Graziela R Keller

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Summary

Ph.D. and post-doctorate in Astronomy; Currently working with radiometric calibration of remote sensing instruments: Terra and Aqua MODIS, Suomi-NPP VIIRS, GOES-16 ABI, Himawari-8 AHI; Experience in acquisition, mining, visualization, reduction, and analysis of astronomical data (spectra, images, hyperspectral data, and catalog data); Daily use of IDL for scientific programming and visualization of data and results; Experience with astronomical software packages; PI of an ESO VLT/UVES spectroscopic program and CoI of two Hubble Space Telescope (HST) snapshot programs; Experience producing synthetic spectra/photometry with stellar radiative transfer and atmosphere codes.

Key Skills

Remote Sensing

- Working on the radiometric calibration of Terra and Aqua **MODIS** IR bands.
- Algorithm development for assessing and correcting the impact of electronic crosstalk on L1B images from Aqua **MODIS** IR bands.
- Conducting research on alternative calibration methods for the Suomi-NPP **VIIRS** Day/Night band.
- Supporting research on instrument inter-comparison using Himawari-8 **AHI** data: georeferencing and use of NAIF SPICE/Icy to derive observation geometry.
- Implemented a pipeline to validate the calibration of GOES-16 **ABI** reflective solar bands.

Astronomy

- Scientific Research.
- Experience with data acquisition, reduction, mining, analysis, and visualization of astronomical data: spectra, images, hyperspectral data, and catalog data.
- Experience in proposing, planning, and acquiring observations from HST and VLT: 1. PI of ESO VLT/UVES spectroscopic program (run 095.D-0256 - period 95); 2. Co-I of HST WFC3 imaging snapshot program (14119 - cycle 23 - PI: L. Bianchi); 3. Co-I of HST STIS spectroscopic snapshot program (13397 - cycle 21 - PI: L. Bianchi).
- Experience in mining Virtual Observatory resources: cross-matching of catalog data (mainly GALEX and SDSS) and mining spectroscopic/imaging archives (mainly MAST, SDSS, ESO).
- Experience working with spectra from HST (STIS, FOS, GHRS), IUE, and FUSE space telescopes, and from ground-based telescopes: SDSS (also BOSS), ESO's VLT (UVES, VIMOS), ESO's FEROS, and Coudé spectrograph at the 1.6m Pico dos Dias telescope.
- Astronomical Tools – Experience with data mining tools: TopCat, CDS X-Match Service, CasJobs, SkyView, and with data reduction and analysis tools: IDLAstro, Coyote, and pp_lib IDL libraries, SExtractor, IRAF, FUSE, ESO/UVES, ESO/VIMOS data reduction pipelines, NAIF SPICE/Icy.

Programming:

- Daily use of IDL to automate tasks, process, organize, explore, visualize, and analyze data (spectra, images, catalogs, data cubes, synthetic data), including large datasets.
- Varied experience with Fortran, Linux shell scripts, SQL, and Python.

Synthetic data

- Experience in using the non-LTE stellar atmosphere code CMFGEN to produce grids of synthetic spectra.
- Experience working with grids of synthetic spectra and synthetic photometry produced with a variety of stellar atmosphere models.

Professional Experience

Science Systems and Applications, Inc. (SSAI) USA
Senior Research Scientist Nov. 2015 – current

- Radiometric Calibration of Remote Sensing Instruments. Currently assessing the impact of electronic crosstalk on images from Aqua MODIS thermal emissive bands (Keller et al. 2017a,b). Conducting research on the use of flux measurements of stellar sources visible in images from the space view port of Suomi-NPP VIIRS Day/Night Band as an independent calibration method. Supporting research on instrument inter-comparison by implementing IDL software to handle and georeference Himawari Standard Format Data and calculate observation geometry using SPICE/Icy. Implemented the pipeline to validate the calibration of GOES-16/ABI reflective solar bands.

Universidade de São Paulo Departamento de Astronomia Brazil
Postdoctoral researcher 2012 – 2015

- CSPNe spectroscopy. Produced grids of synthetic spectra calculated with the non-LTE radiative transfer, stellar atmosphere code CMFGEN and used them in the analysis of far-UV, UV, and optical spectra of central stars of planetary nebulae (CSPNe). This project makes use of MAST archival spectra and recently observed high resolution, high signal-to-noise ratio ESO VLT/UVES spectra of CSPNe (ESO run 095.D-0256 - PI: Graziela R. Keller).
- White Dwarfs (WDs) from matched catalogs - in collaboration with Luciana Bianchi (The Johns Hopkins University). Identification and characterization of hot WDs and hot WDs in binary systems, extracted from cross-matched SDSS and GALEX catalogs, modeled with synthetic photometry and spectroscopy. This project encompasses two HST snapshot programs in which I am a CoI: cycle 21 STIS spectroscopic snapshot program 13397 (PI: L. Bianchi) and cycle 23 WFC3 imaging snapshot program 14119 (PI: L. Bianchi).

The Johns Hopkins University Department of Physics and Astronomy USA
Visiting scientist 02 – 04/2014

Universität Tübingen Institut für Astronomie und Astrophysik Germany
Visiting scientist 10 – 11/2013

The Johns Hopkins University Department of Physics and Astronomy USA
Visiting scientist 01 – 04/2013

Universidade de São Paulo Departamento de Astronomia Brazil
Ph.D. research 2007 – 2011

- Advisor: Walter J. Maciel
- Built grids of synthetic spectra with the non-LTE radiative transfer, stellar atmosphere CMFGEN code, which accounts for expanding atmospheres and line blanketing.

- Used the grids on the analysis of ultraviolet and far-ultraviolet MAST archival spectra from H-poor central stars of planetary nebulae to derive stellar parameters and surface abundances.
- Teaching assistant for the "Fundamentals of Astronomy" undergraduate course at IAG/USP - AGA0215

The Johns Hopkins University Department of Physics and Astronomy — USA
Visiting Ph.D. Student — 2009 – 2010

- Supervisor: Luciana Bianchi

Universidade de São Paulo Departamento de Astronomia — Brazil
Master's research — 2004 – 2007

- Advisor: Vera Jatenco-Pereira
- The Alfvén wave wind driving mechanism was included in 1D stationary magnetohydrodynamical simulations of the radiative winds of Wolf-Rayet stars. Implemented in Fortran.

Universidade Federal do Rio de Janeiro Dept. de Astronomia — Brazil
Undergraduate research — 2002 – 2004

- Advisor: Gustavo Frederico Porto de Mello
- Calibration of an age-chromospheric activity indicator for solar-type stars through the analysis of the H and K Ca II spectral lines.

Universidade Federal do Rio de Janeiro Dept. de Astronomia — Brazil
Undergraduate research — 2000 – 2002

- Advisor: Gustavo Frederico Porto de Mello
- Spectroscopic analysis of the two components of the α Centauri system.

Education

Universidade de São Paulo — Brazil
Ph.D. in Astronomy — 2007 – 2011
Thesis title: "Hydrogen Deficient Central Stars of Planetary Nebulae: Synthetic Spectra and Spectral Analysis"

The Johns Hopkins University — USA
Visiting Ph.D. student at the Department of Physics and Astronomy — 2009 – 2010

Universidade de São Paulo — Brazil
M.Sc. in Astronomy — 2004 – 2007
Dissertation title: "Alfvén Waves Applied to the Winds of Wolf-Rayet stars"

Universidade Federal do Rio de Janeiro — Brazil
B.Sc. in Astronomy — 1999 – 2004
Title of the Final Graduation Project: "Study of the Chromospheric Activity in Solar Type Stars Through the H and K Ca II lines"

Publications

Journal Papers

1. Keller, Graziela R. et al. Aqua MODIS Band 24 Crosstalk Striping. IEEE Geoscience and Remote Sensing Letters 14, no. 4, p. 475, 2017.

2. Keller, Graziela R. ; Bianchi, Luciana ; Maciel, Walter J. UV spectral analysis of very hot H-deficient [WCE]-type central stars of planetary nebulae: NGC 2867, NGC 5189, NGC 6905, Pb 6, and Sand 3. Monthly Notices of the Royal Astronomical Society, v. 442, p. 1379, 2014.

3. Keller, Graziela R. ; Herald, James E. ; Bianchi, Luciana ; Maciel, Walter J. ; Bohlin, Ralph C. A new grid of synthetic spectra for the analysis of [WC]-type central stars of planetary nebulae. Monthly Notices of the Royal Astronomical Society, v. 418, p. 705, 2011.

4. Laganá, Tatiana F. ; de Souza, Rafael S. ; Keller, Graziela R. On the influence of non-thermal pressure on the mass determination of galaxy clusters. Astronomy & Astrophysics, v. 510, p. A76, 2010.

5. Keller, Graziela R. ; Jatenco-Pereira, Vera. Wolf-Rayet optically thick winds with Alfvén waves. Advances in Space Research, v. 46, p. 493, 2010.

6. Porto de Mello, Gustavo F. ; Lyra, Wladimir ; Keller, Graziela. R. The Alpha Centauri binary system. Atmospheric parameters and element abundances. Astronomy & Astrophysics, v. 488, p. 653, 2008.

7. Maciel, Walter J. ; Keller, Graziela R. ; Costa, Roberto D. D. Metallicity effects on the modified wind momentum of CSPNe. Revista Mexicana de Astronomía y Astrofísica, v. 44, p. 221, 2008.

Articles in Conference Proceedings

1. Keller, Graziela R. et al. Aqua MODIS Electronic Crosstalk on SMWIR Bands 20 to 26. arXiv preprint arXiv:1705.07988. Accepted to be published on IEEE IGARSS 2017.

2. Keller, Graziela R. ; Bianchi, Luciana ; Herald, James E. ; Maciel, Walter J. Grids of Synthetic Spectra for H-poor Central Stars of Planetary Nebulae (CSPNe). In: Planetary Nebulae: An Eye to the Future, IAU Symp. 283, 2011, Tenerife. IAU Symposium, v. 283, p. 404-405, 2012.

3. Keller, Graziela R. ; Bianchi, Luciana ; Herald, James E. ; Maciel, Walter J. Using Grids of High Resolution Synthetic Spectra in the Analysis of [WCE] stars. In: Circumstellar Dynamics at High Resolution, 2012, Foz do Iguaçu. Astronomical Society of the Pacific Conference Series, v. 464, p. 309-316, 2012.

Recent Contributions to Conferences

1. Keller, Graziela R.; Bianchi, Luciana; Barstow, Martin A.; Bohlin, Ralph; Casewell, Sarah L.; Gaensicke, Boris T.; Bond, Howard E.; Long, Knox S. HST/STIS UV Spectroscopy of GALEX Selected Hot White Dwarfs. Hubble 2020: Building on 25 years of discovery, 2015, STScI, Baltimore - USA.

2. Bianchi, Luciana; Conti, Alberto; Shiao, Bernie; Keller, Graziela R.; Thilker, David A. The Ultraviolet Sky: final catalogs of unique UV sources from GALEX, and characterization of the UV-emitting sources across the sky, and of the Milky Way extinction. 223rd AAS Meeting, 2014, Washington, DC - USA.

3. Keller, Graziela R. ; Bianchi, Luciana ; Herald, James E. ; Maciel, Walter J. UV spectral analysis of very hot H-deficient [WCE] CSPNe: NGC 6905, Pb 6, NGC 5189, NGC 2867 and Sand 3. ESO/NUVA/IAG Workshop on Challenges in UV Astronomy, 2013, ESO, Garching - Germany.

4. Keller, Graziela R. ; Bianchi, Luciana ; Herald, James E. ; Maciel, Walter J. Using Grids of High Resolution Synthetic Spectra in the Analysis of [WCE] stars. ASPCS Circumstellar Dynamics at High Resolution, 2012, Foz do Iguaçu - Brazil.

5. Keller, Graziela R. ; Bianchi, Luciana ; Maciel, Walter J. Grids of Synthetic Spectra for H-Deficient CSPNe. Workshop on Stellar Astrophysics at Observatório Nacional: Stellar Evolution and Stars in Transition Phases, 2012, Rio de Janeiro - Brazil.

6. Keller, Graziela R. ; Bianchi, Luciana ; Maciel, Walter J. Determining properties of evolved hot stars with winds from UV observations. UV Astronomy: HST and Beyond, 2012, Hawaii - USA.

7. Keller, Graziela R. ; Bianchi, Luciana ; Herald, James E. ; Maciel, Walter J. Grids of Synthetic Spectra for H-poor Central Stars of Planetary Nebulae (CSPNe). Planetary Nebulae: An Eye to the Future, IAU Symp. 283, 2011, Tenerife - Spain.