

Name: Dr. Gioia Rau

Code: 667

Home institution: CUA

Name of task: I am on TWO tasks: (1) Modeling and Observations of Cool Evolved Stars (667.012); (2) Flare stars, astrophysical transient analysis and artificial intelligence (667.007)

What do you do for CRESST: Dr. Gioia Rau is an Astrophysicist working for CUA at NASA's Goddard Space Flight Center, where she works on exoplanets and stellar astrophysics using artificial intelligence techniques, the most advanced computational models, and data from the largest telescopes on Earth and in space. Dr. Rau has a track record of numerous scientific publications, international collaborations, and leads the scientific side of multiple NASA mission concepts in development. She has recently been elected Chair of the prestigious International Astronomical Union Working Group on Red Giants and Red Supergiants.



Dr. Rau has received numerous awards, including most recently from the Astrophysics Division of NASA Goddard Space Flight Center for her excellence in astrophysics; she has been awarded the Italian Cultural Society's Young Scientist Award, which awards the best scientist among NASA, NIH, and NIST for her work in the application of astronomical and computational techniques to outstanding problems in astrophysics; and Dr. Rau has been selected and awarded by prestigious juries the "Inspiring Fifty Europe 2022" and "Inspiring Fifty Italy 2021" awards, as being elected one of the 50 most influential women and role models in Tech and Science in Europe and in Italy.

Dr. Rau is highly committed and passionate about fostering and promoting DEIA (Diversity Equity Inclusion and Accessibility) values, especially by supporting women and other underrepresented minorities in pursuing scientific careers. She supervises interns, PhD students, and postdocs.

Background: Dr. Rau received her PhD in Astrophysics with honors from the University of Vienna, Austria, in 2016, and her master's in physics and Astrophysics Summa cum Laude from La Sapienza University of Rome, Italy, in 2011. Dr. Rau has obtained her bachelor's degree in physics at La Sapienza. Towards the end of her master's degree, Dr. Rau was awarded the Fellowship "Borsa di studio per la Tesi all'estero" for being one of the four students among the whole Science Faculties (physics, math, biology, chemistry, geology) achieving the highest score on the exams (media degli esami più alta). Thanks to this fellowship she has developed her master thesis at Caltech/JPL. After that, she applied and was awarded 3 PhD fellowships in Europe and decided to pursue her Doctorate degree in Astrophysics at the University of Vienna, during which she was awarded the prize for the best finishing fellowship (Abschlussstipendium Universität Wien) and multiple travel grants. After that, she was awarded a Visiting Scientist position at the prestigious ESO (European Southern Observatory) in Germany. Thanks to several projects that Dr. Rau has ideated and developed from scratch, she has been awarded several grants in Austria, France, and USA, among which she has chosen to continue pursuing her career as postdoctoral fellow at NASA Goddard Space Flight Center, where in 2021 she was promoted Research Scientist. In 2020 Dr. Rau was promoted Research Assistant Professor at CUA.

Favorite part of being a CRESST Scientist? The amazing scientists and support staff that I get to work with!

Highlight of research as a CRESST Scientist? The very many exciting missions in development, observing proposals, and science projects I get to work on. I cannot decide on one!!

List of recent publications:

- Ishitani Silva et al. (ApJ, 2022, in press), “MOA-2020-BLG-135Lb”
- Sciluna et al., 2021, MNRAS, 512, 1091 “The Nearby Evolved Stars Survey II: Constructing a volume limited sample and first results from the James Clerk Maxwell Telescope”
- Montarges et al., 2021 (Nature, 594, 365) “A dusty veil shading Betelgeuse during its Great Dimming”
- Rau 2021, RNAAS, 5, 96 “3D radiative transfer simulations of the atmospheric environment of the carbonrich AGB star RU Vir”
- Rau et al. 2021, RNAAS, 5, 73 “A new view into K-giants chromospheres”
- Olmschenk, Ishitani Silva, Rau et al. 2021, AJ, 161, 273 “Identifying Transit Candidates in TESS Full-Frame Image Light Curves via Convolutional Neural Networks”
- Morris et al., 2020, ApJ, 892, 2, L23 Letter “CO, Water, and Tentative Methanol in Carinae Approaching Periastron”
- Rau 2020 “On the role of Chromospheres in cool, evolved stars”
- Rau et al., 2019, ApJ, 882, 37 “Constraining stellar parameters and atmospheric dynamics of the carbon AGB star V Oph”
- Dharmawardena et al., 2019, MNRAS, 489, 3218 “The Nearby Evolved Stars Survey: I. JCMT/SCUBA-2 Sub-millimetre detection of the detached shell of U Antliae”
- Brunner et al., 2019 A&A, 621, 50 “ALMA observations of the “fresh” carbon-rich AGB star TX

List of recent publications:

- May 2022: Contributed talk at the Exoplanets 4 conference: “The unique microlensing event Kojima-1: Keck’s aperture masking observations”
- Dec 2021: The Catholic University of America
- July 2021: University of British Columbia, Vancouver
- June 2021: Portsmouth University
- June 2021: Space Telescope Science Institute
- June 2021: Invited GAPS 2021 conference talk
- Dec 2020: Yale University
- Jan 2020: Invited conference talk, AAS 235’s Session: “Imaging Stars A Century of Advances in High Angular Resolution Astronomy”
- Jan 2020: Contributed poster at the AAS 2020

List of recent awards won:

- 2022 Inspiring Fifty Europe – Top 50 women in Tech and Science in Italy awarded by a prestigious jury
- 2022 NASA Goddard Space Flight Center Team Award “for Excellence in Diversity, Equity, Inclusion, and Accessibility (DEIA)”
- 2021 NASA Astrophysics Science Division Peer Award – “For your excellence in astrophysics research and service, and for your enthusiastic commitment to building a healthy, diverse, and inclusive science community”

- 2021 Inspiring Fifty Italy – Top 50 women in Tech and Science in Italy awarded by a prestigious jury
- 2021 ICS Young Scientist Award awarded the best scientist among NASA, NIH, NIST – “For your work in the application of astronomical and computational techniques to outstanding problems in astrophysics”
- 2021 Top 150 Women of Inspiration
- 2021 National Women’s History Month at NASA/Goddard Award
- 2020 “Outstanding Researcher” recognition from the US Government (“EB-1B Green Card”)
- 2020 Nomination for the “2020 Italian Bilateral Scientific Cooperation Award”
- 2019 Nomination for outstanding achievements, Sigma Xi honorary society

List of Recent Grants:

- 2021 Accepted proposal “MAtISSE: MACHine Intelligence for Small SatEllites” (PI Rich Barry, NASA/GSFC)
- 2021 Accepted Step A NIAC proposal “A Lunar Long-Baseline Optical Imaging Interferometer: Artemisenabled Stellar Imager (AeSI, PI Kenneth Carpenter, NASA/GSFC)”
- 2021 Accepted Step A NIAC proposal “Laser-Guided Space Interferometer” (PI Kerri Cahoy, MIT)
- 2020 Accepted Step A NIAC proposal: “SI-LP: Stellar Interferometer Lunar Pole” (PI Kenneth Carpenter, NASA/GSFC)

Three fun facts:

- 1) I wrote NASA when I was 8 (and got a reply!), as it’s my biggest dream to work here since a very young age!
- 2) I made my own daughter’s one year old birthday 3-tiers decorated cake from scratch (picture upon request)
- 3) I am a semi-pro Volleyball player, and avid sport lover (I run, ski, hike, swim, climb, and many more...)