

UH Hilo astronomy student Chantelle Kiessner awarded internships, conducts research on solar atmosphere

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By Staff

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Budding astronomer Chantelle Kiessner is already conducting solar investigations, supported by three internships during the past two years.

By Leah Sherwood.

This is the third in a series on projects done by UH Hilo physics and astronomy students awarded research positions.

Women astronomers may be rare in the world at large, but not in Hawai'i—the state leads the country in employing the most women astronomers.

This fact is not lost on young women interested in studying the stars.

“One great thing about studying astronomy here is that Hawai'i has more women astronomers than anywhere else in the world,” says Chantelle Kiessner, a University of Hawai'i at Hilo senior majoring in physics and astronomy who is already conducting her own research.

Kiessner is doing solar investigations, having been awarded three internships over the course of the past two years.



Chantelle Kiessner. Photo by John Coney/UH Hilo Dept. of Astronomy and Physics.

She started as a trainee in 2016 and then moved on to two positions over the following two years where she was given more opportunities to build the skills needed to do more complex research.

She began by competing and being selected for two intern programs.

Hawai'i Space Grant Consortium

In the fall of 2016, Kiessner was selected to be a Hawai'i Space Grant Consortium trainee. The consortium trains the space scientists, space settlers, and aerospace engineers of the future and is part of NASA's National Space Grant College and Fellowship Program. As a trainee, she learned about collecting data with UH Hilo Associate Professor of Physics and Astronomy Kathy Cooksey.

Kiessner explains that during this research, she analyzed a spectrum of a quasar that had absorption-lines from a galaxy's halo.

"The light from the quasar traveled through this galaxy's halo, which is how we can see its signatures in the spectrum," she says. "The goal was to learn more about the circumgalactic medium, the halo, and understand how it is affected by the evolution of galaxies."

Akamai Internship Program

Building on the skills learned through the trainee program, Kiessner was selected for the Akamai Internship Program in the summer of 2017, when she was placed at the Daniel K. Inouye Solar Telescope on Maui to work on quantifying data on the new Adaptive Optics (AO) system—she looked for ways to correct the errors introduced by Earth's atmosphere.

"The Earth's atmosphere is a significant source of error in data and an AO system attempts to correct for those," she explains.

"The work I did helped the scientists to predict how the data will look once the telescope is fully functional and how to improve the AO."

The Akamai Internship Program is an eight-week summer program that offers college students from Hawai'i an opportunity to gain a summer work experience at an organization, observatory, or scientific or technical facility in Hawai'i and is funded by a large group of organizations and agencies.



Daniel K. Inouye Solar Telescope, Maui. Photo courtesy NSF.



Chantelle Kiessner during the summer of 2017 while she was an intern in the Akamai Internship Program. Courtesy photo from Akamai.

Then she was ready for the next challenge: analyzing spectral data.

Research Experience for Undergraduates: Analyzing spectral data

Kiessner conducted research over the past summer as an intern in the Research Experiences for Undergraduates (REU) program, a highly competitive program that supports active research done by undergraduates and is funded by the National Science Foundation. She studied at the Laboratory for Atmospheric and Space Physics, a research lab at the University of Colorado, Boulder. While there, she worked at the National Solar Observatory with scientists **Christian Beck** and **Sanjay Gosain**.



Laboratory for Atmospheric and Space Physics, Boulder, Colorado. [Google image](#).

Kiessner's project involved analyzing spectral data from the solar chromosphere, the reddish outer layer of the sun.

"We are interested in learning about the solar atmosphere," she says. "Why does the temperature of the atmosphere generally increase with distance from the sun? How is the energy transferred in ways that are not radiation?"

Kiessner's project specifically involved applying an archive of pre-calculated synthetic spectra to compare to actual data of the solar chromosphere taken with the Interferometric Bidimensional Spectrometer (IBIS) on the Dunn Solar Telescope.

"This archive will help reduce the amount of time it takes to analyze the data from IBIS, as it currently takes five seconds to analyze a single spectrum," she explains. "IBIS produces 70,000 spectra in a single scan, so the goal is to reduce the time to less than one second per spectrum, or one day of analysis per observation."

Presenting the data

In December 2018, Kiessner will attend the [American Geophysical Union meeting in Washington, DC](#), to participate in the poster session and communicate her work to the scientific community. The REU program will fund her trip.

She hopes that her work and the code she wrote in interactive data language or IDL and Python programming language will help other researchers analyze the solar atmosphere more quickly and efficiently.

“Current solar imaging spectrometers produce a few hundred million spectra in a single hour of observation,” she explains. “Any quantitative analysis of such a huge data volume thus has to be fast. This can be achieved by using a comparison of observed spectra to an archive of pre-calculated synthetic spectra.”

Kiessner’s code allows scientists to analyze a few million spectra per day using moderate computing power, such as a single 32-core computer.

She also hopes her work will provide clues on the temperature of the atmosphere, alongside data from the recently launched Parker Solar Probe.

“This is a really cool and interesting field at the moment, because of the recently launched probe and [the Maui solar telescope] nearing completion,” she says. “There will be much to learn in the upcoming years about the behavior of the solar atmosphere, and REU gave me great exposure to the field.”

Looking to the future

Kiessner thinks the UH Hilo campus is the perfect place to study astronomy. “It is so great to be supported and to be surrounded by such a diverse community where I get to learn multiple perspectives and interpretations of what goes on in the astrophysics world. I don’t think I would have gotten that at any other school.”

She is graduating this semester and is looking ahead to the next phase of her academic career. She is focused on applying for graduate programs for the 2019-2020 academic year. Fortunately for her, the research she conducted in the REU summer program helped clarify her academic interests.

“Before the internship I was sure I would aim for a PhD in astrophysics, but now I’m deciding between that or a PhD in solar physics or space physics because I was able to learn about those fields this past summer,” she said.

Kiessner, who was born in Germany and grew up in Salt Lake City, Utah, where her family still lives, is also looking at other possibilities outside of attending graduate school right away. She says that she is not ready to count out the possibility of work experience in her field since Hawai’i Island has plenty of career opportunities for budding astronomers.

“Some of the astronomy majors who did not go to graduate school ended up finding excellent job opportunities or careers right here on the island,” says Kiessner. “I’m glad I have those other options.”

This story was updated on Oct 3, 2018, to clarify the chronology of Kiessner’s internships.

About the author of this story: Leah Sherwood is a graduate student in the tropical conservation biology and environmental science program at UH Hilo. She currently serves as an intern in the Office of the Chancellor. She received her bachelor of science in biology and bachelor of arts in English from Boise State University.

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