

Laura Orr is one of four teachers selected to participate in the 2016 NASA Infrared Processing and Analysis Center's Teacher Archive Research Program. The teachers work with an astronomer as an astronomy research team. From left, Alexandra Miller, astronomer Luisa Rebull, Mackenzie Schultz, Laura, and Milton Johnson.

Photos courtesy of Laura Orr



In Search of Baby Stars

Teacher opens up a world of opportunity to Ukiah students

By Jody Foss

Laura Orr has taught science to middle and high school students at Ukiah School for 13 years.

"I was planning on going to Fairbanks for graduate school in upper atmospheric magnetism, the study of the Northern Lights," Laura says. "We decided it was the best thing for our family to come home to Ukiah."

She and her husband, Ted, are raising their two children, ages 11 and 13, in Laura's hometown. They are the fourth generation of Laura's family to attend Ukiah School.

Laura's interest in astronomy and physics created a unique opportunity for students to present their astronomy research alongside professional scientists

through the NASA Infrared Processing and Analysis Center's Teacher Archive Research Program, or NITARP. For more than a decade, NITARP has paired teachers and students with astronomers to work on research projects.

Laura is a teacher mentor for the group. This year, she is working with Luisa Rebull of IPAC, two teachers from California and one from Arizona. Ninety-eight teachers from 34 states have participated.

NITARP reaches thousands of students with information about how science works, what NASA does and a wealth of astronomy data that is free to the public.

"It is absolutely hands down the best program I have ever been a part of," Laura says. "Our subject is baby stars—more correctly, young stellar objects in a

region of the constellation Cepheus. YSOs are typically studied in infrared. We will use archived data from NASA's Spitzer space telescope in our study."

The baby stars, born from time and gravity, emit heat from the dust cloud around them. The telescope detects this heat.

"We will use this data to try and find new stars that have not been seen before and add to what people already know about the stars in this area," Laura says. "The kids really get it and are excited to be looking for objects that no one else has ever seen before."

To aid in other studies of visible astronomy, the school has three telescopes. The newest was donated by the Tri Cities Astronomy Club.

In the spring, members of the club will

work with Laura and her students, and teach students and local residents about the telescope.

Laura says club members enjoy coming to Ukiah because of the dark sky and dry conditions.

"I remind the kids that even though we are in a rural part of the world, that doesn't mean that we can't do cool stuff," Laura says. "One of the great things we have is a gorgeous sky."

Thanks to a small grant from the DonorsChoose.org—an organization that partners donors with teachers, students and their projects—Laura's middle school students are a part of the Globe at Night Program. They will study the quality of the night sky regionally, compare conditions with those throughout the state and then across the globe.

Laura's students will work with students from two other Oregon schools on a collaborative research question.

"I think we are going to get picked up as their featured research project," Laura says. "Hopefully, we will present our research at the national conference in November."

She says the students typically conduct a research project for a few years, but some projects are short.

"The only thing that limits us is time," Laura says. "We only have so much time and then we have to cut off. So finding research we can do in a semester or a year gets to be more challenging."

The baby star project is ongoing.

"This is going to be a long process," Laura says. "There's going to be lots of parts we don't understand. This is actual factual cutting edge right now. The world doesn't know. You cannot look it up."

"At first, the students are confused and unsure on what to do. Once they get past the idea that I don't know the 'right' answers—that we are testing our process and learning something brand new—real learning takes place. They get into it. Kids ask really good questions and are really good researchers."



Caleb Mader and Chad Billings, two of Laura's students at Ukiah School in 2013, enjoyed a tour of the Jet Propulsion Laboratory in Pasadena, California. Students watched Mars Rover in its "play yard" and took a private tour of the research center.

The students will present what they have learned at the National Convention of American Astronomers Society next January. The teachers will present the education paper.

"One of my favorite parts of astronomy and physics is how kind and supportive the people are, especially of the students and teachers," Laura says. "It's really fulfilling—personally and professionally—to watch the hard work of these students. The kids will go up against a Ph.D researcher and have a really active conversation about their science."

"Do they know all the nitty gritty details? Not always, but they know their project, what they did, how they did it and what it means. But the level of confidence they gain! One of my senior students said that if he could do that, he could do anything."

Laura always has research in the works.

"I have a solar physics, weather, astronomy and an aurora project going, all the time," she says.

As an educator ambassador for more

than 10 years, Laura has helped convert science into a general vocabulary that can be used in the classroom.

"I met with my group of teachers and UC Berkeley scientists from 2004 to 2011 and again in 2015," she says. "It brings good research into the classroom and information that the kids really, really like. If it's something new—something that is right now—they really get into it."

As part of NITARP, Laura and her students will travel to Pasadena, California, to work on the project research with their mentor astronomer at the Jet Propulsion Laboratory and at IPAC.

"We will really work out the bulk of our research or at least get really started," she says.

At the laboratory last year, the group toured the facility and watched the Mars Rover as it traveled its test ground.

They will present more results of their research at the 2017 AAS meeting in Grapevine, Texas.

For now, all they need is time, a big telescope and the dark Ukiah sky. ■