Shaping Careers

In 2013, for the fourth year, UC-HiPACC will be sponsoring two funding cycles for **small grants to support research collaborations** in computational astrophysics research that involve two or more UC campuses and the affiliated DOE labs. Working groups may consist of two to a dozen people—in practice, mostly students and postdoctoral fellows—who travel to another campus or laboratory to collaborate, typically from a few days to a few weeks. For grad students, such travel and collaborations are a career-shaping opportunity in which they learn from other leading faculty members, master skills not taught on their own campus, line up writers for crucial letters of recommendation, and form other contacts and alliances that can powerfully influence their futures.

In the first six funding cycles from early 2010 through late 2012, more than two dozen mini-grants (grants under \$10,000) were received by researchers at seven UC campuses and two DOE labs, totaling nearly \$100,000. Some of these grants helped support travel between campuses and labs, including mini-conferences. Mini-grants have also supported UC



Tours of supercomputer centers, formal presentations, hands-on instruction, informal coaching, stimulating discussions, and relaxation with fellow grad students and postdocs and with faculty are all part of UC-HiPACC's annual advanced International Summer School on AstroComputing (ISSAC). Photographs are from ISSAC 2011 at UC Berkeley/Lawrence Berkeley National Laboratory and ISSAC 2012 at UC San Diego/San Diego Supercomputer Center. 2013 ISSAC will be at UC Santa Cruz.

undergraduate research projects in computational astrophysics or provided matching funds for purchases of computational hardware.

Reaching Out to the Public

UC-HiPACC has helped provide content from cosmological simulations to several major planetariums. In 2010, it contributed to the show *LIFE: A Cosmic Story* at the Morrison Planetarium of the California Academy of Sciences in San Francisco. In 2011, simulation outputs of black holes (from Enrico Ramirez-Ruiz) and cosmology (from Joel Primack) were prominently featured in *The Searcher*, the inaugural show of the Adler Planetarium's new Grainger Sky Theater, with 20 advanced projectors creating an image in the dome 8000 pixels across.

UC-HiPACC worked closely with the Adler scientific staff; UC-HiPACC Public Outreach and Scientific Visualization Coordinator Nina McCurdy connected the computation and visualization team at NASA Ames Research Center with the Morrison and Adler Planetariums and with visualization experts at the National Center for Supercomputing Applications (NCSA) at the University of Illinois. In summer 2011 and 2012, UC-HiPACC supported UCSC Education graduate student Zoe Buck (advised by UCSC Prof. Doris Ash) to conduct pre- and post-show interviews with Adler viewers on the effectiveness of *The Searcher*.

In August 2012, Buck presented her findings in a talk "Planetarium Audiences and Cosmology Visualizations" at the Astronomical Society of the Pacific's annual education and public outreach conference Communicating Science in Tucson, Arizona.

In 2010, UC-HiPACC launched its website at <http://hipacc.ucsc.edu/>, posting meeting announcements plus **videos and slides from all speakers and presenters at UC-HiPACC events**. In 2012, the Center revamped the website to broaden its appeal to the general public and educators. One innovative program that debuted in 2012 was a series called **AstroShorts**: free approximately monthly one-page features on research in computational astronomy specifically designed to be reprinted in the monthly newsletters of amateur astronomical societies; they immediately proved to be popular with astronomy clubs around the country. Also debuting on the website in 2012 was the **Lecture Gallery**, a lecture database management system containing video recordings and associated slides from all lectures given at UC-HiPACC events.

UC-HiPACC Small Grants Awarded Spring 2010–Winter 2013

Principal Investigator	Type	Amt \$K	UC-HiPACC site(s)	Project
Small Grant Expenditures: Spring/Summer 2010				
Sukanya Chakrabarti	IT	1	UCB, UCI	Dynamical impact of satellites on Milky Way disk
Michele Fumagalli	IT	1	UCSC, UCSD/CASS	Cold gas in high redshift galaxies
Total:		2		
Small Grant Expenditures: Fall 2010/Winter 2011				
David Collins	IT	1	UCSD	Travel to attend Enzo Users Workshop
Donald Korycansky	IT	2	LANL, UCSC	Hazardous asteroids
Michael Kuhlen	IT	2	UCB, UCSD	Travel to attend Enzo Users Workshop
Geoffrey So	IT	2	UCSD	Travel to attend Enzo Users Workshop
Daniel Whalen	IT	1	LANL, UCSD	Work with Enzo on primordial SN remnants
Przemek Wozniak	IT	5	LANL, UCB	Transient classification of petascale sky surveys
Andrea Zonca	IT	1	LBLN, UCSB	Iterative calibration technique for data analysis
Total		14		
Small Grant Expenditures: Spring/Summer 2011				
Michael Boylan-Kolchin	Eq	5	UCI	80-TB data storage for Millenium II-simulation
James Bullock	Eq	10	UCI	Rack server for GreenPlanet Cluster
Asantha Cooray	UR	2	UCI	CMB secondary anisotropies
Jason Dexter	IT	1	UCB, UCSB	Numerical simulations of compact objects
Steve Furlanetto	Eq	7	UCLA	Early universe with a 64-GB workstation
George Fuller	IT	3	LANL, UCSD	Neutrino flavor transformation in stellar collapse
Joel Primack	UR	7	UCSC	Properties of dark matter halos
Andrea Zonca	IT	1	LBLN, UCSB	Bandpass mismatch effect on CMB measurements
Andrea Zonca	IT	1	LBLN, UCSB	Scaling study of CMB mapmaker
Total:		37		
Small Grant Expenditures: Fall 2011/Winter 2012				
Joel Primack	UR	4	UCSC	Semi-analytic models from Bolshoi simulation
Total:		4		
Small Grant Expenditures: Spring/Summer 2012				
Eugene Chiang	UR	5	UCB	Rotation curves of protoplanetary disks
William Dawson	IT	10	UCD, UCI	Merging cluster collaboration
Jose Onorbe	Eq	6	UCI	High RAM/core node
Enrico Ramirez-Ruiz	Eq	4	UCSC	3D Visualization Lab
Andrea Zonca	IT	1	UCD, UCSB	Cosmological parameters estimation with PICO
Total:		26		
Small Grant Expenditures: Fall 2012/Winter 2013				
Charlie Conroy	IT	2	UCSB, UCSC	Stellar evolution and galaxy formation
Dusan Keres	IT	6	UCB, UCSD	Galaxy simulations with realistic feedback
Mark Krumholz	IT	6	UCB, UCSC, LLNL	Conference on yt
Enrico Ramirez-Ruiz	Eq	3	UCSC	Simulation analysis
Total:		17		
Grand Total 2010-2012:		\$ 96		

Eq = Equipment matching funds; IT = Intercampus Travel; UR = Undergraduate Research

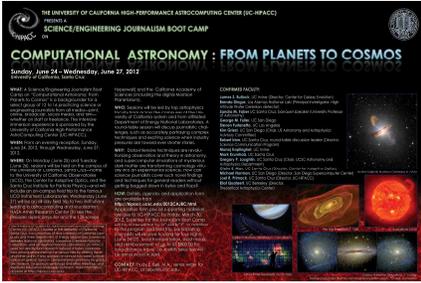
Ultimately the scope of this database may be expanded to include other lectures given within the UC-HiPACC consortium. In January 2013, Eric Maciel was hired as webmaster to increase the visibility of UC-HiPACC on the internet and manage the website's archives of lectures, visualizations and reference material.

Significant for both research and outreach, **AstroViz**—the UC-HiPACC Visualization Gallery—debuted on the website in late 2012, making astrocomputing



As part of its outreach efforts to K-12 students and the general public, UC-HiPACC provides dramatic astrocomputing visualizations to major planetariums, such as the Bolshoi cosmological simulation, shown here on the dome of the Grainger Sky Theater of the Adler Planetarium in Chicago.

Photo by Adler Planetarium



The 20 participants accepted to UC-HiPACC's boot camp "Computational Astronomy: From Planets to Cosmos" in June 2012 are among the world's top science and engineering journalists in all media, whose publications and productions collectively reach over 10 million readers and viewers worldwide. The boot camp offered two days of intense "mini-courses" at UC Santa Cruz plus an on-campus field trip to the UC Observatories instrument labs; a third day featured field trips to visualization facilities at NASA Ames Research Center and California Academy of Sciences.

simulation images and videos accessible to the scientific community, educators, journalists, and the general public. One goal for AstroViz is to host an archive of the best astronomical visualizations developed anywhere over the past two decades.

Also in 2012, Ramirez-Ruiz and Primack created a 3D Visualization Laboratory (nicknamed the **3D VizLab**) with partial support from UC-HiPACC. The 3D VizLab will develop and test innovative new 2D and 3D scientific visualizations, which also will be made publicly available

through AstroViz. Primack and McCurdy partnered with zSpace, Inc., which donated their new 3D visualization product zSpace to the 3D VizLab. In 2012, McCurdy presented astro-visualizations at a Goethe Institut art/science symposium in San Francisco. Previously, McCurdy represented Primack's group and UC-HiPACC in the NASA exhibit at Supercomputing 2010 (the annual international conference for high-performance computing, networking, storage, and analysis) in New Orleans, LA; at Supercomputing 2011 and at the Astro-Viz Workshop 2011 (both in Seattle, WA, but in different months);

Stories Inspired by the Journalism Boot Camp

"From Planets to Cosmos" was a backgrounder for U.S. and international working press on pioneering work in computational astronomy, plus introduction to some of the major practitioners, research areas, modeling approaches, and applications of high-performance computing in theory, analysis, and observation. In addition to shorter columns, feature stories that grew out of subjects introduced or experts met at the boot camp include:

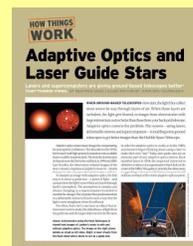
- German-language half-hour radio program "The Cosmos in the Computer—How Astronomers Simulate the History of the Universe" in September by Guido Meyer for Austrian Public Radio ORF (at <http://oe1.orf.at/programm/313325>);
- Two print features by Martin Uhlir for the weekly Czech magazine *Respekt*: one on dark matter called "The Hidden World Around Us" (July 23) and the other on dark energy and the multi-universe called "The Universe: One of Many" (November 19, for which story Uhlir returned to the U.S. for follow-up interviewing at LBNL), plus two associated online columns;
- An online feature "Cosmic Web Weeds Dwarf Galaxies" by Camille Carlisle for *Sky &*



Telescope at <http://www.skyandtelescope.com/news/Cosmic-Web-Weeds-Dwarf-Galaxies-179102791.html>, Nov. 13, 2012.

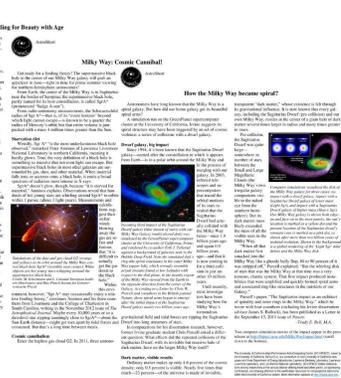
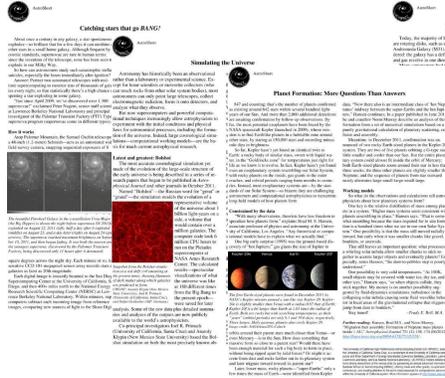
In early 2013, three more pieces appeared:

- A German-language half-hour radio program by Guido Meyer to air on Rundfunk Berlin-Brandenburg RBB http://www.kulturradio.de/programm/sendungen/130107/kulturtermin_1904.html;
- An illustrated spread on adaptive optics (inspired by Claire Max's mini-course) by Heather Goss in the "How Things Work" column of *Air & Space/Smithsonian*, online at: <http://www.airspacemag.com/space-exploration/HTW-Laser-Guide-Stars-187934441.html>;
- An online feature "How Particle Smasher and Telescopes Relate" by Elizabeth Landau for CNN, online at <http://www.cnn.com/2013/02/16/tech/innovation/science-exploration/index.html>.



And at least one more feature story is slated to appear:

- A Spanish-language print feature on cosmology and humanity by Angela Posada-Swofford (including interviews with Joel Primack) to be published in *Muy Interesante*.



UC-HiPACC's revamped website home page (upper left) is appealing to students and educators. In 2012, UC-HiPACC debuted one-page AstroShorts (upper right), which describe research in computational astronomy at one of UC-HiPACC's 12 consortium sites, for reprinting in astronomical society newsletters. UC-HiPACC staff also were involved in the publication of feature articles for the general public (column at lower right).

and at Supercomputing 2012 in Salt Lake City, UT.

As a major outreach initiative, in June 2012, UC-HiPACC sponsored the first science/engineering journalism boot camp to be held on the West Coast in astronomy, and the first ever held anywhere on astrocomputing. The boot camp, called **Computational Astronomy: From Planets to Cosmos**, consisted of two full days of formal sessions at UC Santa Cruz, in which 15 faculty from six UC campuses and DOE labs presented one-hour mini-courses on key topics in computational astronomy. A third day featured field trips to the Hyperwall at NASA Ames Research Center and the visualization facilities of the California Academy of Sciences.

The 20 journalist attendees included magazine feature writers for *Air & Space/Smithsonian*, *Astronomy*, *Chemical & Engineering News*, *New Scientist*, *Scientific American*, and *Sky & Telescope*; a daily newspaper reporter for the *Los Angeles Times*; online writers and new media specialists for *Physics Today*, *Popular Science*, and *CNN.com*; an Emmy Award-winning documentary filmmaker for *National Geographic* and *Smithsonian*; a reporter for German Public Radio; senior writers for *Muy Interesante* (the largest science magazine in the Spanish language for the general public, with a worldwide circulation of more than 3 million) and *Respekt* (a Czech language weekly, the largest magazine in Eastern Europe); plus public information officers from Ohio State University and the University of Florida. Stories resulting from subjects introduced in the camp began appearing in 2012 (see "Stories Inspired by the Journalism Boot Camp").

Since joining UC-HiPACC in June 2011, Senior Writer Trudy E. Bell has written four UC-HiPACC press releases on: UC Irvine's research on the formation of the Milky Way's bar possibly arising from the interaction with the Sagittarius galaxy; work at UC Santa Cruz and New Mexico State University on the Bolshoi cosmological simulation; work at UCSC and NASA on the rate of galaxy collisions; and work by six collaborators at three UC

campuses on the structure of disk galaxies. For the UC-HiPACC website, Bell regularly aggregates press releases about computational astronomy research on all UC campuses, the three affiliated DOE laboratories, plus NASA Ames. She also writes articles, and writes and designs the monthly AstroShorts, reports, and other documents.

UC-HiPACC staff were involved in five feature articles about computational astronomy in popular science magazines published in 2012. The articles, in order of appearance throughout the year, were "A Box of Universe," by Brian Hayes, *American Scientist* (January-February); "Universe on Fast Forward," by Joel R. Primack and Trudy E. Bell, *Sky & Telescope* (cover feature, July); and "The Cosmological Supercomputer: How the Bolshoi simulation evolves the universe all over again," by Joel R. Primack, *IEEE Spectrum* (October); and "Computational Astronomy Boot Camp" in *ScienceWriters* (quarterly magazine of the National Association of Science Writers, Winter 2012/2013). Bell also described several UC astrocomputing projects in "Deluged by a Data Tsunami" in *The Bent* (Winter 2012).

For 2013, UC-HiPACC plans to organize a conference for UC faculty and educators on educational materials focusing on cosmology, galaxy formation, and the evolution of the large-scale structure of the universe. The materials will be especially relevant following the 2013 release of the Next Generation Science Standards for K-12 students, which are expected to include Earth's place in the universe.





UC-HiPACC Director and Staff



Joel R. Primack

Distinguished Professor of Physics

Director

Office: Room 318 Interdisciplinary Science Building (ISB), UCSC, Santa Cruz, CA 95064

Phone: (831) 459-2580 Fax: (831) 459-3043 e-mail: joel@ucsc.edu

<http://scipp.ucsc.edu/personnel/profiles/primack.html>

Joel R. Primack specializes in the formation and evolution of galaxies and the nature of dark matter, which makes up most of the matter in the universe. He is one of the principal originators and developers of the theory of Cold Dark Matter, the basis for the standard modern picture of structure formation in the universe. With support from the National Science Foundation, NASA, and the Department of Energy, he uses supercomputers to simulate and visualize the evolution of the universe and the formation of galaxies, comparing the predictions of theories to the latest observational data. He is the author, with Nancy E. Abrams, of popular books on modern cosmology: *The View from the Center of the Universe* (2006) and *The New Universe and the Human Future* (2011).



Trudy E. Bell, M.A. (History of Science; American Intellectual History)

Senior Writer

(216) 221-5008

e-mail: tebell@ucsc.edu or t.e.bell@ieee.org

Twitter: @trudyebell

<http://www.trudyebell.com>

<http://nationalcalamityeaster1913flood.blogspot.com/>

Trudy E. Bell is a science/technology journalist whose 19 top awards include the David N. Schramm Award of the American Astronomical Society (2006). A former editor for *Scientific American* and *IEEE Spectrum* magazines, she is now a contributing editor for *Sky & Telescope* magazine. She has written or co-authored a dozen books, including a picture history *The Great Dayton Flood of 1913* (2008), the Smithsonian Science 101 volume *Weather* (2007), the Institute of Electrical and Electronics Engineers' millennium book *Engineering Tomorrow* (2000), four books for middle-school ages about the solar system, and five books on bicycling. She has observed five total solar eclipses.



Nina McCurdy

Public Outreach and Scientific Visualization Coordinator,

(415) 375-0779

e-mail: nmccurdy@ucsc.edu

Nina McCurdy creates scientific visualizations and acts as a liaison between UC-HiPACC and the scientific, artistic, and planetarium communities. She received her B.S. in Applied Physics with highest honors from UCSC in 2009; her senior thesis focused on scientific visualization for the purposes of public outreach. In 2008, she received The Ronald H. Ruby Memorial Scholarship for "promising young physicists."



Sue Grasso, M.A. (Education)

Administrator

Office: Room 339 Natural Sciences II, 1156 High Street, UCSC, Santa Cruz, CA 95064

(831) 459-1531

e-mail: hipacc@ucsc.edu

Sue Grasso manages and supervises the operations of UC-HiPACC. She serves as liaison with collaborating institutions, coordinates events, and handles purchases, payments, and travel reimbursements. Her previous experience includes marketing for the University Press at both Yale and UC Berkeley, teaching at the junior high and high school levels, and coordinating GATE (Gifted And Talented Education) and professional development programs for Santa Cruz City Schools.



Eric Maciel

Web Developer/Webmaster/Videographer

(831) 840-7626

e-mail: emaciel@ucsc.edu

<https://www.facebook.com/UCHiPACC>

<https://www.twitter.com/UCHiPACC>

<http://www.youtube.com/UCHiPACCVideos>

<http://hipacc.ucsc.edu/>

Eric Maciel graduated from UCSC in 2012 with a B.A. in Global Economics and Latin American and Latino Studies. He played collegiate lacrosse for UCSC during his four years. His experience includes assisting in filming and post-production for broadcasts on ESPN.