Lisa Prato Unravels the Nature of Binary Stars

by Kevin Schindler

As Dr. Lisa Prato stares at a flickering computer monitor and periodically taps a control paddle button, she reflects on the significance of this observing run at Kitt Peak National Observatory. The data she collects this week will serve as another piece in a puzzle that Lisa has spent her career working to assemble. While such a run is normally an invigorating experience, this particular one is tinged with wistfulness as Lisa says goodbye to a workhorse telescope.

Lisa Prato is now in her ninth year as an astronomer at Lowell Observatory, following a career path that took several turns. After considering programming for a short time, she decided to major in English at the University of Massachusetts at Amherst so she could focus on her passions of reading and writing. But in her junior year she took an astronomy class to fulfill a science requirement and instantly became hooked on the study of space, enough to change her major to astronomy. “I figured that I would always be reading and writing, thinking about books, being interested in books, reading books, and maybe even writing something,” she recounts. “But this was probably my one opportunity to study astronomy.”

After graduating from UMass in her new-found field of astronomy, Lisa taught for three years in South America before heading to SUNY at Stonybrook, earning her Ph.D. in 1998 and two postdocs at UCLA. Later she joined the Lowell staff in 2004. Her research interests are varied but center around the formation and evolution of binary star systems.

Lisa’s Kitt Peak observing run is focused on infrared observations of binary stars in the Taurus and Orion star-forming regions. She uses an instrument called Phoenix — a high resolution infrared spectrograph — attached to the 2.1-meter telescope, the same telescope astronomer Vera Rubin used, along with Lowell’s Perkins, to discover dark matter. Lisa’s efforts are two-fold. First, she will spectroscopically analyze young stars to determine if they are close binaries. Those that she positively identifies will be added to a list of stars she one day hopes to examine further. Second, she will collect more data on known young binaries.

The stars in close binaries orbit each other in days, weeks or months. Thus, it is possible to measure the Doppler shift of each star’s spectrum. By gathering spectra over several nights, Lisa is able to measure the radial velocities of the stars at distinct points in their orbit. The ratio of one star’s radial velocity to the other’s provides the mass ratio of the two. In this way, astronomers can weigh stars hundreds of light years away! By ultimately combining mass ratios with other measurements from larger telescopes, Lisa and her colleagues will determine that holy-grail characteristic of stars — their mass. As Lisa points out, “Stars are more boring than people because with a person you might know her mass but you still don’t know anything about her. But for a star, if you know its mass, you can really understand its life, how it was born, how it’s going to live, how it’s going to die.” Knowing the fundamental properties of these young stars is also important for characterizing planet formation, a pursuit important to Lisa and other astronomers at Lowell.

With all of the valuable information that Lisa can glean from this observing run, why is she wistful? Because this run, which she completed in January, is likely the last she’ll ever have on the 2.1-meter telescope. The telescope is slated to shut down, a victim of budget cuts that are closing the doors to many National Optical Astronomy Observatory (NOAO) facilities.

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commissioning milestones by the end of the year. Our staff and our partners are reporting good observing and a good experience using the telescope. DCT is, by any reasonable measure, a huge success.

We have finished the $2.5 million Putnam Collection Center. Staff members have moved into the offices, and Lauren Amundson and Samantha Thompson are planning the long and careful process of moving our library and the huge undertaking of assembling our century-plus of artifacts in the repository.

We’re ramping up to initiate a long-awaited and huge project, in collaboration with our partners across town at the U.S. Naval Observatory: the upgrade of the Navy Precision Optical Interferometer with four 1.8-meter telescopes. Once they are installed, they will make the NPOI the most powerful instrument of its type in the world, bar none.

The Clark Telescope dome is empty, and Ralph Nye, Jeff Gehring, and Peter Rosenthal are doing a magnificent job of restoring the telescope, which is now in quite a few pieces up in our instrument shop. They’ve made steady and rapid progress and I can already tell the finished product is not only going to be beautiful, but robust enough to handle the heavy use our educators make of it.

Speaking of outreach, Samantha Christensen and her team ran extended hours in the Steele Visitor Center in March – essentially going to summer hours to offer more opportunities for visitation during the busy Spring Break season in Flagstaff. The campus was abuzz all month with large tours by day and busy nighttime viewing with the newly-repaired 16” McAllister Telescope (yet another project of our skilled technical crew) taking the central role for viewing with the Clark out of service. In fact, as I write this, educator Eric Nolan is leading a tour group by outside my window, and it’s great to see how many kids there are.

Let’s see, anything else? We’re prepping for our annual board meeting in June. It will coincide with an appearance by Captain Mark Kelly at our annual Speakers Series event on June 7, which is being organized pretty much singlehandedly by Mica Doucette. The very next day, the 18th Cambridge Workshop on Cool Stars, Stellar Systems, and the Sun kicks off at Flagstaff’s conference center; it’s one of the major international conferences and will bring in some 400 astronomers from around the world. Our astronomer Gerard van Belle is the lead on that. Later in the summer, we’ll have a significant conference on lighting technology and dark sky preservation. In the fall, both Gerard and astronomer Deidre Hunter are leading science workshops in their respective areas of expertise.

There’s more, but I’m out of space. You’ll read about some of it in the pages of this and upcoming Observers, but the executive summary is: it’s a happening place indeed.

**Deidre Hunter Wins Education Prize**

In January, the American Astronomical Society (AAS) awarded astronomer Deidre Hunter the prestigious Education Prize for co-founding and directing the Lowell Observatory Navajo-Hopi Astronomy Outreach Program, now in its 17th year. Carl Sagan won the first AAS Education Award in 1992.

**Kevin Covey Awarded CAREER Grant**

In February, the National Science Foundation awarded astronomer Kevin Covey a coveted CAREER grant for his research of young star clusters, which involves collaboration with amateur astronomers via the LARI program (see story about LARI on next page).
LARI Brings Amateur and Professional Astronomers Together

by Samantha Thompson

In 2012, Lowell Observatory introduced LARI, the Lowell Amateur Research Initiative, which has successfully paired professional astronomers with technically sophisticated amateur astronomers to conduct exciting research projects. The research these amateurs conduct goes far beyond citizen-science projects like “Moonwatch,” and involves real data collection through astrometry, photometry, and image-taking that Lowell astronomers use to advance their research.

LARI boasts 75 active amateurs volunteering their time, through data mining and observations, and making significant contributions to cutting-edge Lowell research.

Amateurs in Dr. Deidre Hunter’s project are taking ultra-deep, wide-field images of dwarf galaxies looking for stellar debris, indicating past interactions with other galaxies. Amateur Dr. Steve Leshin has been imaging these galaxies for Dr. Hunter from his home observatory in Sedona for nearly two years. Though he has not yet found evidence of these interactions, he is not discouraged. “It would be nice to see a tidal stream,” Leshin says, but “a negative is still valuable data.” What keeps him going is his excitement over assisting in real astronomical research and the opportunity to expand his own education.

Dr. Kevin Covey and his team of amateurs are monitoring variable young stars in several star-forming regions in our galaxy, working to classify the mechanism driving each star’s variability. Studying the physics behind these events requires detailed observations of the changes in each star’s color and brightness in order to distinguish between stars which are brightening due to enhanced accretion, or fading as circumstellar material blocks more of their light from view. Dr. Covey’s team is providing critical data for this project by photometrically monitoring more than a dozen variable young stars, characterizing their behavior at optical wavelengths for comparison with near-infrared data that Dr. Covey is gathering at Lowell’s 72” Perkins telescope at Anderson Mesa.

For these amateurs LARI is a dream come true. Amateur Michael Cook remarked, “LARI has given me the opportunity to work with a professional astronomer on a project where I can make meaningful scientific contributions using my backyard observatory. Through this program, I’ve been able to get a better understanding of how the work of science is done while learning a lot about the subject being studied.”

One of the added perks has been learning from the other amateurs on their project team. Working with other, more experienced amateurs on a project can help the entire team learn a lot in the process of acquiring data. After seeing their data put to scientific use, their names listed as co-investigators on proposals and soon-to-be published scientific papers, it is no wonder both amateurs and professionals alike are enjoying and benefiting from these collaborations. Gary added, “I highly recommend the LARI experience to any amateurs who wish to expand their skill set while contributing to a viable scientific project.”

It was 1957, the dawn of the Space Age, and the Soviets had just launched Sputnik. Though American officials had known of the Soviets’ plans, they found themselves scrambling to track Earth’s new “moon.” The planned worldwide network of tracking cameras wasn’t ready yet, but dedicated teams of amateur astronomers were. A group of ordinary citizen-scientists eagerly, and with great pleasure, seized the opportunity to participate in a new era of discovery. Known as the “Moonwatchers,” this largely forgotten group of teenagers, homemakers, teachers, and other citizens helped professional astronomers by providing critical and otherwise unavailable information about the first satellites.

Though scientific research is most often not the main goal for many citizen scientists, work of scientific merit is possible, and many amateurs successfully contribute to the knowledge base of professional astronomers. Thanks largely to the infusion of high-end instrumentation into more backyards, astronomy remains one of the few sciences for which amateurs can still contribute useful data.

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Jerry Loynachan and Helen Horstman, Co-Volunteers of the Year

by Mary DeMuth

When Jerry Loynachan and his wife Joanne (who, incidentally celebrated their 53rd wedding anniversary on February 19) were mulling over a move to the southwest in the 1990s, the fact that their daughter and her family lived here was an important consideration. So was their desire “to find a location with some topography. The tallest structure in DuPage County, Illinois was the landfill!” laughs Jerry.

In addition to northern Arizona’s topographic diversity and its unmatched possibilities for outdoor recreation, Jerry discovered a community that offers the types of volunteer opportunities that a retired science teacher thrives on. The observatory is lucky to be a beneficiary of a large portion of Jerry’s time and talent since he began as a docent here in 2006. His enjoyment in giving daytime tours and sharing his knowledge of the sun during public solar viewing times becomes apparent when he is asked why he has continued as a docent for almost eight years. “Actually, I’m having such a good time, I haven’t been counting!” Jerry feels that volunteering at a park, museum, or research facility like Lowell is an enriching experience from which all retirees can benefit. “It’s like stealing an education,” he says. And as an educator, Jerry’s an expert on the subject!

A 43-year career at Lowell wasn’t quite enough to satisfy co-Volunteer of the Year Helen Horstman’s appetite for involvement with the observatory. Following a four year post-retirement break, Helen returned to Lowell in 2011 to volunteer in the archives. Her volunteer hours are spent in the same building that she first occupied on her arrival at Lowell in 1964, where she began work as an administrative assistant in what was then the Planetary Research Center (now called the Hendricks Center for Planetary Sciences). Her responsibilities included assisting with grant oversight, cataloging information and images from the Planetary Patrol project, and acting as an assistant to several Lowell directors including John Hall, Art Hoag, and Robert Millis. Helen’s first project as an archives volunteer – processing Dr. Millis’ correspondence and papers from his tenure at Lowell – was tailor-made for her. That project completed, Helen now invests hours each week digitizing photographs of Lowell staff and events that span decades, making them available to the public on Lowell’s website, and re-housing them in archival albums. “I enjoy this immensely,” says Helen. And that’s not surprising; an ardent scrapbooker, Helen’s work in the archives is the perfect complement to her hobby!

Mark Kelly Headlines 2014 Speaker Series

Captain Mark Kelly is coming to Flagstaff for this year’s Lowell Speaker Series. Captain Kelly is a four-time space shuttle astronaut, retired US Navy Captain, best-selling author, cancer survivor, and experienced naval aviator who flew combat missions during the Gulf War. He is an American hero who inspires others to be their best while remaining true to their core values. He exemplifies leadership, the importance of teamwork, and courage under pressure. His keynote presentation, “Endeavor to Succeed,” will address his success in space as well as his personal life.

Individual tickets are $100 each and may be purchased at www.lowell.edu. You and a guest may meet Captain Kelly for $1,200. To purchase these tickets, discuss sponsoring the event (sponsorship packages start at $1,500), or ask general questions, contact Mica Doucette at (928) 255-0229 or mica@lowell.edu.
Percival Lowell’s Last Observing Session
by Michael Kitt

For several months I worked in the basement of the Slipher Building, sorting through a century’s worth of instruments, artifacts, publications, photographic materials, and old documents. The objective of this exercise was to prepare for the upcoming transfer of much of these materials into the new Putnam Collection Center. This work was sometimes dreary, but there were moments of pure fascination, and I would like to relate a very special one.

Have you ever watched Antiques Roadshow? If so, I’m sure you’ll know that the ultimate dream is to find an original copy of the Declaration of Independence hidden behind an old beat-up painting. Well, for any preservationist, the holy grail is to find a long forgotten piece of history. It can be the reward for long hours spent rooting around in musty, dirty, hot, unventilated storage rooms.

I was in just such a room clearing a large bookshelf filled with copies of old Lowell bulletins, arcane books, and a jumble of miscellanea of questionable historic value. Working from top to bottom, I finally removed some crumbling publications from atop an old small wood crate on the lowest shelf. In this crate was a collection of small photographic plates sorted into old cigar boxes. I should mention at this point that Lowell Observatory is in possession of one of the largest known collections of vintage cigar boxes, which were E.C. Slipher’s favored storage device for a multitude of small items. Tucked in a corner of this crate, however, was a carefully folded group of letter-size papers. It was immediately obvious to me that they did not belong in the crate.

When I unfolded the papers, imagine my surprise at finding a slip of paper therein reading “Dr. Lowell’s Last Observing Session.” And sure enough, the four sheets of paper were handwritten notes from the evening of November 11, 1916. As we know, the following day was the last in the life of a true visionary. Finding these documents was truly a magical moment for me, one I will never forget. How they got to be stored in an obscure, unrelated box of plates is anyone’s guess, but it appears that E.C. had tucked these four sheets away for “safekeeping.”

So just how did Percival Lowell spend his final night behind the eyepiece? From a review of these new materials, it appears that he and E.C. Slipher were observing Amalthea (denoted by them as Jupiter V), the fifth moon of Jupiter, which had been discovered by E. E. Barnard only 24 years earlier. The notes from that night suggest that they were gathering data for the purpose of refining Amalthea’s orbital elements. These observations were part of Lowell’s work on the satellites of Jupiter and the rings of Saturn in his attempt to determine a scheme for the origin of the Solar System. A quick trip to the archives vault and we confirmed that these two astronomers had been observing Amalthea for several nights. The last entry in Percival Lowell’s journal was for November 10th, followed by nothing but blank sheets of paper. Now we can add the final document to that journal.

The day after I came across these papers, it occurred to me that it had been a long time since I last visited the mausoleum and paid my respects to Uncle Percy. So I strolled past the Clark Dome to do a little private communing. What was running through my mind was that Percival Lowell, in the true spirit of his adopted home in the wild west, died with his boots on, observing to the last in his quest to better define the unique solar system we live in.

Percival Lowell’s last observation notes, along with dozens of other documents, photographs and drawings from the Lowell Observatory Archives, have been digitized and are accessible online through the Arizona Memory Project.

http://azmemory.azlibrary.gov/cdm/
New Views of the Universe Exhibit Opens May 19

Developed by the Space Telescope Science Institute and the Smithsonian Institution Traveling Exhibition Service (SITES), this exhibition immerses visitors in the magnificence and mystery of the Hubble mission. With a scale model of the Hubble Space Telescope as the focal point, “satellite” units incorporate hands-on activities about how the telescope works, and a “Space/Time” section features Hubble’s contributions to the exploration of planets, stars, galaxies, and the universe. Information and models of the new James Webb Space Telescope (JWST) are also featured! New Views of the Universe will run at Lowell from May 19, 2014 to January 4, 2015. Would you like to sponsor this exhibit? Contact Antoinette Beiser at (928) 255-0186.

Summer Camps Now Open for Registration

Lowell is pleased to open registration for our 2014 summer camps. This will be the third year Kids Camp is offered for students entering grades 1 through 7 in the fall. Topics include Exploring the Moon (grades 1-4), Discovering the Sun (grades 4-5), and Lighting our Way: Using Light to Learn about the Universe (grades 6-7). The cost per student is $200 (members get a $25 discount) and scholarships are available. For more information, see http://www.lowell.edu/kidscamp.php or contact Jamie Money at (928) 856-9484 or jamie.money@lowell.edu.

We are also pleased to add the new Astronomy Camp, for middle school students, to the list of summer camps. This camp will engage students in all areas of STEM (Science, Technology, Engineering, Math) and feature an informal research component. For more information, see http://www.lowell.edu/astronomycamp.php or contact Jamie Money at (928) 856-9484 or jamie.money@lowell.edu.

ARRIVALS
- George Aukon - Electronics Technician
- Brian Cothrun - Retail Sales Associate
- Shannon Gonzales - Retail Sales Associate
- Robert Hall - Retail Sales Associate
- Mattie Harrington - Science Staff Administrative Assistant
- Glenn Hill - Facilities Maintenance Assistant
- Shelby Irons - Accounting Intern
- Cecile LeBlanc - Retail Sales Associate
- Teznie Pugh - DCT Specialist
- Greg Rothwell - Public Program Educator
- Laura Stinger - Retail Sales Associate
- Kimberley Tackitt - Retail Sales Associate
- Charles von Buchwald-Wright - IT Systems and Network Administrator
- Nick Moskovitz - NSF Fellow

DEPARTURES
- Don Chriscoe - IT Technician
- John Kistler - Public Program Educator
- Kim Morris - Science Staff Administrative Assistant
- John O’Reilly - Public Program Educator
- Kristen Rakes - Retail Sales Associate
- Alexander Venetiou - Senior Electrical Engineer

PROMOTIONS
- Leslie Wells - Administrative Assistant for Development
- Charles Wendt - Deputy Director for Business Development
- Catie Blazek - Observatory Administrative Assistant
- Samantha Christensen - Outreach Manager
- James Gorney - Anderson Mesa Site Steward
- Jaime Lange - Controller
- Kevin Schindler - Communications Manager
- Diana Weintraub - Retail Supervisor
- Will Grundy, Lisa Prato, Dave Schleicher, and Gerard van Belle - Deputy Director for Science Team
be extremely competitive for astronomers to get time on. Although they’ll do unique and fantastic and wonderful science, there won’t be this sort of open access provided to the broad community that the National Observatory offers and that will hurt astronomy. It will also impact future generations of astronomers because students won’t have the opportunities to use smaller facilities, and faculty at institutions that don’t have their own facility will no longer be able to get such good telescope time.”

For now, Lisa will enjoy this latest observing run as she slewed to the binary UZ Tau East and lines up the bobbing point of light on the spectrograph.

In Memoriam

Jill Allen
(1946 - September 8, 2013)
by Mary DeMuth

Last September, Lowell lost a dear friend in docent Jill Allen. After retiring from teaching in 2003, Jill shared her love of astronomy as a volunteer in Lowell’s outreach program, leading tours of the observatory’s historic campus and manning solar telescopes. She also volunteered as a counselor and helped develop curriculum for Lowell’s inaugural summer kids camp in 2012. Later that year, she was presented the observatory’s Volunteer of the Year award. When nominees for the Flagstaff Cultural Partner’s 2013 Viola Awards were announced, it was not surprising that Jill’s name was on the list for Science Educator of the Year. The observatory is pleased to honor Jill’s memory with the Jill Allen Challenge Course, a space where kids will engage in various low ropes-related activities and enjoy the outdoors. Jill’s family and friends have contributed more than $6,000 to the project, an amount sufficient to purchase, install and maintain the course. Additional donations will go toward the Jill Allen Kids Camp Fund. If you would like to contribute, contact Antoinette Beiser at asb@lowell.edu or (928) 255-0186.

Joseph Newton Orr
(October 25, 1954 - December 9, 2013)
by Antoinette Beiser

Longtime Friend of Lowell and generous benefactor Joseph Newton Orr passed away on December 9th, 2013 after a short battle with cancer. Joe graduated from Sul Ross University in Alpine, Texas and did graduate work at the University of Texas and Texas A&M University in Spanish, astronomy, and Mayan history/archaeology. He had a lifelong passion for viewing the night sky and supported efforts to maintain dark skies over our national parks, including a lighting inventory at Grand Canyon National Park.

At Lowell Observatory, he helped preserve our archival collections by contributing towards the completion of a new collection center and library. He also made a substantial gift towards renovating and restoring the historic Clark Telescope. Joe took a keen interest in our research projects here, spending time this past September with each of our astronomers. He was interested in the science they were doing and the instruments required for accomplishing their goals. His infectious enthusiasm for the world around us and the heavens above will be missed.

Edwin Earl Slipher
(July 26, 1952 - November 7, 2013)
by Antoinette Beiser

Ed Slipher, son of longtime Lowell Advisory Board members Earl and Gloria Slipher, and grandson of longtime Lowell astronomer and director E.C. Slipher, passed away in November after battling cancer for several years. Ed also served on Lowell’s Advisory Board for the past four years. After graduating from ASU with a degree in electrical engineering, Ed had a 35 year career in the semiconductor industry, working for Motorola, National Semiconductor and e2V. He was considered a world expert on High Reliability Grade semiconductor processing. He was also an experienced pilot. Ed supported Lowell for the past 15 years. He gave generously to the Discovery Channel Telescope First Light Challenge and to the capital campaign for the new Putnam Collection Center, naming one of its offices in honor of his parents. He also purchased a spectrograph for use in the astronomy educational programs. Ed was also an active and generous supporter of the Poore Free Clinic, which provides free medical care to the uninsured in downtown Flagstaff. He gave unselfishly and was always a pleasure to talk to.

continued from page 1

While partner organizations or private supporters might be able to supply the money to keep some of these facilities open, the outlook is dire for public access.

Lisa believes the closures will negatively impact the way astronomy is done in the United States. “In the future, the astronomy community will likely have to rely on fewer, very large facilities that will
New Views of the Universe - May 19, 2014 - Jan 4, 2015

MAY

Regular Public Hours:
M - Sat 9:00 a.m. - 9:30 p.m.
Sun 9:00 a.m. - 5:00 p.m.

MON 19  Exhibit Opening: New Views of the Universe
(9:00 a.m. - 9:30 p.m.) – This Smithsonian traveling exhibit immerses visitors in the magnificence and mystery of the Hubble mission.

SUN 25  Holiday Star Fest
6:00 p.m. - 9:30 p.m.

MON 26  School is Out and Kids are Free
9:00 a.m. - 9:30 p.m.

JUNE

Regular Public Hours:
Daily 9:00 a.m. - 10:00 p.m.

FRI 13  Second Friday Science Night
(6:00 p.m. - 9:30 p.m.) – Featuring chemistry experiments at 6 p.m., 7 p.m., and 8 p.m.

30  JULY 5  Pluto Week
(6:00 p.m. - 9:30 p.m.) - Through hands-on activities, learn about the former ninth planet that was discovered at Lowell Observatory.