



## Seriously Funny: Spitzer's IRrelevant Astronomy Podcast



Consider the following reviews of one of our podcast series at the Spitzer Science Center from Aint-It-Cool News: "the most (intentionally) hilarious series of educational films you'll find...the pieces carry a Muppets-esque charm." Alan Dyer at Discovery.com says "It's a lot of fun and breaks the mold for NASA videos." The 2008 Podcast Awards described it as "packed with CG animation and snarky humor, all wrapped around the latest astronomy news." Since when is NASA "Muppets-esque" or "snarky?" What gives?

NASA outreach has come a long way in the last decade, and at Spitzer, we're still trying to push the envelope in some unorthodox directions. Naturally, in all our outreach products, we strive for the highest standards of accuracy and educational value. At the best of times, people have even called us inspiring. But can (or should) NASA try to be funny?

This question is actually more serious than it sounds. To be blunt, are we in science education ready to attract new audiences on their own terms, or are we too invested in our idea of science being necessarily serious and noble? If you actually look at what videos young people are downloading on iTunes or YouTube, it becomes obvious that the ones that go viral, so to speak, are almost always funny. The style of humor popular in cartoons and movies is very fast-paced, self-deprecating, and just a bit surreal.

But you can see why NASA might be justifiably nervous about adopting this style. Answering the question "Why should taxpayers spend money on this?" is a central part of any NASA education program. Appealing to the current style of internet humor might seem frivolous and possibly offensive. Would we end up on some budget-cutting legislator's list of Golden Fleece awards? It's not that NASA has no sense of humor (Some of Hubble's wonderful education activities have also made me chuckle.), but when you do something new, you also incur some risk.

All of this was on our minds about three years ago when we decided to create an intentionally funny science podcast series. Since this series would be relevant to all things infrared, "IRrelevant" sort of came out naturally, even if it made my stomach drop a bit to think about how I would sell this to our somewhat traditional management. "IRreverent" might have worked too, much to the same effect. We had recently hired Tim Pyle, an amazing computer animator that had worked previously on *Invader Zim*, an Emmy Award-winning television series on Nickelodeon. Tim had come to Spitzer looking for steady work and health benefits for his growing family, and had spent his first year producing wonderfully accurate and detailed science visualizations for our press releases. But for those of you who know our education group, it wasn't long before our nerdy sense of humor got the best of us.

This is actually another serious point: we are sci-fi nerds. Almost everyone I know who works for NASA is. We grew up post-Apollo program with *Star Wars* and *Babylon 5* as major inspirations and we know not to take ourselves too seriously. One Halloween we were sitting around at one of our weekly meetings discussing what to do for the office party. Well, I said, everyone has a *Star Trek* costume already, right? We all did. So, let's just buy some gold fabric and fake goatees and go as Mirror Universe versions of our *Trek* selves. Done. I loved my goatee, by the way. But the real point is that science culture is changing. We are not your grandfather's rocket scientists. We all grew up post-Apollo in an era where space science was less about national security and global politics and more about eccentricity and imagination. We were all early adopters of video games, cell phones, Facebook pages and Twitter accounts. Perhaps we should trust our instincts about what had inspired us, and use that insight to reach a wider contemporary audience.

The first podcast produced for *IRrelevant Astronomy* was a fully animated short called *M51 and Gizmo: Half-Baked Plan* (You can find all the podcasts I'm talking about at [coolcosmos.ipac.caltech.edu/videos/irrelevant/index.html](http://coolcosmos.ipac.caltech.edu/videos/irrelevant/index.html).) It featured a charming but naïve alien that wanted his birthday to come sooner, so he altered Earth's orbit to be closer to the Sun, and thus have a shorter year. Out of the consequences of this came a discussion of the "life zone" in a solar system and

# SPaRk

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## In This Issue

### Welcome to this issue of Spark!

It's hard to believe that we are already half way through the International Year of Astronomy! We hope that all of our readers are finding exciting new opportunities in which you and your students can engage. If you have found something particularly engaging we encourage you to contact us and contribute to the January 2010 issue of Spark. In the January issue we will attempt to capture some of the best of the best of IYA, to keep the built up educational momentum going!

In this issue we will hear from some of our youngest colleagues—undergraduate and high school students—about their experiences at the Long Beach meeting this past January. We will also hear from Paul Robinson (Westchester Community College) about the online Astrolmer@CAE community, and to follow up, Zoe Webster (Columbus State Univ.) reviews a recently published book on building online communities. Matthew Price (Ithaca College) reports on some of his latest research in astronomy education—course design can make a difference—and of course we have our regular wrap up of the contents of the latest issue of Astronomy Education Review. Not to mention a collection of our other regular columns, and a new one: Majors, Undergrad Research, & Graduate Education.

We encourage all members of the community to contribute articles to Spark, which is published twice a year to coincide with the AAS national meetings. If you are interested in making a contribution, we recommend sending us a brief description of your proposed contribution in advance so that we can discuss your idea and suggest a suitable article length (generally around either 400 or 800 words). Our editorial meetings are held in February and September of each year, so suggestions received before those months are easiest for us to incorporate. Article deadlines are April 1 for the issue released at the summer meeting, and November 1 for the winter meeting issue.

We look forward to discussing your ideas for contributions, and to reading your articles!

*Gina Brissenden & Jake Noel-Storr*  
Editors

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*Seriously Funny continued*

why Earth's position is so fortunate. *M51 and Gizmo* turned to be tremendously popular. It broke the top ten podcast down-loads on iTunes (And that's *all* podcasts, not just the science ones!) and won the CINE Golden Eagle award, one of the highest honors for on-line video. After three years, it continues to get tens of thousands of down-loads each month.

We would have loved to keep making *M51* podcasts, but as a fully-animated feature, the production time was just too long. Next came *Spaceship Spitzer*, which used a robot without a mouth (easier to animate) and me dressed in a spacesuit I bought on Ebay hamming it up in front of a green screen that we set up in a spare office. We currently have two segments of *Spaceship Spitzer*; the first one features a space battle with evil aliens who lured us with promises of free pizza. We end up playing a game of space chicken around the supermassive black hole in the middle of the Milky Way and use a clever general relativity trick to escape. The next episode finds us trying to detect water on exoplanets (We're thirsty after all that pizza!) only to be interrupted by a rude race of conquering aliens who build an energy web (very slowly) around our spaceship.

After this series, we decided to use the robot on his own (even less production time) and create the *Robot Astronomy Talk Show (RATS)*, the only talk show by robots, for robots. The robots always want to take over the Universe but somehow can't get their act together. They've tried to bombard Earth with asteroids, eradicate fish (long story), ignite a new star and reinstitute Life Day (Remember that horrible *Star Wars* holiday special?). Amazingly, the series has proved so popular that some local celebrities were interested in lending a hand; the last installment featured the voices of George Takei (Mr. Sulu), Mark Hamill (Luke Skywalker) and Ed Wasser (Mr. Morden on *Babylon 5*). I'm not kidding—these famous actors actually volunteered to be on our podcast.

These days, with several major web awards under our belts, and down-load numbers that can't be argued with, we feel a lot more secure about *IRrelevant Astronomy*. It may not be everyone's style, but something is definitely working. I'm very interested in the discussion as to whether or not this is a direction NASA should take in the future. Some people may argue that this is another step in the "dumbing down" of American culture, but I would disagree. We still check our facts rigorously and present real astronomy framed in humor. Something about the way we currently do science education is putting people off, and we've got to check our egos at the door, and talk seriously about how to get our audience back. Perhaps it's time to get serious about being funny.

*Michelle Thaller*  
*CalTech*



*Michelle and her plucky robot companion, IR2, in full panic mode*



*Robot Astronomy Talk Show host IR2*



*IR2 interviews an astronomer on the Robot Astronomy Talk Show*



## From the desk of the AAS Education Officer... Don't Miss Out on Your REU Stimulus Package

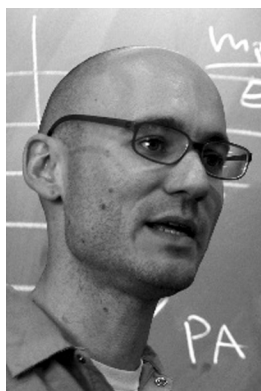
For many of us, the long days of summer bring a few classroom-free months to focus on moving our research forward. Summer is also the time when enthusiastic undergraduate students are most available to learn how the scientific research enterprise is done. Indeed, NSF is supporting more than

100 undergraduates studying astronomy this summer through its Research Experiences for Undergraduates (REU) Program. Even without funding, many more undergraduate students are willing to work hard to gain valuable work experience for their budding CVs, insight into whether or not a scientific career is what they really want to do, and to obtain an enthusiastically positive letter of reference for graduate school. But, more than anything, what we have discovered is that REU students most want to build personal relationships with faculty so that they can gain deep insight into our scientific culture.

All too often, REU students unintentionally leave a summer research experience believing that all astronomers ever do is sit in front of a computer. I suspect that such an automaton

perspective isn't what we want students to think astronomy is all about. In other words, to best meet students' needs and our overarching goals to nurture the profession, you need to do more than just give them a password into your computer workstation and access to data. They need face-to-face time with you that is dedicated not just to how to code and analyze data, but purposeful conversation time with you to talk about why you are doing what you are doing and where it fits into the bigger picture of astronomy. Yes, in many cases, a more senior student or post-doc might know a little better how to actually "do" the data analysis. And, yes, in many cases, it is great experience for a more junior researcher to guide an undergraduate in learning how to do research. But, just like our US economy won't grow simply by randomly throwing some stimulus money at it, students need a degree of care and feeding too. To stimulate the growth of a new researcher, students also need an enculturation experience that can only come from a more senior researcher who can share with them about the human side of the scientific enterprise, can introduce them to colleagues at scientific conferences, and help them understand the larger adventure of doing astronomy as a career.

*Tim Slater*  
*University of Wyoming*



## Majors, Undergrad Research, and Graduate Student Education

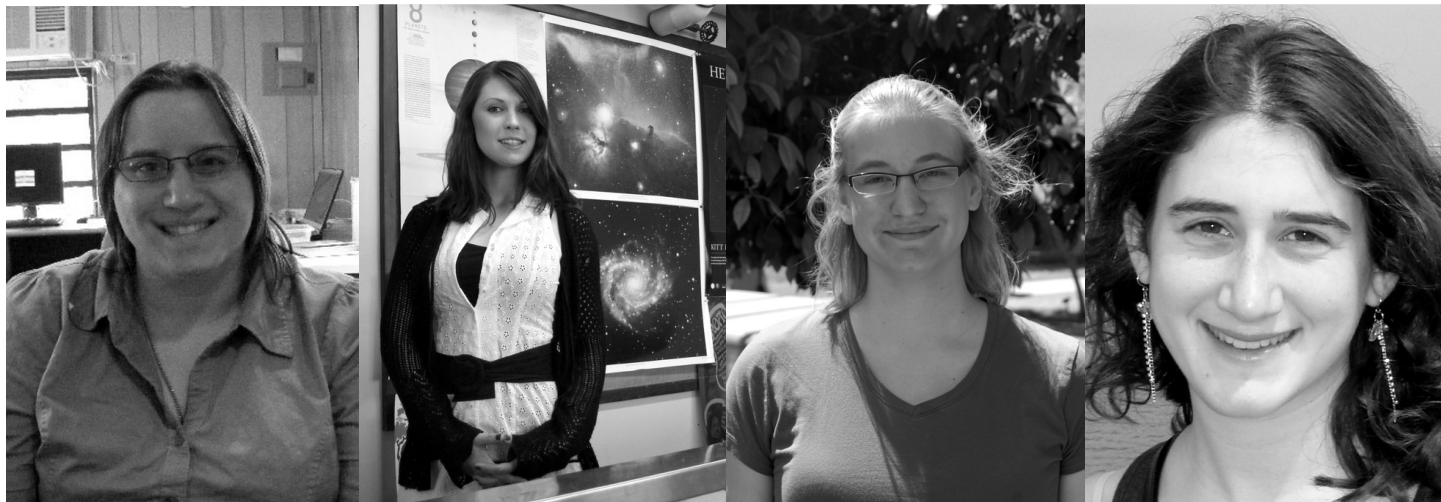
*Columnist: David Hogg, NYU*

In our debut of this Feature Section, Gina Brissenden and Jake Noel-Storr (coeditors of Spark) thought it would be interesting to hear from undergrads about what their experience is like at an AAS meeting. So, Gina made an impromptu announcement at the Undergrad Reception at the beginning of the Pasadena meeting asking for volunteers to write an article about theirs. Four female undergrads approached her, so she asked them all to collaborate on the article. They met later in the week to discuss how to merge all their experiences together in one coherent article, and so they decided to each write a section about what was most striking to them about the week of events.

They all had very interesting experiences, and I think you'll really enjoy reading about not only the AAS meeting, but us as a Society, through the eyes of our next generation.

If you've got something interesting to tell us about your department with respect to majors, undergrad research, or graduate student education, we'd love to hear from you ([spark@as.org](mailto:spark@as.org)).

## Undergraduates Share Their Experiences from the Pasadena AAS Meeting



*Left to right: Kristen Jones, Jacquelyn Parsons, Allison Strom, Lauren Weiss*

### Diversity and the AAS

This January I attended the AAS meeting for the second time. I came primarily to do networking, especially as I finished my graduate school applications. But I was also interested in seeing how the Society deals with its own challenges. I particularly looked at the Committees on the Statuses of Women and Minorities in Astronomy (CSWA, CSMA), and attended both committees' Town Hall meetings. While I was delighted with the work and progress outlined by both programs, I was surprised to hear someone ask, at the CSWA Town Hall, "Do we still need a Committee on the Status of Women in Astronomy?"

The rapid discussion of why the CSWA was still necessary, even vital, as a part of the AAS quickly reassured me, but the question, nevertheless, stood out for me throughout the rest of the conference. Perhaps it is because I am an undergraduate that I found it so astonishing. In my pursuit of a Bachelor's degree, I am required to be involved in interdisciplinary activities, and as such it seems obvious to me that there are still gender and race (and other) imbalances in every field, including astronomy. While the CSWA and CSMA are both themselves evidence that the astronomical community is attempting to overcome these discrepancies, a mere glance at my peers in my classes is proof that there is still work necessary.

Overall, I remain inspired by what I encountered at the AAS Meeting. There may still be much work to be done, but I observed an active, engaged attempt at overcoming the challenges of representation within the field. I believe this activity is absolutely vital to the growth of the Society;

after all, it is not enough to only do what you love—it is also necessary to help change things for the better.

*Kristen Jones  
Univ. of Wisconsin*

### Collision Courses

Attending an AAS conference as an undergrad can be one of the best experiences of your undergraduate career. It can also be one of the most intimidating. With a wealth of knowledgeable and experienced individuals at your fingertips, knowing where to begin can be daunting. You could see the author of your astronomy textbook pass you in the hallway, or Neil deGrasse Tyson taking questions near the podium. And the one thousand page booklet of all the lectures, poster sessions, and press releases was also daunting, to say the least. But what wasn't intimidating or daunting was talking to people who were presenting posters.

The people presenting posters ranged from senior faculty to undergrads. Talking with them not only let me learn about different types of research currently being done in astronomy, but maybe even more importantly, as an undergrad having to make decisions about where I would like to go to grad school in the future, it also gave me a great opportunity to ask them about the different research programs at their department and to ask them about their institutions. To my surprise, I learned that different types of research that were done in a particular department were more determined by the subject-area interests of its faculty, and the history of research already

continued on next page

### *Undergraduate Experiences continued*

conducted in that area, rather than by the department itself. In addition, I learned that areas of research I expected to find in astronomy departments were often also found in physics, chemistry, biology, and geology departments.

What I took from this experience was that I could learn more about particular institutions I might be interested in attending as a grad student if I talked to researchers doing their work in areas related to those I was interested in researching, more so than just talking to researchers from particular schools I thought I might want to attend.

I hope your first AAS experience is as enjoyable and enlightening as mine.

*Jacquelyn Parsons  
City College of San Francisco*

### **Looking Forward**

Astronomy is an observational science, which means we are always looking: looking around, looking back, looking forward. As an undergraduate student, the latter, especially, occupies my thoughts. I worry about doing well in classes, certainly, but also about acquiring the skills and intuition that transform people interested in science into scientists. Often, it is a confusing transition, but surrounded by the bustle of the scientific community, it seems less mysterious.

Scores of students like myself presented their research at the January AAS Meeting, where we all took the first steps toward thinking like independent researchers. Working as a student in a research group means ready access to guidance and support and a certain absolution from responsibility for the overall direction of one's efforts; explaining and defending my work during one of the poster sessions placed that responsibility squarely on my shoulders, and it was a thrilling, nerve-wracking, invaluable experience.

These opportunities are more rare than they should be, but they are still an integral part of our education. Not only are they an important litmus test in discovering if we want to stay in astronomy, they help prepare us for the expectations of that future.

*Allison Strom  
Univ. of Arizona*

### **The (Un)Importance of Being an Undergraduate**

As an undergraduate, one of the questions I am facing is whether to become a research professor. The first thing I thought when I saw the poster exhibit hall, which was large enough to be an airplane hangar, filled from wall-to-wall with rows upon rows of posters, was that I simply wasn't cut out for research.

Like the exhibit hall, the conference itself was imposing in its size. With attendance that tops 2500, the winter AAS Meeting is the largest gathering of astronomers in the world. For comparison, the Harvard-Smithsonian Center for Astrophysics, the largest working environment for astronomers in the world, houses 300—just over a tenth of the AAS conference attendance.

The AAS Meeting boasts not only high quantity, but also high quality. Famous research scientists, professors from prestigious universities, and NASA gurus abounded. I even got to shake hands with one of the top dogs of the National Science Foundation—he probably approved the grant that led to my presence at the AAS meeting in the first place.

Yet, as the 213<sup>th</sup> AAS Meeting progressed, its intimidating first impression disappeared. Standing in line for overpriced drinks, behind a professor, reminded me that even the people who make groundbreaking discoveries get thirsty. While student presenters sported suits and shiny shoes, the veterans of science paraded their favorite astronomy-related t-shirts and hiking boots—it was as if the students and professors had spontaneously switched wardrobes. Some professors even solicited me for their graduate programs and summer research internships. There is nothing like a little attention to make an undergraduate feel appreciated.

However, the experience that made me feel like I really belonged in the astronomy community was going to a bar to dance (and drink) with a group of astronomers, aged from undergraduate to professor emeritus. Watching the emeriti “shake it,” I remembered that all professors were once undergraduates—and we're all just people.

*Lauren Weiss  
Harvard Univ.*

## Astronomy in Out of School Time



*Columnist: Jacob Noel-Storr, Rochester Institute of Technology*

Science in out of school time doesn't have to mean science away from teachers! Following on from the previous article, showing undergraduates' experiences at an AAS meeting, Jeff Paradis, a teacher from upstate New York, explains his motivations, and shares some of his students' comments who were able to attend the AAS meeting in Pasadena. It was a pleasure to see the high school kids at the meeting, and I'm sure that many of you who attended the meeting had the chance to interact with them as they became more and more confident about walking up to Astronauts, Nobel Prize Winners, and familiar faces from NOVA.

Seeing this group of high school students at the meeting was a great reminder to me that we should not only concern ourselves with whether the 'content' is at an appropriate level for high school students, but to also give them opportunities to develop their attitude towards science, and see some 'real science'. Though the students may not have understood all of the science from the presentations they attended, as you will see from their comments, they certainly came

away with the attitude that being a member of the scientific community would be a great thing for them to do—and even if they couldn't 'get' all the science now... one day they will...

## High School Students as Attendees at a AAS Conference

*Jeff Paradis, Rush-Henrietta High School*



*Rush Henrietta High School students do some stargazing with Galileo (Photo: Theresa Moody)*

I like to tell my high school students that science is like a sport: It's not something you just talk about, it's something you do. In a classroom that idea can get lost or seem out of contact with the world they walk through. So many students think that science is "finished." There's not much left to discover or learn about that is of interest to them. At the start of almost every class I take a headline from a major news source and show them that science is happening out there, and I connect it to one of the concepts from class. And

then there's the other stuff... Every year I take kids on a trip to whatever scheme I've laid out to let them see science in action and to even conduct their own research. Whether it be to Kitt Peak, different science conferences, or CERN, we go. This past January I was able to bring eight high school students to the AAS conference after doing their own work with AGN reverberation as part of a class. Below are some of their comments.

*"The smaller sessions were quite intense for the most part but the talks in the large room were amazing. My favorite talk was the professor from Texas State University who talked about a class he teaches at the school. I could personally connect to this talk since it combined my favorite hobbies, photography, travel, art, and science! And I found all of his explorations fascinating. My favorite example that Professor Donald Olsen dissected was the famous 'Autumn Moon, the High Sierra from Glacier Point' taken by Ansel Adams. Olson showed step-by-step how his class found out the exact time and date of the photograph. It amazed me and now I want to go down to Texas to take that class!"*

*Not only were the talks interesting but the people I met were famous in the astronomical world and they were very intelligent people. John Mather, a Nobel prize winner, Neil Tyson, and the president of the AAS are just a few people I met on my trip.*

continued on next page

*Astronomy in Out of School Time continued*

*My trip out to California to attend the AAS meeting was one I will never forget. I hope to go to another meeting sometime so I can compare the two and see how far my knowledge has come.”  
Marlena (12th Grade)*

*“The most fascinating and beneficial aspect of our trip to Long Beach was when we were able to meet the different physicists and astronomers. Jon McDowell was incredible and gave great advice on how to approach college and future careers. John*

*Mather, the Nobel Prize winner, helped us see how it’s not just talent that determines success and to ‘follow your dreams’.”  
Chris (11<sup>th</sup> Grade)*

*“...So much science flows through the air, but I can’t interpret it. It’s like dark matter, I know it’s there and it’s extremely important, but I can’t understand it. But I know someday I will.”  
Taylor (11th Grade)*



## Community Building

*Columnist: Gina Brissenden, Univ. of Arizona*

In our last issue of Spark we debuted our feature section Community Building. It was nice to hear from Jerry Dobeck (Northwestern Mich. College), Andrew Fraknoi (Foothill College), and Connie Walker (Univ. of Arizona) about how working as a community has helped them sustain and expand the Project Astro (and Family Astro) programs.

In this issue, we hear from Paul Robinson (Westchester Community College) about an online community he is a very active member of called Astrolrner@CAE. Now, I’ll have to tell you, right up front, that this is an online community I am personally very involved in, but that isn’t the reason I wanted Paul to tell us about it. I think you’ll hear why when you read Paul’s article—especially if you teach Astro 101, and even more especially if you feel like you have no one to talk with about the courses you teach, your students, your concerns, and your successes.

Many of us who teach Astro 101 feel this sense of isolation. Perhaps we are the only astronomer in a physics department. Maybe we teach at a smaller college where we “are” the astronomy department.. Maybe there are a couple of us at our institution, but our institution is pretty far from others, and we don’t have any travel money. There are lots of ways to feel isolated. But when we’re part of a community—when we know we’re not in it alone, that we have colleagues to support us and cheer us on, and that a helpful voice is just an email away—when we can excel at reaching our goals, and not just as individuals, but as a community. I hope reading Paul’s article compels you to become a part of this, or any other, community of practitioners.

In our next issue of Spark, we will be hearing from Audra Baleisis (Swiss Federal Institute of Technology). Audra is a recent PhD graduate student from the Univ. of Arizona, earning her degree in Teaching and Teacher Education. At the Long Beach AAS meeting this past January, Jake Noel-Storr (coeditor of Spark; RIT) and I found her dissertation talk so interesting and relevant to Community Building that we asked her to write about it. She’ll be telling us a bit about her research on how, as a graduate student, one aspect of becoming part of our greater community of astronomers involves developing the common language and common way of communicating that our community uses. I think we’ll all really benefit from learning about her findings.

And now, here’s Paul!

## Astrolrner@CAE: Connecting to Your Astro 101 Community & Colleagues Using Electrons

*Paul Robinson, Westchester Community College*

In a corner of the internet, hosted by the Center for Astronomy Education (CAE), lives Astrolrner@CAE, the listserv community for Astro 101 educators. Members of

Astrolrner@CAE post and reply to messages through email, or via the web interface at <http://astronomy101.jpl.nasa.gov/discussion>. Currently, Astrolrner@CAE has over 750



*Community Building continued*

members, comprised primarily of community college and university instructors, postdocs, and graduate students, as well as planetarium operators, industry professionals, physics and astronomy education researchers, and others who share a common interest in Astro 101 education.

Last April, I was asked to guest moderate the listserv for a year. Having read all the incoming

messages for the past year, I have gained a fondness for the Astrolrner@CAE community. Reading their posts, I get the feeling that I know some people, though I have not met them. When I do meet teachers from the Astrolrner@CAE community, at a conference or workshop, there is an instant recognition and an opening for friendship. I know their school and their work, because they have posted about it on the listserv.

Why should you join in the Astrolrner@CAE discussions? I can think of several reasons:

1. A sense of community that only comes with interacting with like-minded colleagues. If you are like me, then you know there is nothing quite like teaching astronomy and interacting with students. The next best thing is sharing that experience with colleagues. Astrolrner@CAE gives you the community "fix" in between conferences.
2. We have lively discussions on teaching and learning. In 2008, for example, there were discussions about the school performance of low-income students and spirited debates on whether or not we need textbooks in Astro 101 courses. The aforementioned discussion on low-income students was a thread that began originally as an offshoot of a discussion about the efficacies of using classroom response devices! One of the nice things about Astrolrner@CAE discussions is that the participants are not just armchair philosophers. They often present as evidence research in the relevant literature, or even research they have done themselves to support their statements. More than once I have been compelled to read an education research article that I did not know about because I saw it referenced in one of these discussions.
3. Instant advice and input on teaching preparations. For an instructor preparing a lesson for the first time, there is often the feeling that they may be

reinventing the wheel, so to speak. Every month on Astrolrner@CAE, I see instructors asking for advice on a topic they are slated to teach, or for guidance on constructing a demonstration. It does not take long for there to be a string of responses from other instructors who have done it before. They offer advice from their own student populations, link to articles written about the topic in question. Oftentimes, a fellow instructor will have a class activity already written and will offer it for use. This past year, a member of the Astrolrner@CAE community needed to know how to find an affordable infrared camera that could be used for a classroom demonstration. Several teachers responded with links to camera models that they had experience with, the prices of the cameras, and how well they worked in the classroom. This was information that I myself used to place an order for such a camera.

4. Announcements and networking. One of the advantages of having so many department chairs, astronomy education researchers, and education directors/coordinators on Astrolrner@CAE is that we often hear about opportunities within the community first. Job opportunities? Check. Meeting and workshop announcements? Check. Opportunities to participate in education research? Check.

Astrolrner@CAE is a moderated listserv. Submitted messages are first approved by one of the group moderators. Gina Brissenden, Program Director of CAE, at the University of Arizona, oversees the group. Since April 2007, Astrolrner@CAE has had the Guest Moderator Program, in which members of the Astrolrner@CAE community are invited to help manage the messages and encourage participation. Jeff Sudol, now of West Chester Univ. in Pennsylvania, was the first guest moderator. Since April 2008, I have been the guest moderator. One of the advantages of having a moderated group is that participants receive no spam messages or advertisements. Listserv moderation also helps to keep the group on the topic of Astro 101 education.

There are several ways to receive and participate in Astrolrner@CAE. You can sign up for the group by visiting the website at <http://astronomy101.jpl.nasa.gov/discussion>. You can decide if you want to receive individual messages to the listserv as separate emails, or if you would like a single email daily digest of the listserv messages. Even if you decide not to receive emails, please join the group to read and post messages on the website. Join your community!

## *Building Online Learning Communities: Effective Strategies for the Virtual Classroom, 2nd Edition*

By Rena Palloff and Keith Pratt, Jossey-Bass (2007), ISBN: 978-0-7879-8825-8; \$40



**Zodiac T. Webster, Reviewer**  
Columbus State University

I teach a course at Columbus State Univ. called Astro 101-Solar System, and reading *Building Online Learning Communities* by Rena Palloff and Keith Pratt (Jossey-Bass, 2007) made me realize how inferior my first attempt at online teaching has been. The authors provide

extensive information about how to turn the otherwise impersonal environment of a typical course management system into a caring community of students working together to learn. The book focuses on learning theory, community building, and practical details such as the time commitment needed for online teaching. Details about using the technology are lacking, but the book compensates by providing extensive examples of syllabi and grading schemes used in online teaching.

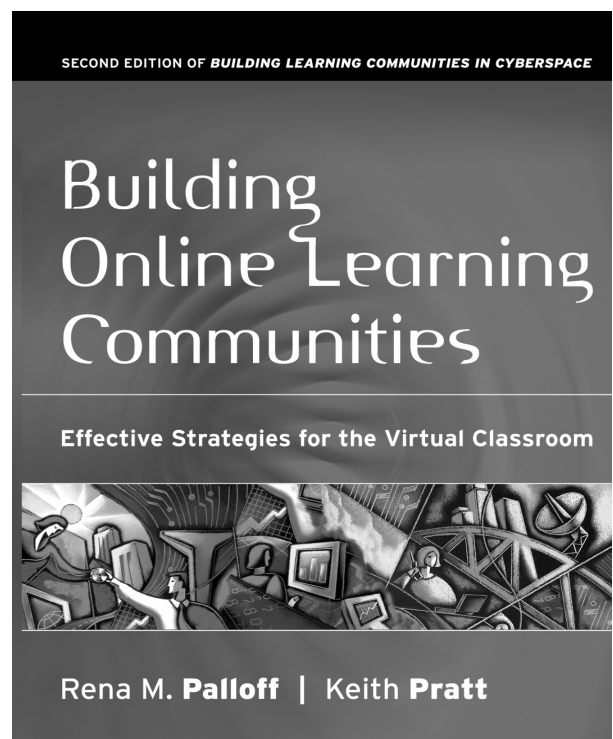
The authors spend a considerable amount of effort describing how students learn; old news for those familiar with education research. However, many people transitioning to an online class are comfortable with lecturing and are confused about how students will learn if there are no lectures. The authors suggest that building a community increases student-to-student learning and opportunities for self-reflection about the learning journey. The authors' wisdom about creating community, stemming from years of teaching online, includes the need for (managed) conflict, defining norms, and even suggestions about how to deal with the death of a classmate.

The total neophyte to online teaching may want to skip to Chapters 7 and 8 which discuss designing an effective course syllabus and methods of encouraging collaborative learning. Someone looking to increase learning in an online or hybrid class who has already mentally taken inventory of the learning goals for their course may want to wrestle with the challenge of building a community of learners as described in Part 1, "The Learning Community in Online Learning." Those of us who are paranoid about what will happen to our course evaluations when our very personable selves are removed from the students' presence should read Chapter 10, "Student Assessment and Course Evaluation," and be

prepared to have lengthy discussions with our department chairs.

For an astronomer, used to assigning numerical or short answer questions, the key "take-away" lesson is that those types of assignments will fall flat online as there is little opportunity for student discussion. Palloff describes her online discussion groups in terms reminiscent of talking with a friend at a coffee shop. Assignments must be meatier (or tempeh-ier for the vegetarians) so students have something to ponder. There are copious excerpts of postings provided; however, few are from introductory science or mathematics courses. This lack of direct analogues makes it hard to envision how a similar discussion would play out for beginner undergraduates. This book is not a substitute for working with a STEM colleague to develop appropriate conversation-motivating assignments, but it can serve as a strong starting point.

Your campus may be much like my own; rushing to embrace online teaching with very little training for instructors about outstanding online teaching. Reading this book is an excellent first step for training online faculty to be successful facilitators of online student learning.





## Astronomy Education Research

*Columnist: Ed Prather, Univ. of Arizona*

As work on the Astronomy Decadal Survey moves towards its final stages, it's exciting to reflect back on the progress that has been made in past years regarding our understanding about how people learn astronomy. Year by year more students are completing their PhD while conducting their dissertation work on astronomy education research topics. In this issue of the Astronomy Education Research Feature Section, Matthew Price, 2008 graduate from the Department of Science and Mathematics Education at Oregon State University, and now Assistant Professor in the Physics Department at Ithaca College, discusses results from his dissertation which looked at how instructional methods can help to improve students' understanding of the nature of science and foster improved conceptual understanding of astronomy.

## Connecting Nature of Science Learning and Content Learning

*Matthew Price, Ithaca College, Ithaca, NY*



Two important topics in astronomy education research involve investigation into (1) student conceptual gains and (2) student views on the nature of science (NOS) astronomy-*i.e.* student attitudes<sup>1</sup>. Of these two topics, the majority of research efforts have been on the development and validation of instruction methods proven to foster gains in the conceptual understanding of students in the introductory non-major

astronomy course (Astro 101)<sup>2,3,4,5</sup>. One common element among these successful astronomy instructional methods is that they incorporate interactive engagement: students doing instead of the instructor simply lecturing<sup>6</sup>. However, there have been few studies in astronomy on the impacts of interactive engagement on student attitudes, or whether there is a connection between student attitudes and their conceptual understanding of astronomy<sup>7</sup>. This article is a report of such a study.

The study described here was conducted at Oregon State University and investigated a large enrollment Astro 101 lecture-lab course designed to improve student views on NOS while simultaneously improving their content knowledge. The lecture section of the course utilized instructional methods documented to increase student conceptual understanding (for example, *Lecture-Tutorials*, *Ranking Tasks*, and *Peer Instruction*). The lab sections built on concepts from the lecture, but used novel instructional activities explicitly designed to help students understand how scientists come

to defend their understanding of that concept. These latter instructional methods used inquiry-based activities and focused questions that included collecting and analyzing data to actively engage students through scientific lines of evidence-based reasoning.

The study took place in multiple stages. For the first stage, in spring 2004 baseline data were gathered about student views on NOS, at the beginning and end of the semester, from 112 participants enrolled in a traditionally taught Astro 101 course. In the following stages, during the 2006-2007 academic years, we implemented in the lecture component of the courses the research-validated instructional materials mentioned earlier, and in the lab section of the courses we implemented the redesigned instructional activities. In total, pre-/post- NOS data and post-instruction conceptual understanding data were collected from 487 students in the redesigned Astro 101 course.

We measured student views on NOS using the Epistemological Beliefs Assessment for Physics Sciences (EBAPS) developed by Andy Elby<sup>8</sup>. EBAPS measures the sophistication of student views on how knowledge is constructed in science and in the science classroom. A higher percentage score indicates a higher level of sophistication. The range of scores on the pre-instruction EBAPS between the students in the baseline data course and the students from the courses with the redesigned instructional activities were very narrow, clustering around 63% (62±2%). This result suggests that students entering Astro 101 at this institution had similarly sophisticated views of NOS. The average post-instruction EBAPS score for the students in the traditional Astro 101 course showed a decline to 51±3%. The average post-instruction EBAPS score for

continued on next page

*Astronomy Education Research continued*

students in the redesigned courses was  $61 \pm 2\%$ . A  $\chi^2$  test for independence indicated that post-instruction EBAPS scores for the redesigned course were different at the 95% confidence level from scores for the students in the traditional course. A T-test between the two groups' pre- and post-instruction EBAPS scores indicated that the difference in the scores was significant at the 95% confidence level. This suggests that the traditional Astro 101 course did not foster increased sophistication in student views of NOS. In addition, the higher post-instruction EBAPS scores for the redesigned course indicates that our redesigned Astro 101 course helped maintain students' views on the nature of science—whereas, the traditional Astro 101 course caused them to decrease. We take this as a positive result regarding the ability of instruction—using research validated instructional materials in our lecture and our redesigned instructional materials in our lab—to positively affect student views.

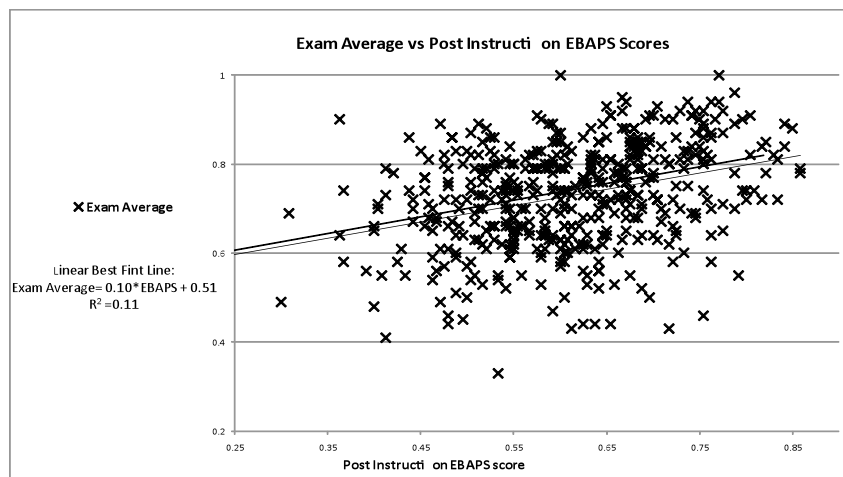
Student content knowledge was measured using the average of four student exams given over the course of each term in the 2006-2007 implementation year. Figure 1 shows a plot of exam average vs. post-instruction EBAPS scores. The line drawn on this graph is provided to illustrate that there is a moderate linear dependence between post instruction

understand how scientific knowledge is gained and defended while simultaneously helping students gain content knowledge. While this result is promising, its critical that more work be done by our community on the connection between students understandings of astronomy and whether their attitudes toward science improves as a result of being in our courses.

The results discussed here are being used to inform the research being done by a collection of astronomy college and university faculty and graduate students working together as part of the NSF Collaboration of Astronomy Teaching Scholars program. This group of researchers is currently developing an instrument that will focus on measuring Astro 101 students' understanding of, and attitudes and beliefs regarding NOS as it applies to their experience in the Astro 101 course. As of this publication we are in the process of building the pilot instrument that will be studied and verified on a small scale, after which we will begin asking for other sites to administer the instrument on a national scale.

**References:**

<sup>1</sup>Bailey, J.M., and Slater, T.F. (2005). Resource letter AER-1: Astronomy education research. *American Journal of Physics*, 73(8), 677-685.



*Figure 1. Exam average vs. post-instruction EBAPS scores*

EBAPS scores and exam average. Linear regression modeling indicated that post instruction EBAPS and exam average were correlated at the 95% confidence level.

It is worth noting that the EBAPS is primarily focused on assessing students' views of how knowledge is gained in the classroom and not on how students gain knowledge in science. However, the correlation between EBAPS scores and exam scores implies that instructional environments can be created which are capable of helping students better

<sup>2</sup>Zeilik, M., Schau, C., Mattern, N., Hall, S., and Teague, K.W. (1997). Conceptual astronomy: A novel model for teaching postsecondary science courses. *American Journal of Physics*, 65, 987-996.

<sup>3</sup>Prather, E.E., Slater, T.F., Adams, J.P., Bailey, J.M., Jones, L.V., Dostal, J.A. (2004). Research on a Lecture-Tutorial Approach to Teaching Introductory Astronomy for Non-Science Majors. *Astronomy Education Review*, 2(3), 122-136.

*Astronomy Education Research continued*

<sup>4</sup>Green, P.J., (2002). Peer instruction for astronomy. Upper Saddle River, NJ: Benjamin Cummings.

<sup>5</sup>Hudgins, D.W., Prather, E.E., Grayson, D.J., and Smits, D.P. (2007). Effectiveness of collaborative ranking tasks on student understanding of key astronomy concepts. *Astronomy Education Review*, 1(5), 1-22.

<sup>6</sup>Rudolph, A. (2009). Understanding of light and the use of interactive learning strategies. *SPARK: The AAS Newsletter*, 7, 8-9.

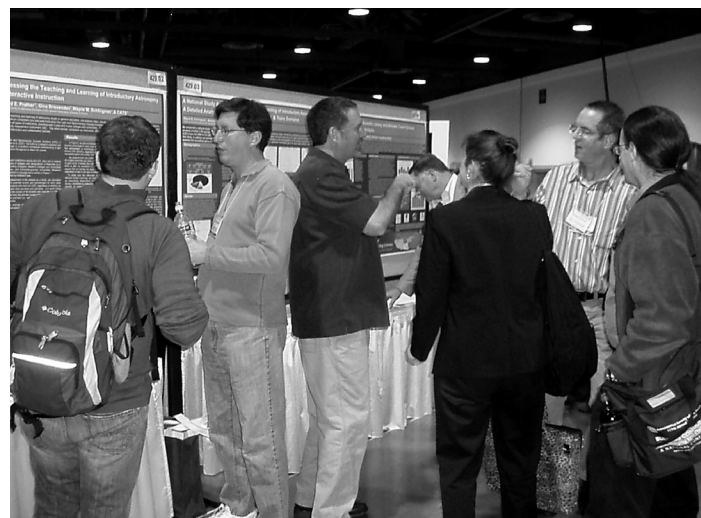
<sup>7</sup>Zeilik, M., Schau, C., & Mattern, N. (1999). Conceptual astronomy. II. Replicating conceptual gains, probing attitude changes across three semesters. *American Journal of Physics*, 67(10), 923-927.

<sup>8</sup>Elby, A. (2001). The idea behind EBAPS. Retrieved November, 2004, <http://www2.physics.umd.edu/~elby/EBAPS/idea.htm>.



*Above: Ed Prather, Gina Brissenden (both CAE, Univ. of Arizona) and Jake Noel-Storr (RIT) celebrate what they hope is the first of many Educators Networking Receptions at the Long Beach AAS Meeting.*

*Below: At the Educators Networking Session, Emilie Drobnes (NASA's GSFC) eyes the camera as if to say, "Look, she's reading Spark!"*



*Left: The Collaboration of Astronomy Teaching Scholars (CATS) Poster Session was lively, presenting a wide array of research on Astro 101. Here we see (l to r) Alex Rudolph (Cal State. Poly., Pomona) answering questions, while Ed Prather (CAE, Univ. of Arizona), Pamela Harman (SETI), Doug Duncan (UC Boulder), and Daniel Caton (Appalachian St. Univ.) engage in an animated discussion. That's former AAS Education Officer, Bruce Partridge (Haverford Col.) lurking in the back.*

## Astronomy Education Review

We are proud to announce that, as of January 2009, the American Astronomical Society has taken over the publication and management of *Astronomy Education Review (AER)*. The AAS has engaged the American Institute of Physics (AIP) to re-design, update, publish, and archive the journal.

The new web site, on which our back issues are already on display and on which new papers are now published is: <http://aer.aip.org>.

We will keep all issues through No. 14 live at <http://aer.noao.edu> for several months. Readers should begin substituting the new *AER* address in any links or bookmarks you have for the journal. And, as you see on both sites, the submission e-mail address for submitting papers and articles, as well as for communicating with the editors, has also changed to: [aer@aas.org](mailto:aer@aas.org). Judith Johnson, a long-time member of the staff at the American Astronomical Society, is the manager of editorial functions and liaison with the AIP.

The AIP has an electronic publishing platform called Scitation, into which *AER* is now integrated. This brings many benefits to our readers, authors, and editors, including:

1. Each *AER* paper or article is assigned a permanent Digital Object Identifier (DOI), and becomes part of an international system of tagging intellectual property. This identifying number (and its unchanging link) can be used to keep track of that article on our site and elsewhere. (These numbers have already been assigned for all our back issues as well.)
2. The “top page” for each *AER* paper or article shows you its abstract and, with one click, its references. (Whenever the referenced article has a DOI, it shows up as a link, and one click will take you to it.)
3. The Search Tools for our journal have been greatly expanded and strengthened.
4. As an *AER* reader, you have free access to My Scitation, a service that lets you personalize your use of the Scitation platform on which our journal is built. For example, you can set up a “Virtual Filing Cabinet” in which to keep articles you want to come back to, not just from *AER* but from other AIP managed journals.
5. Each paper in *AER* has also been assigned one or more PACS identifiers—seen at the bottom right of the page. This “Physics and Astronomy Classification Scheme” (see: <http://www.aip.org/pacs/>) is a complex system of organizing all topics in our field. It seems more precise for scientific research than for education, and doesn’t quite map into the “keywords” we and our advisors set up for *AER*. However, it has one immediate advantage. If you find a PACS identifier of interest, you can click on, and find, a list of dozens to thousands of articles that have been assigned that same identifier in the literature.

Papers and articles in the recently complete 14th issue, which is our biggest so far, include:

- Development and Application of a Situated Apprenticeship Approach to Professional Development of Astronomy Instructors—Edward Prather & Gina Brissenden (U. of Arizona)
- How Do Pre-service Teachers’ Religious Beliefs Affect Their Understanding of Astronomy?—Jesus Rodrigo F. Torres (Rizal Technological U., Philippines)
- Impact of Modifying Activity-Based Instructional Materials for Special Needs Students in Middle School Astronomy—Julia Olsen & Timothy Slater (U. of Wyoming)
- Regulations and Ethical Considerations for Astronomy Education Research: A Suggested Code of Ethics—Erik Brogt, Erin Dokter, Sanlyn Buxner, & Jessie Antonellis (U. of Arizona) and Tom Foster (S. Illinois U.)
- Effect of Night Laboratories on Learning Objectives for a Non-major Astronomy Class—Ian C. Jacobi (Rensselaer Polytechnic Inst), et al.
- Virtual Field Trips: Using Google Maps to Support Online Learning and Teaching of the History of Astronomy—Christopher Fluke (Swinburne U. of Technology)
- Online Academic Integrity—Kendra Sibbernsen (Metropolitan Community Coll.)
- Grade 9 Astronomy Study: Interests of Boys and Girls Studying Astronomy at Fletcher’s Meadow Secondary School—Mirjan Krstovic (Fletcher’s Meadow Secondary School), et al.

This issue also has a Special Section on Demonstrations for Teaching Astronomy:

- An Interactive Demonstration of Solar and Lunar Eclipses—Joanne Rosvick (Thompson Rivers U.)
- A Student-Constructed Three-Dimensional Model of Stars in Nearby Space—Tracy Furutani (N. Seattle Community Coll.)
- Demonstrations Illustrating the Difficulties Astronomers Face When Observing Astronomical Objects—Jeff Stanger (Sydney Girls H.S. & Sydney Obs.)
- A Doppler Shift Speed Gun—Reid Sherman (U. of Chicago)
- Demonstrating Absorption Spectra Using Commercially Available Incandescent Light Bulbs—Jennifer Birriel (Morehead State U.)
- Kinesthetic Life Cycle of Stars—Erika Reinfeld (Harvard-Smithsonian CfA) & Mark Hartman (MIT Kavli Inst.)
- The Milky Way Model—Robert Bryan Friedman (U. of Chicago)

There is also a book review, announcements, and more!

*Sidney Wolff and Andrew Fraknoi*  
Editors



## Astronomy Education in Unexpected Places

*Columnist: Sara Mitchell, NASA Goddard and SP Systems*

### “Where Nobody Knows Your Name”

I see the same faces at many of our astronomy events - the families that choose to participate in our evening programs are the ones that will also show up to our rocket launches and weekend open houses. Astronomy education easily reaches a science-interested audience that actively seeks it out. But how do we get newcomers?

In my previous columns, I've discussed bringing astronomy education to unusual venues. Last year, I had the opportunity to participate in the Smithsonian Folklife Festival on the National Mall in Washington, DC. For two weeks, thousands of locals and tourists alike visited our tents and learned about NASA. As an event that usually features the cultures and regions of the world, it was a very unusual opportunity to do science education.

Whenever I participate in an opportunity like this, I bring my loudest, messiest activities. It may be a gimmick, but I want to draw a crowd! This may be someone's first taste of astronomy, and I want it to be delicious and memorable. I want people to come back for more. I don't expect my brief interaction to teach an extensive amount of science content, but it's a teaser, an engagement with the subject that will hopefully entice them to attend a future event or seek out other astronomy enrichment. I bring fliers to distribute about our other local offerings, and we start seeing a few new faces at the next family night or open house.

The International Year of Astronomy is a celebration designed to stimulate worldwide interest and participation in astronomy. A key goal of IYA is access, making astronomy available to those who don't usually participate in astronomy activities (whether by circumstance or by choice). In order for IYA to find success, we must broaden our reach beyond the familiar faces and expected places and bring astronomy to new crowds.



## Astronomy Education in Planetaria and Science Centers

*Columnist: Lindsay Bartolone, Adler Planetarium*

Adler Planetarium and NASA's Interstellar Boundary Explorer Mission are pleased to announce the opening and release of the new full length digital planetarium show, *IBEX: Search for the Edge of the Solar System*. In this show, audiences can join scientists who are investigating the boundary between our Solar System and the rest of our galaxy. Designed for visitors with an appreciation for the challenges of space science and a desire to learn more about science research, *IBEX: Search for the Edge of the Solar System* follows the creation of NASA's IBEX mission. Audiences will get an in-depth look at the mission and how IBEX is collecting high-speed atoms to create a map of our Solar System's boundary. Narrated by two inquisitive teenagers, audiences will hear from the scientists and engineers that developed the IBEX mission and created the spacecraft, and get the latest updates on the mission's discoveries.

The show is available lease-fee free from show distribution companies and a limited number of Educational Kits containing posters, handouts and materials to present demonstrations are available from Adler Planetarium. For more information on obtaining the show or to download free copies of the educational materials, see <http://ibex.swri.edu/planetaria/index.shtml>.

# AAS Education Meeting Schedule - Pasadena, CA

## 214<sup>th</sup> Meeting of the AAS, 6-11 June 2009

### SATURDAY, 6 June 2009

- CAE Astro 101 Teaching Excellence Workshop  
Day 1 of 2  
Pasadena Ballroom, Hilton  
9:00am-5:00pm
- AstroZone: Pasadena & Astronomy Bazaar  
Convention Center  
4:00pm-7800pm

### SUNDAY, 7 June 2009

- CAE Astro 101 Teaching Excellence Workshop  
Day 2 of 2  
Pasadena Ballroom, Hilton  
9:00am-5:00pm
- Getting Started in Astronomy Education Research  
Workshop  
San Diego, Hilton  
2:00pm-5:00pm
- Undergraduate Orientation  
San Barbara, Hilton  
6:00pm-7:00pm
- Opening Reception  
Fountain Ballroom, Westin  
7:15pm-10:00pm

### MONDAY, 8 June 2009

- Welcoming Address  
Exhibit Hall A  
8:00am-8:20am
- International Year of Astronomy 2009  
Poster Session 400: Exhibit Hall B  
9:20am-6:30pm\*
- Education  
Poster Session 401: Exhibit Hall B  
9:20am-6:30pm\*

### TUESDAY, 9 June 2009

- International Year of Astronomy 2009  
Poster Session 400: Exhibit Hall B  
9:20am-6:30pm\*
- Education  
Poster Session 401: Exhibit Hall B  
9:20am-6:30pm\*

**\*Please note that all poster sessions will run for three (3) full days: Monday-Wednesday, 8-10 June.**

- IYA2009 Cornerstone Projects  
Special Session 228: Exhibit Hall A  
2:00pm-3:30pm
- Graduate Student Decadal Survey Town Hall Meeting  
Event 501: Room C106  
6:30pm-8:00pm
- Planet Classification in the 21<sup>st</sup> Century  
Special Session 237: Exhibit Hall A  
6:30pm-8:30pm

### WEDNESDAY, 10 June 2009

- Delivering the Starry Message  
Invited Session 109: Exhibit Hall A  
8:30am-9:20am
- International Year of Astronomy 2009  
Poster Session 400: Exhibit Hall B  
9:20am-6:30pm\*
- Education  
Poster Session 401: Exhibit Hall B  
9:20am-6:30pm\*
- New Media in the International Year of Astronomy  
Special Session 238: Exhibit Hall A  
10:00am-11:30am
- AAS Members Meeting  
Town Hall Meeting 247: Exhibit Hall A  
12:45pm-1:45pm
- IYA2009 Outreach: Reports from the Field  
Special Session 248: Exhibit Hall A  
2:00pm-3:30pm
- Education  
Oral Session 312: Ballroom B  
2:00pm-3:30pm
- History of Astronomy at the Huntington Library  
Invited Session 112: Exhibit Hall A  
4:30pm-5:20pm
- Society Banquet  
Event 502: International Ballroom, Hilton  
7:00pm-9:00pm

### THURSDAY, 11 June 2009

- IYA2009 Citizen Science Programs  
Special Session 256: Exhibit Hall A  
10:00am-11:30am