David R. Ciardi, Ph. D.

Caltech-IPAC/NExScI, 1200 E California Ave, MS100-22 Pasadena, CA 91125 USA
Phone: +1.626.395.1834 • Mobile: +1.626.200.6634 • E-Mail: ciardi@ipac.caltech.edu

Education

Ph.D. Physics, University of Wyoming, Laramie, WY, USA 1997
Star Formation in the Filamentary Dark Cloud GF-9: A Multi-Wavelength Intra-Cloud Comparative Study, Advisor Charles E. Woodward
B.A. Astronomy & Physics (*cum laude*), Boston University, Boston, MA, USA 1991

Professional Experience

2018 – Present: Senior Research Scientist, NASA Exoplanet Institute/IPAC/Caltech
2009 – Present: Member of the Caltech Professional Staff
Chief Scientist of Operations at the NASA Exoplanet Science Institute. Project Science for the NASA Exoplanet Archive, the Exoplanet Follow-Up Observation Program services for Kepler, K2 and TESS, NN-Explore, and LBTI. Previous leadership duties include Project Scientist for the Large Synoptic Survey Telescope, the Kepler Science Analysis System, and the Keck Observatory Archive. Duties include management and scientific direction of a team of software engineers and scientists during the design, development, implementation, and operation. Other duties include liaison to the exoplanet community for NExScI with an emphasis on new projects and coordination of the Community Exoplanet Follow-Up Observation activities. Scientific research focused on exoplanet detection, characterization, and formation, and stellar astrophysics and formation. Techniques include high precision optical and near-infrared time-series photometry and spectroscopy, optical and infrared imaging and spectroscopy, and near-infrared interferometry.
Associate Research Scientist 2008 – 2018; Assistant Research Scientist 2006 – 2008; Assistant Staff 2002 – 2006

2000 – 2002: Assistant Scientist, University of Florida
Instrument scientist and optical designer for the Florida infrared instrumentation group. Lead optical designer and engineer for the spectroscopy components for T-ReCS, a mid-infrared imager and spectrograph for the Gemini 8-m Telescope, and CanariCan, a mid-infrared imager and spectrograph with polarimetric and coronographic modes for the Spanish GTC 10-m Telescope. Team leader for the integration and testing of T-ReCS; team leader for the scattering analysis for CanariCam.

1998 – 2000: Postdoctoral Research Scientist, University of Florida (Dr. Elizabeth Lada)
Responsible for the University of Florida in-orbit observational plan to be performed with NASA's Wide-Field Infrared Explorer (WIRE) to map and take a complete census of the nearest star formation regions. Developed a suite of GUI-based planning tools that utilized the satellite coordinate system and orbital parameters to optimize data acquisition. Primary point of contact between the University of Florida team and the NASA team.

1996 – 1998: Postdoctoral Research Scientist, University of Wyoming (Dr. Steve Howell)
Developed and lead an optical-infrared imaging and spectroscopic scientific program to study low-mass stellar objects in interacting binary systems. Team leader for the preparation, setup, operation, and support of the cryogenic near-infrared camera systems at the Wyoming Infrared Observatory (WIRO). Developed a suite of software tools for data collection and analysis to be used with the near-infrared imaging systems at WIRO.

Awards

2016: NASA Exceptional Scientific Achievement Medal for work on Kepler and contributions to the confirmation of Kepler's exoplanets which have led to the characterization of planets ranging in size from Jupiters to Earths.

Professional Mentoring

2004 – 2006: Dr. Kaspar von Braun, postdoctoral scholar, Caltech
2005 – 2007: Ms. Samantha Lawler, undergraduate, Caltech
2007 – 2009: Dr. Peter Plavchan, postdoctoral scholar, Caltech
2009 – 2011: Dr. Julian van Eyken, postdoctoral scholar, Caltech
2011 – 2012: Mr. Daniel Glomboske, undergraduate student, College of the Canyons
2015 – 2016: Ms. Mindy Saylors, undergraduate student, College of the Canyons
2014 – 2018: Ms. Lea Hirsch, graduate student, University of California, Berkeley
2019 – 2020: Dr. Michael Lund, postdoctoral scholar, Caltech
2016 – Current: Mr. Alan Payne, graduate student, University of Southern Queensland
2020 – Current: Ms. Ummee Tania Ahmed, graduate student, University of Southern Queensland

Professional Affiliations and Major Research Collaborations

American Astronomical Society, Full Member
International Astronomical Union, Full Member
Kepler Science Team
Kepler Follow-Observation Program (Lead)
K2 West Coast Planet Collaboration
CoRoT Science Team
PI Palomar Transient Factory-Orion Transit Survey
ExoPAG Executive Council
Palomar Transient Factory Science Team
Spitzer Key Program: "Young Stellar Object Variability"
Herschel Key Project "GASPS"
CanariCam Science Team
WFIRST SIT for Coronographic Science
TESS Follow-Up Observation Program (Imaging Lead)
CASE/ARIEL Science Team

Professional Publications Highlights (290+ Papers with 22000+ Citations; H-index=71)

<u>Highlights of some important contributions to the field of astrophysics</u>

2021: "Understanding the Impacts of Stellar Companions on Planet Formation and Evolution: A Survey of Stellar and Planetary Companions within 25 pc," Hirsch, L et al. Paper does a full completeness study to show that single star systems have a higher giant planetary occurrence rate than binary stars

2019: "Detecting Unresolved Binaries in TESS Data with Speckle Imaging," Matson, R, Howell, S. & Ciardi, D. R. Paper describing how high resolution imaging can be used to determine the stellar companion content of TESS stars.

2018: "A Binary System In The Hyades Cluster Hosting A Neptune-Sized Planet," Ciardi, D. R., Paper describing the first planet found in a binary system within an open cluster.

2017: "The Kepler Follow-up Observation Program. I. A Catalog of Companions to Kepler Stars from High-Resolution Imaging," Furlan, E.; Ciardi, D. R., Paper summarizing the Kepler Imaging Program led by Ciardi highlighting the stellar companions detected and the effects on the derived planetary radii and frequency rates of planets

2017: "Assessing the Effect of Stellar Companions from High-resolution Imaging of Kepler Objects of Interest," Hirsch, L. Ciardi, D. R. et al., Paper describes the probability that stellar companions detected around Kepler planet host stars are bound and how these stars affect the derived planetary sizes and frequency rates of planets

2016: "197 Candidates and 104 Validated Planets in K2's First Five Fields," Crossfield, Ciardi, et al., Catalog of Validated Planets from K2's First Year of Observing

2015: "Understanding The Effects of Stellar Multiplicity on the Derived Planet Radii from Transit Surveys: Implications for Kepler, K2, and TESS," Ciardi et al., Paper describes the effects of undetected binary companions on the derived planetary radii from transit surveys

2013: "On the Relative Sizes of Planets within Kepler Multiple-candidate Systems," Ciardi et al., First paper to show definitely that larger gas and ice giant planets are more commonly in orbits outside of smaller, rocky planets in the Kepler sample indicative of migrational shepherding and/or evaporation.

2012: "The PTF Orion Project: A Possible Planet Transiting a T-Tauri Star," van Eyken, Ciardi et al., First paper to discover a transiting Jupiter-sized planetary candidate around a few million year T Tauri star.

2011: “Characterizing the Variability of Stars with Early-release Kepler Data,” Ciardi et al., First paper to use the Kepler data to determine the variability amplitudes and variability fractions of the stars in the Kepler sample.

2001: “On the Near-Infrared Size of Vega,” Ciardi et al., First paper to use infrared interferometry to measure the size of the debris disk and show that Vega's debris disk harbors dust inside of 1 AU.

Proposals and Grants

Awarded over $5M in research grants as either primary investigator or co-investigator since 2005.

Recent Funded Proposals as Primary Investigator

NASA 2019, “Understanding the Role of Stellar Multiplicity in the Formation and Evolution of Exoplanetary Systems,” $688,326

NASA 2018, “Determining the True Kepler Occurrence Rates: Correcting for Stellar Multiplicity,” $10000

NASA 2017,”Understanding the Stellar Multiplicity of Exoplanet Direct Imaging Targets: Preparing NASA for WFIRST,” $9000

NASA 2016, “Validating K2 Planets with Keck Adaptive Optics Imaging,” $18,000

NASA 2014, “Assessing the True Sizes of Kepler's Smallest Planets in Multi-Planet Systems,”$35,000

NASA 2013, “Validating Kepler’s Smallest Planets”, $10,000

NASA 2012, “Adaptive Optics Imaging of Kepler Objects of Interest,” $130,000

NASA 2012, “The R-M Effect for a 3Myr Transiting Jupiter-sized Planet Candidate,” $15,000

NASA 2010, “Measuring the Temperature of the Peculiar Exoplanet CoRoT-3,” $15,000

NASA 2005, “A Search for Warm Dust in the Habitable Zones Around Solar−Type Stars,” $300,000

Recent Funded Proposals as Co-Investigator

NASA 2015, “Harnessing the Power of the WFIRST Coronagraph: A Coordinated Plan for Exoplanet and Disk Science,” $3.3M

NASA 2012, “High Precision, Directly Determined Radii and Effective Temperatures for Giant Stars,” $234,000

NSF 2012, “High Precision, Directly Determined Linear Radii and Effective Temperatures for Giant Stars,” $356,000

Selected Recent Talks and Colloquia

2021 “Kepler, TESS and Keck Observatory: Driving Our Understanding of Exoplanetary Systems” Cosmic Events Guest Speaker Keck Observatory

2020 “Exoplanets From Space and Ground,” Colloquium, Florida Gulf Coast University

2020 “A Summary of TESS Discoveries From Year 1+,” Invited Talk 2020 ARIEL Science Meeting, Noordwijck, ND

2019 “Characterizing Exoplanets Means Characterizing Stellar Multiplicity,” Colloquium, Australia National University, Canberra, AU

2018 “Palomar and Kepler: A Decade of Exoplanet Candidate Confirmation and Characterization,” Invited Talk 2018 Palomar Science Meeting: 70 Years of Palomar

2018 “Exoplanets, Stellar Companions, and the Power of High Resolution Imaging”, Colloquium University of Wyoming, Host: Hannah Jang-Condell

2017 “NASA's Kepler Mission: Spawning a Revolution in Exoplanets and Beyond!” 17th Australian Space Research Conference, Invited Talk, Sydney, AU

2017 “NASA's Kepler Mission: Spawning a Revolution in Exoplanets and Beyond!” 2017 Planetary Frontiers Workshop, Invited Talk, Sydney, AU

2017 “Stellar Companions and Planet Properties with High Resolution Imaging.” Invited talk “Know Thy Star, Know Thy Planet” Conference

2017 “Lessons learnt from the Kepler/K2 follow-up observation programs: leading to TESS … now PLATO”, PLATO Mission Conference 2017: Exoplanetary systems in the PLATO era”, Contributed Talk, Warwick, UK

2017 “Variable Variability: Understanding How Stars Vary from 4 years of Kepler Data”, K2 SciCon IV, Contributed Talk, Mountain View, CA

2016 “Planets Everywhere! The Revolution in How We View the Earth,” Colloquium USQ, Toowoomba, AU

2016 “Kepler Planetary Radii and Planetary Densities,” Invited JPL Exoplanet Science Initiative