

## Featured Stories



### Mars Helicopter a new challenge for flight

When JPL's Mars 2020 rover heads to the Red Planet, it will be accompanied by the first-ever heavier-than-air aerial vehicle sent to another world.

JPL is developing the Mars Helicopter, a technology demonstration of a small but lightweight and powerful flyer intended to show the viability of flight in the thin atmosphere of Mars, and the potential of vehicles for more ambitious missions to come.

"At JPL we are at our best when we take risks that no one else will," said JPL Director Michael Watkins. "The Mars Helicopter is the latest in a long list of achievements that redefine what's possible, such as Explorer 1, the Sojourner rover, the Curiosity mission, and the camera to fix the Hubble telescope. The odds for the helicopter once seemed as thin as the air on Mars. If all goes well, in three years we will explore the Red Planet from the sky."

"This first-time flight demo at Mars seeks to confirm our analytical models and flight test demonstrations that have been performed in a Mars-like atmosphere in the 25-foot Space Simulator chamber at JPL, said Project Manager MiMi Aung. "It will form the foundation on which more capable helicopters can be developed for aerial exploration of Mars and other planetary targets with atmosphere."

The helicopter weighs a little under four pounds (1.8 kilograms). Its fuselage is about the size of a softball, and its twin, counter-rotating blades (1.2 meters in diameter) will move at almost 3,000 rpm — about 10 times the rate used by a helicopter on Earth. The helicopter will be attached to the belly pan of the Mars 2020 rover.

The team has faced unique challenges in building the copter and testing it, as Mars' atmosphere is 100 times thinner than that on Earth.

"We had to design a lightweight aircraft that could fly on Mars but which would also be strong enough — usually this means being heavy — to withstand the rigors of launch; entry, descent and landing; and deployment," noted Bob Balaram, the mission's chief engineer.

In addition to the design of a new kind of vehicle, he added, the team also had to design from scratch a first-of-a-kind test program for a non-Earth flying vehicle.

Flight tests on engineering models were performed in JPL's 25-foot-diameter chamber to understand the dynamics of flight in the very thin rarefied atmosphere; thermal tests probed the helicopter's ability to withstand the low temperatures of the Martian night; random vibration tests assessed structural strength; radiation testing and analysis of critical parts looked for possible vulnerabilities; and landing gear options were tested on Mars-like terrain.

"Further tests are planned to understand the robustness to higher wind speeds as well as to refine our understanding of radiation susceptibility," Balaram added.

JPL is scheduled to integrate the helicopter to the 2020 rover by April 2019.

The 2020 team is planning to deploy the copter after rover commissioning, between 60 and 90 Martian days after the landing, scheduled for February 2021.

The full 30-day flight test campaign will include up to five flights of incrementally farther flight distances and complexity. For safety reasons, the copter will be no closer than 100 meters from the rover and no more than 1 kilometer away (for radio signal strength reasons). On its first flight, the helicopter will make a short vertical climb to 10 feet (3 meters), where it will hover for about 30 seconds. Subsequent flights of incrementally farther distances up to a few hundreds of meters and duration up to 90 seconds will follow.

What could the future hold for flying vehicles at Mars? The next generation of helicopters in the 5- to 15-kilogram could have direct communication to an orbiter and would not need a lander, or could continue to work with a landed asset, said Balaram, adding that these larger helicopters could also have science payloads in the 0.5- to -1.5-kilogram class.

"The overall small mass of these helicopters could lead to small fleets of vehicles that could support new kinds of science and exploration mission across large sections of the Mars surface, including regions inaccessible to humans and rovers," said Balaram. "Smaller vehicles could serve as scouts for future rovers and astronauts. It is also conceivable that a helicopter could fetch samples one at a time from a sample cache back to a Mars ascent vehicle."

The team is led by JPL, with team members from JPL, NASA Ames, NASA Langley and AeroVironment Inc. It is a tight partnership leveraging on JPL autonomous system design, integration and test; aerodynamic analysis and rotorcraft expertise from Ames and Langley; and AeroVironment expertise in implementation of very lightweight aerial systems. The helicopter is composed of the rotor system and the landing gear designed and built by AeroVironment and the fuselage designed and built by JPL.

Aung said the team is currently building the flight model that will be launched on the Mars 2020 mission.

"I am very grateful and proud to be a part of this team," she said. "We have had a chance of a lifetime to design a helicopter for first-time aerial flight at Mars. The newness of this endeavor required us to start from the basic technical principles and solid fundamental engineering to build our way up from first showing feasibility of lift, then feasibility of controlled flight and to the final step of a helicopter that can fly as well as survive and operate in the environment of Mars. The team has worked very hard to get to this point."



## Public embraces 'Explore JPL'

*Photo caption: Water vapor streams out of a model of Saturn's moon Enceladus.*

More than 25,000 people attended "Explore JPL" during the weekend of June 9-10. The event was the equivalent of a backstage pass to JPL's legacy of exploration and discovery.

The Laboratory's third try at a new open house format proved to be popular. Saturday saw slightly more guests during the two days, with 12,600 visitors, 40 more than on Sunday.

By limiting tickets and staggering arrival times, JPL was much easier to navigate than in some previous years, when crowds climbed as high as 22,000 visitors per day.

Public Services Office Manager Kim Lievens noted that entry to JPL, as well as waiting times for popular attractions, were much improved this year.

The Space Flight Operations Center, one of the most visited attractions, had waits as high 90 minutes at peak times. On Saturday, 6,432 guests visited SFOF, and about 7,200 on Sunday. The Spacecraft Assembly Facility hosted more than 3,700 guests on Saturday, slightly more than on Sunday.

The event was also a hit with JPLers who supported it. More than 800 employees and affiliates made it all happen.

"This was my first year volunteering and it was great fun greeting the excited guests at the main entrance," said Christina Lopez of Group 3219. "It was a reminder of the 'neat-o' place where we get to work."

"We all chatted with people as they left, asking how their experience was, and I never heard one negative comment all weekend," said Laurie Lincoln of Group 2145. "Everybody was very happy to have the time to visit and for many it's been a lifelong dream."

"I thought the organization this year was superb, and the general vibe seemed like the best ever," added Doug Isbell of 1660.

Although many members of the public missed out on a ticket this time, they will get their chance for a closeup view of the Lab. The Public Services Office has added extra tours for the coming summer months, which could accommodate up to 100 more people per day.

### **Special treat for Solar System Ambassador**

This year, one Explore JPL staffer might have set a new record for the farthest traveled to lend a helping hand, as Solar System Ambassador Morgan Kempf, recently stationed at the U.S. Naval base in Sasebo, Japan, was on Lab at the "Rolling Rover" activity tent organizing patrons as they laid down to create "Martian Rocks" for the prototype rover to navigate.

Kempf, 31, a mother of five, started volunteering with the Solar System Ambassadors program in 2016.

"My husband had just been assigned from Texas—where we call 'home'—to Japan, and I was looking for ways to keep active, and my mind fresh," Kempf said. "When I found out more about the SSA program, and its goal of telling NASA's story to local communities, I knew this was an opportunity for me to have a title and talk about NASA, and not just be that lady who always talks about space."

Kay Ferrari, co-lead of the Solar Systems Ambassadors Program at JPL, said Kempf has conducted 36 outreach events aimed at military families and base personnel, reaching more than 12,000 people.

"She also has given us and other military family Solar System Ambassadors lots of good tips on how to work with overseas U.S. military bases," Ferrari said. "And she even inspired a military spouse whose husband is stationed in Spain to join this year."

Earlier this year, Kempf got word that her husband's ship was being re-homeported in California before he was to be reassigned to Guam's naval base.

"We have a couple months in San Diego before we head out, and it's just incredible timing that it happened to be when Explore JPL was going on," Kempf said.

During her short morning shift at the Rolling Rover exhibit, Kempf said one moment stood out to her. She was instructing the next batch of would-be Martian Rock volunteers to line up, when a 2 1/2-year-old boy tapped her on the elbow, saying "Excuse me, what is that?" pointing to the backdrop of the Martian terrain in the booth.

"He just melted my heart!" Kempf said. She soon found out that the boy's grandmother, aunt, uncle, mother, father and baby brother had all joined in attending Explore JPL solely due to the boy's interest in the solar system. "He could name all the planets and dwarf planets, but his family couldn't satiate his

knowledge appetite, so they all came to Explore JPL just for him to help boost his wonder and get his questions answered that they haven't been able to provide him," Kempf said. "I thought that was just beautiful."

For Kempf, the experience at Explore JPL was a dream come true, and also a chance to check in to the Solar System Ambassador headquarters in person for the first time. It is a program that has come to mean a great deal to Kempf during her time overseas.

"One of the most humbling realizations I've had recently is because of my involvement in the Solar Systems Ambassador Program and the impact it had on my community before I left Japan," Kempf said. "I left 400 students behind at the school where I was a frequent substitute teacher, and so many of them developed a passion for space sciences because of my SSA curriculum infusions. Of that 400, half were girls. I made space cool for girls. Representation is so important. I've learned and lived that with the Solar System Ambassador Program."



## Solar System Ambassadors reach 40,000 events

*Photo Caption: An early SSA event at Cape Canaveral in 2002, where the public could learn about space and watch a launch.*

Using your spare time to teach the public about our vast universe is an achievement unto itself. Doing it 40,000 times? That's what the Solar System Ambassador group—launched right here at JPL—recently accomplished.

Since 1997, volunteers of the Ambassadors program have organized public outreach events, reaching the 40,000-event milestone on June 12th this year. It all started as a volunteer educators' group sharing information and science gleaned from the Galileo mission, said Kay Ferrari, co-lead of the Solar Systems Ambassadors program at JPL. Today, the SSA program includes more than 700 volunteers located in all 50 states, Puerto Rico, and multiple U.S. military bases, all hosting a range of public events aimed at spreading the word on space exploration.

In the early years, a lot of the events followed traditional routes—in-person talks at schools, rotary club discussions and festival exhibits—but over time, the Ambassadors have branched out, looking for new ways to connect with the public.

“Now, there are Ambassadors doing television interviews, radio spots, podcasts, social media events, and more,” Ferrari said. “It’s just been such a great success and these events are reaching so many more people than we or the Ambassadors hosting them probably even realize.”

One example of reaching an unexpected audience comes from Beate Czogalla, a 14-year Solar System Ambassador based in Milledgeville, Georgia. Following Mars Exploration Rover Opportunity’s landing in 2004, Czogalla started writing articles for her town’s newspaper, the Union-Recorder, providing bi-weekly updates on the rover and its findings.

For years, Czogalla continued to write articles, steadfastly keeping abreast of Opportunity. About three years ago, the Ambassador program management team at JPL got a call from a woman in Georgia wanting to be a Solar System Ambassador. She had worked at the Georgia Reading Radio Service—where volunteers read and record newspaper articles to be played on the radio for the blind and visually impaired. Unbeknownst to Czogalla, the service had been reading her Opportunity update stories over the air for years, reaching an audience about double the size of the Union-Recorder’s subscription base.

“It’s really a testament to this program,” Ferrari said. “It was a grassroots effort from the beginning. The Ambassadors plant the seed and watch the enthusiasm and knowledge of space exploration grow.”

With millions of individuals reached, the Ambassador program has continued to grow while retaining its grassroots base. Many of the Ambassadors currently volunteering have been with the program for over a decade.

“In many organizations, it’s hard to keep a volunteer around for more than a year or two,” Ferrari said. “We’re unique because our volunteers have wanted to stay on.”

But that loyalty has not bred complacency. The program has evolved over time to admit volunteers from outside the education profession to become Ambassadors,

“Homeschool moms, a Roman Catholic nun, an episcopal monk, a theater arts professor ... we’re including space enthusiasts from all walks of life, and that’s what makes the program special today,” Ferrari said.

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## JPL attracts a diversity of interns

*Image captions: Photo 1: Rebeca Reyes Carrion. Photo 2: Brandon Murphy. Photo 3: Erin Leonard. Photo 4: Elio Morillo.*

Hurricane Maria blew Rebeca Reyes Carrion to JPL, and she's been holding on ever since.

After huddling six hours in a closet at her home in Toa Alta, near San Juan, Reyes Carrion spent six weeks in Orlando, Florida, with relatives. She'd been attending the University of Puerto Rico-Mayaguez, but the storm damage shut the campus down and she wasn't sure when she'd be able to go back.

She had seen a posting earlier for an internship at JPL, but when she looked again it was gone. Rather than give up, she sent her resume cold to five names on JPL's website.

The university reopened later in the fall, though often without lights or power. Then Reyes Carrion got a call from Section 352: Would she be interested in a six-month internship over her second semester and the summer?

"I don't know if I'm going to have a second semester, so I would not like to miss out on an opportunity because of my situation," she explained.

She finished her delayed first semester and arrived on Lab Feb. 12.

"I remember the first day, when you get the whole tour, I texted my friends and said I don't know what I'm going to be doing the next six months, but I know I want to stay here the rest of my life," she said. "It's amazing."

The mechanical engineering junior is now working on integration and testing of the coring instrument for Mars 2020.

## **A Race for Talent**

Reyes Carrion is a serendipitous example of a new effort by JPL to broaden access to talented scientists and engineers from all backgrounds.

Last fall, JPL representatives visited university campuses to conduct interviews and build a solid pipeline of intern talent.

“We are in a war for talent at every level, even for interns, and especially for underrepresented candidates,” said Michelle Roth, manager for Talent Management in Human Resources.

Lab recruiters had noticed that most of JPL’s offers to interns were going out after the holidays – too late to land many top intern candidates. “Most of our competitors send out all of their intern offers before the holidays,” said Roth.

To speed up the process and stay competitive, HR and the Education Office now allow for intern requisitions and Announcements of Opportunity to be submitted in August, with first offers sent out the first week of September.

The 2018 summer intern cohort represents 45 U.S. states and 15 countries. Thirty-six percent are women, and 25 percent come from minority groups traditionally underrepresented in science and engineering.

This fiscal year, about two-thirds of early career hires started as interns. The recruiting push for interns, therefore, underlines a bigger initiative. This year the Lab added a new value of Inclusion to the four heritage values of Openness, Integrity, Quality and Innovation. A newly-formed Inclusion Advisory Board and Inclusion website was created to promote diversity and inclusion in its overall workforce.

## **Making Connections**

If someone needed IT help at North Carolina A&T State University, Brandon Murphy often would get the call. He had learned the fine points of building networks and making cables from one of his computer science professors. He worked fast, made decent money and had plenty of down time.

Then one of his customers burst his bubble.

“He posed a question to me that always stuck with me. He said, outside of the work I had done for the university, who would know me?”

Soon after, he picked up a NASA brochure while waiting outside a professor’s office. He googled NASA internships and applied for a bunch.

“I always had a fascination with NASA since I can remember. I’m a country boy at heart. If you’re outside you can always see the stars,” said the native of Pascagoula, Mississippi.

Murphy landed a series of internships starting at Wallops Flight Facility in Virginia in 2012. He came to JPL in 2016, a semester shy of completing his master’s degree in computer science.

“All the other times I’ve been to other NASA facilities, I never really felt at home,” he said. “When I got here, it felt right.”

He talked his professors into letting him finish his degree remotely, and gambled that JPL would keep him on after the internship ended.

"It was a very risky choice," he said.

His gamble paid off. Murphy has been on staff since late 2016 as part of OCIO's cybersecurity team.

## **Finding Focus**

Erin Leonard landed her first internship at JPL in 2013 after her junior year at UC Berkeley, where she was an astrophysics major.

She worked with Benjamin Greenhagen to investigate lunar cold spots in a simulation chamber. By the end of the summer, she added planetary science as a second major.

"Working on that simulation chamber really got me interested in doing research," she said.

Leonard went straight into a Ph.D. program at UCLA and has been at JPL almost continuously ever since, as a junior visiting researcher during the school year and a full-time paid intern in the summer. She hopes for a postdoctoral job at JPL after completing her program next year.

While many other graduate students remain adrift well into their doctoral programs, interning at the Lab gave Leonard an academic direction, a thesis topic and a career.

"I've watched the summer program grow over the past six summers. When I first came it was so much smaller than it is now, and just over the past six years it's really exploded. I think that's so great, mostly because I know my experience, and my life wouldn't have been the same without it."

## **Testbed**

A JPL internship was a systematic experiment for Elio Morillo, personally and professionally.

Interning between his bachelor's and master's programs allowed Morillo to dip his toes into JPL and California. He was born in Ecuador, spent his childhood in Puerto Rico, completed high school in New York and went to college in Ann Arbor, Michigan. Trying out yet another new place before diving in seemed like a good idea.

Morillo had studied mechanical engineering with an electrical engineering minor, and he was contemplating a master's in systems engineering when he came to JPL in January 2016.

He arrived at an inflection point for the flight project testbed, as it was undergoing conversion from MSL to Mars 2020 ownership. Morillo became involved in conducting electrical tests, and he quickly discovered how much he still had to learn.

His mentors at the University of Michigan had encouraged him to take systems engineering classes. His experience at JPL helped him understand why.

"Those eight months reassured me that the classes I was going to take were going to be relevant for work at JPL, which is the premier location for systems engineering."

He came back last spring, and became a JPL employee in September.

Every intern has a story, and these are just four among the hundreds of interns currently at JPL. If you know a student who might be a good match for a JPL internship, ask them to check out the internship website.

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## Upcoming Events



### **Spend July 4th celebrating America and Mars**

Want to catch an Earth-shaking fireworks display and do some ground shaking yourself?

Then head to the Rose Bowl's Fourth of July celebration, "Americafest," where JPL's Mars InSight Roadshow is making a stop to explain how the robotic lander will study Mars' deep interior using seismology and other geophysical measurements.

The roadshow team will be running a "Make Your Own Marsquake" demo, in which members of the public jump and see seismometer readings on a screen. A half-scale model of the InSight lander will also be situated outside of the Rose Bowl stadium, where attendees can take selfies and talk with InSight mission team members about the upcoming Mars landing scheduled for Nov. 26.

This is the third year JPL has collaborated with Americafest, a music and fireworks celebration now in its 92nd year.

JPL employees can purchase discounted tickets online. General admission tickets are \$10 (\$15 to the public). Children 5 and under are free. Reserved seats are \$25 (\$30 to the public). Children 2 and under are free.

Go to <https://www.rosebowlstadium.com/events/detail/america-fest>. Use "JULY4JPL" as the event offer code.

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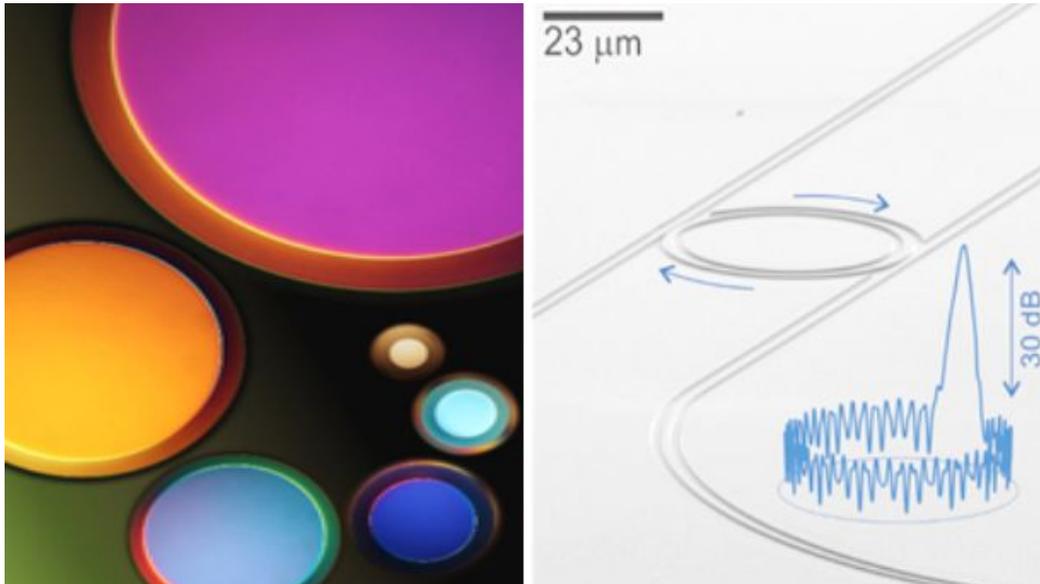
## **JPL Chorus performs in ‘Music Under the Stars’**

The JPL Chorus, in combination with the Donald Brinegar Singers, will perform with the Pasadena POPS in a free concert Saturday, July 7 at 8 p.m. at Pasadena City Hall Plaza on Garfield Street.

Resident POPS Conductor Larry Blank will lead the orchestra in a celebration of music from Broadway, Hollywood, and the Great American Songbook, featuring soloists straight from Broadway and the JPL Chorus. Arrive early for gourmet food trucks, a musical instrument petting zoo, and pre-concert family fun, which begins at 7:10 p.m.

For more information on the event, visit  
<http://pasadenasympohony-pops.org/concerts/music-under-the-stars>.

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## Stories from a nonlinear flatland

### Frequency combs 2.0: Stories from a nonlinear flatland

Scott Papp of the National Institute of Standards and Technology will speak Thursday, July 12 at 1:30 p.m. in 180-101.

Optical-frequency combs are fantastic measurement tools for time, frequency, length, positioning and navigation, astronomical spectroscopy, ranging, signal detection, chem/bio analysis, and generation of quantum states. A new direction in experiments is to make tiny frequency combs by using nanofabrication and intriguing nonlinear behaviors of light. This talk will introduce the frequency-comb concept and how they are used, and the new generation 2.0 of frequency combs being built on the nonlinear flatland of a silicon chip.

Papp is a physicist in the National Institute of Standards and Technology Time and Frequency Division and Lecturer at the University of Colorado, Boulder. From 2008-10 he was a Caltech Postdoctoral Fellow at the Center for the Physics of Information on multipartite entanglement in atomic ensemble quantum memories and on cavity opto-mechanics. Since 2010 he has worked at NIST, leading investigations of Kerr frequency combs and other optical devices. His research interests include the ultrafast science of microcombs, making the devices useful for applications, and inching towards the quantum domain.

This event is presented by the Offices of the Chief Scientist and Chief Technologist.

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## Walking on Mars

July 12 & 13

Virtual and augmented reality promise to transport us to places that we can only imagine. When joined with spacecraft and robots, these technologies will extend humanity's presence to real destinations that are equally fantastic. NASA's Operations Laboratory at JPL is spearheading several ambitious projects applying virtual and augmented reality to the challenges of space exploration. Through partnerships with multiple VR and AR companies, scientists on the Curiosity Mars Rover mission are exploring the Martian terrain, engineers are finding new ways to collaborate on 3D designs, and astronauts on the International Space Station are preparing to perform their work more efficiently than ever before. The lead of these projects at NASA will share their progress so far, the challenges that lie ahead, and their vision for the future of VR and AR in space exploration.

### Speaker:

Primary Presenter/Speaker:

Victor Luo – Operations Lab Lead

### Panel Speakers:

Alice Winter – User Experience Researcher

Parker Abercrombie – OnSight Project Lead

Abby Fraeman – MSL Scientist

### Location:

Thursday, July 12, 2018, 7pm

The von Kármán Auditorium at JPL

4800 Oak Grove Drive

Pasadena, CA

Friday, July 13, 2018, 7pm

Caltech's Ramo Auditorium

1200 E California Blvd.  
Pasadena, CA

**Webcast:**

Go to: <http://www.ustream.tv/nasajpl2> to watch the event live on Ustream

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# JPL Classifieds

Ads submitted June 16-22

Submit an ad to: [universe@jpl.nasa.gov](mailto:universe@jpl.nasa.gov)

## For Sale

MISC.: very lightly used Ethan Allen (quality name brand) Tribeca series sofa-sleeper (twin size) and matching ottoman on wheels with storage space in excellent condition, \$600/obo; fabric sofa and loveseat in excellent condition with matching fabric pillows, \$400/obo; Nordic Ware Microwave Tender Cooker, \$40; 27" Kitchenaid microwave KCMS1655BSS, can be used on kitchen counter or can be installed in cabinet with trim kit (both items for \$250 and will consider selling separately); these items come from smoke-free and pet-free house. Call or text 818-470-4482 for pictures.

SHELVES, powder-coated steel, heavy-duty industrial, used; row of 18 connected units available, assembled units measure 3 ft. x 2 ft. x 7 ft. (W x D x H); currently disassembled, there are 89 individual shelves (20 gauge), 38 corner posts (12 gauge), about 60 under-shelf reinforcing bars, and several diagonal X-braces; pictures at <http://bit.ly/1JVxEdx>; \$100 per unit, \$1,050 for all, obo for multiple units. [staseleni@earthlink.net](mailto:staseleni@earthlink.net).

## Wanted

SPACE INFORMATION/memorabilia from U.S. & other countries, past & present, for personal use (see <http://www.youtube.com/watch?v=S7PvjGp7mCU>). [mrayman@alumni.princeton.edu](mailto:mrayman@alumni.princeton.edu), 818-790-8523, Marc Rayman.

TYPEWRITER, IBM Selectric I, the variant with "accent blue" keys, any condition is fine (working or not); reference image: [http://typewriterdatabase.com/img/gIBM%20\\_6\\_1383360762.jpg](http://typewriterdatabase.com/img/gIBM%20_6_1383360762.jpg). [agoodman1120@gmail.com](mailto:agoodman1120@gmail.com), 847-521-3640.

## For Rent

ALTADENA, great space for an intern, cozy, quiet cottage with 3 rooms: bedroom, study/living room/kitchen, and bathroom, available July; fully furnished (optional) with bed, desk, dresser, large full closet, refrigerator, kitchen table & chairs, small appliances, bedding and towels; amenities include washer/dryer use, high-speed WiFi, full kitchen use, carport parking for car or bike, 1/2 mile from JPL; \$1,300 furnished, \$1,200 unfurnished, includes all utilities. Christina: [geminipowers1@gmail.com](mailto:geminipowers1@gmail.com) or 213-268-9940, call or text.

ALTADENA studio, walking distance from JPL, furnished with private entry in a quiet backyard setting; 400 sq. ft., queen bed, bathroom with shower, kitchen with fridge, stove, oven, microwave etc., wall a/c, desk, nice bright interior, fast WiFi; all utilities included, no pets; available July, August; \$540/week, \$1,600/month. 626-644-2472, Theresa.

LA CANADA guest unit with separate entrance, 2 bedrooms, 1 bath, living and dining room, office, in-unit laundry room with lots of cabinets and kitchen, approx. 1,500 SF; \$2,700/month, utilities included. 818-642-9999.

MONTROSE, room for a non-smoker in a lovely single-story air-conditioned home to share, 4 miles from JPL; private room, bath, entry; Wi-Fi and utilities included, washing facility on site, full kitchen available and a peaceful garden to reflect and relax in, street parking available in a safe and friendly neighborhood, just one block to the trendy village with coffee shops, boutiques and multi-cultural cuisine restaurants; \$800/month. 818-437-1970, Jane.

PASADENA, 2468 Mohawk St., apt. 110; 2 beds, 2 bath, 1,000 sq. ft.; newly renovated entire apartment, new appliances, new piping and new HVAC system; private balcony, 2-car covered parking, laundry on-site; quiet street and complex

one street below Colorado Ave., Gold's Gym and Pasadena Public Library across the street, 2 miles from Caltech; \$2,450/month includes utilities and HOA; \$2,650/month furnished.  
mrtakidin@gmail.com, 818-688-1153.

PASADENA, furn. room in a lovely 4-bd./2-bath house, big backyard, hardwood floor, big closet, shared bathroom, kitchen and laundry privileges; 2 miles to JPL, close to public transportation; short- or long-term lease available; must like dogs and be very clean; \$900 + \$900 deposit. 818-960-8654.

TUJUNGA house, remodeled 1 bed, 1 bath with small yard, shared garage and extra parking, pets welcome; unfurnished, cute cottage in a quiet, safe neighborhood in the hills, 10 miles to JPL, utilities included: water, power, gas, trash; \$1,700/mo. 310-625-6996, Audra.

## Vacation Rentals

MAMMOTH, Snowcreek, 2 bd., 2 ba. + loft, sleeps 6-8, fully equip'd kitchen incl. microwave, D/W, cable TV, VCR, phone, balcony w/mtn. vw., Jacz., sauna, streams, fishponds, close to Mammoth Creek, JPL discount, no pets. 626-798-9222, 626-840-3749 or valeriee@caltech.edu.

MAMMOTH, Snowcreek, beautiful updated condo, 2 bd., 2 ba. + loft (sleeps 6-8), great location by pond/meadow, new appliances, TVs, DVD players, free wireless Internet and washer/dryer, no pets. 818-952-2696 or BigMtnPrettySky@gmail.com.

MAMMOTH, remodeled 2 bed/2 bath + loft, short walk to Canyon Lodge; Courchevel 6 features full kitchen, cable/Internet TV, DVD, Blu-Ray, wireless hi-speed Internet, 2-car garage, Jacuzzis, grill, pool; no pets. <http://Courchevel6.com>.

# JPL Family News

## Awards

JPL Director for Engineering and Science **Jan Chodas** has been awarded an honorary doctorate from her alma mater, the University of Toronto.

At the university's June 19 convocation, Chodas was honored with a Doctor of Science, honoris causa, "for her excellence in the professions and for her outstanding service for the public good, as an engineer, mentor and role model and as a tireless advocate for diversity and gender equality in engineering."

Chodas earned bachelor's and master's degrees in aerospace engineering from the university. She began at JPL in 1980 as an attitude control analyst for Galileo, and has since has held numerous positions of increasing responsibility in both line and project management. She managed the development of the attitude control system for Cassini and the onboard flight software development for the Mars Exploration Rovers. When she managed JPL's Systems and Software Division, Chodas provided leadership for both systems engineering and software engineering across the breadth of JPL's missions and throughout the flight project lifecycle. She served as Juno project manager, managing the successful development and launch of the spacecraft, and led the Office of Safety and Mission Success prior to her current appointment. For more information, visit the [University of Toronto website](#).

## Retirees

The following JPL employees recently announced their retirements:

**Edward Contreras**, 46 years, Section 2726

**Robert Crippen**, 31 years, Section 329A

**William Heventhal**, 29 years, Section 3970

**Richard Markley**, 34 years, Section 172L

**Karen Moran**, 37 years, Section 5160

**Rajendra Parikh**, 17 years, Section 5125

**Robert Toaz**, 28 years, Section 398A

**Yakov Vodonos**, 21 years, Section 333K

## Passings

**Ralph Bartera, 82**, a retired engineer, died May 21. Bartera worked at JPL from 1962 to 2004. He contributed to Cassini, Stardust and the solar simulator. Bartera is survived by his spouse, Wesley; children Bart, Rick and Diana Lee; and grandchildren Jennifer, Crystal and Reb. Bartera's family requests that everyone do an act of kindness in his honor.

Planetary astronomer **Michael Belton, 83**, a JPL affiliate who led the Galileo mission imaging science team and contributed to several other JPL missions, died June 4. A native of England, Bolton received a

bachelor's degree at the University of St. Andrews in Scotland and earned a Ph.D. at UC Berkeley. He joined Kitt Peak National Observatory in 1964 and carried out research in planetary science. Belton was a member of the Mariner 10 team that flew a probe by Mercury and Venus. As a member of the Mariner Jupiter/Uranus Science Advisory Committee, he helped define what became JPL's Voyager missions to the outer solar system.

Belton also served as deputy principal investigator of the Deep Impact mission to P/Tempel 1, a co-investigator on the EPOXI mission to P/Hartley 2, and a co-investigator on the Stardust NExT mission that returned to P/Tempel 1. Belton is survived by his daughter, Lise Myra Belton (John Prader), son Scott, and grandchildren Emily Prader, John Prader and Elizabeth Rose Prader. A memorial was held June 30 at the University of Arizona. Remembrances may be sent to [sykes@psi.edu](mailto:sykes@psi.edu).

## Letters

"I would like to express thanks to my colleagues at JPL for their expressions of kind sympathy on the passing of my mother **Hildy Buratti**, and to the ERC for the lovely plant. I still have the plant (it's a tree now) the ERC sent me in 1986 when my grandmother died!" -- **Bonnie J. Buratti** and family