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Clara E. Brasseur

Education

University of St Andrews; St Andrews, UK

PhD, Astronomy, expected 2024.

Liverpool John Moores University; Liverpool, UK (2019)

MSc with distinction, Astrophysics.

Mills College; Oakland, California (2010)

MA, Music Composition.

Oberlin College; Oberlin, Ohio (2008)

BA, Astrophysics and Music Composition. Mathematics minor.

Selected Experience

Software Engineer

May 2016 – August 2021

Space Telescope Science Institute (STScI), Baltimore, MD

- Software developer at the Mikulski Archive for Space Telescopes (MAST).
- Created scalable all-sky imagery from Panoramic Survey Telescope and Rapid Response System (PanSTARRS) data.
- Documented, improved, and extended the MAST Application Programming Interface (API).
 - Developed MAST module for Astroquery Python package
 - Led trainings on usage of RESTful and Python APIs
 - Developed new API functionality for image cutouts
- Developed Astrocut python package for astronomical image cutouts, providing streamlined data access to astronomers and relieving pressure on archive infrastructure.
- Developed Astronify python package for sonifying time series data, helping to increase access to astronomical data for blind and visually impaired astronomers.
- Developed interactive plots for the MAST web interfaces exo.MAST and z.MAST.
- Provided user support including responding to helpdesk questions.
- Sustaining engineering for general software maintenance and reduction of technical debt.
- Supported and mentored undergraduate interns.

Research Assistant for Dr. Rachel Osten**September 2015 - present**

Space Telescope Science Institute (STScI), Baltimore, MD

- Multiwavelength (visible/ultra-violet) exploration of stellar flares using the overlapping surveys from the Galaxy Evolution Explorer (GALEX), and Kepler space telescopes.
- Detected and analyzed a collection of short-duration ultra-violet flares in GALEX data, leading to Brasseur et al, 2019.
- Explored Kepler flares in corresponding Kepler data to better understand flare energy fractionation and frequency distributions, leading to Brasseur et al, 2022.

Cryptanalyst**July 2011 - April 2016**

National Security Agency (NSA), Fort Meade, MD

- Devised statistical and analytic tests for data diagnosis; developed software to apply tests and processing based on results.
- Modified high interest information gathering algorithm, by using theoretical mathematics to explore trade-offs in effort, efficiency, and accuracy.
- Designed algorithm in C/C++ for implementation of secure information sharing protocol and worked jointly to implement it in a cross-platform application. Achieved five-fold improvement in application speed through parallelization of code. Demonstrated program prototype to management and potential customers.
- Brought legacy production Perl scripts up to agency coding standards, adding robust error handling, increased flexibility in supported file types, and detailed succinct logs.

Publications

Brasseur, C. E., Rachel A. Osten, Isaiah I. Tristan, and Adam F. Kowalski. “Constraints on Stellar Flare Energy Ratios in the NUV and Optical from a Multiwavelength Study of GALEX and Kepler Flare Stars” *The Astrophysical Journal* 994.1 (2023): 5.

Brasseur, C. E., Rachel A. Osten, and Scott W. Fleming. “Short-duration Stellar Flares in GALEX Data.” *The Astrophysical Journal* 883.1 (2019): 88.

Ginsburg, Adam, B. M. Sipőcz, **C. E. Brasseur**, et al. “astroquery: An Astronomical Web-querying Package in Python.” *The Astronomical Journal* 157.3 (2019): 98.

Fleming, Scott W., Chase Million, Rachel A. Osten, Dmitrii Y. Kolotkov, and **C. E. Brasseur**. “New Time-Resolved, Multi-Band Flares In The GJ 65 System With gPhoton” submitted to *The Astrophysical Journal* (2020).

Astropy Collaboration, Adrian M. Price-Whelan, Pey Lian Lim, Nicholas Earl, Nathaniel Starkman, Larry Bradley, David L. Shupe, Aarya A. Patil, Lia Corrales, **C. E. Brasseur**, et al. “The Astropy Project: Sustaining and Growing a Community-oriented Open-source Project and the Latest Major Release (v5.0) of the Core Package” *The Astrophysical Journal* 935.2 (2022): 167.

Burt, Jennifer A. et al. “TOI-1231 b: A Temperate Sub-Neptune Transiting the Nearby M3 Dwarf NLTT 24399” submitted to The Astrophysical Journal (2020).

Charmichael, Theron W. et al. “TOI-811b and TOI-852b: New transiting brown dwarfs with similar masses and very different radii and ages from the TESS mission” submitted to The Astrophysical Journal (2020).

Brasseur, Clara E., Ryan E. Grady, and Stratos Prassidis. “Coverings, Laplacians, and Heat Kernels of Directed Graphs.” the electronic journal of combinatorics (2009): R31-R31.

Brasseur, Clara, Ryan E. Grady, and Stratos Prassidis. “Kazhdan's Property (I) for Graphs.” arXiv preprint math/0607351 (2006).

Software

Astronify: Astronomical data sonification (astronify.readthedocs.io)

- Lead developer and maintainer for this Python package
- Open source and accepting community contributions (github.com/spacetelescope/astronify)
- Used to sonify MAST light curve data

Astroquery: tools for querying astronomical web forms and databases (astroquery.readthedocs.io)

- Package maintainer
- Lead developer of the MAST module (astroquery.readthedocs.io/en/latest/mast/mast.html)
- General contributor to package infrastructure

Astrocut: Astronomical image cutouts (astrocut.readthedocs.io)

- Original developer and maintainer for this Python package
- Provided to the community on PyPI Python package index (pypi.org/project/astrocut/)
- Open source and accepting community contributions (github.com/spacetelescope/astrocut)
- Implemented continuous integration/automated testing using GitHub actions and CodeCov coverage testing
- Basis for TESScut (mast.stsci.edu/tesscut) and zCut (mast.stsci.edu/zcut) cutout services, which allow astronomers to download astronomical cutouts from the TESS mission and Hubble deep field surveys respectively
- Used (via TESScut) for TESS light curve creation by Python packages Eleanor and LightKurve

zCut: Astronomical cutouts from deep field surveys (mast.stsci.edu/zcut)

- Developed zCut RESTful API on MAST microservice infrastructure
- Extended Astrocut functionality to support this service

Awarded Grants

“Sonifying MAST: Engagement and Accessibility for The BVI Community”, Space Telescope Science Institute Director’s Discretionary Research Fund Grant, PI Dr. Scott Fleming, **\$60,000**.

“Mining Multiwavelength Flares with Kepler and GALEX”, NASA Astrophysics Data Analysis Program Grant, PI Dr. Rachel Osten, **\$141,400**.

“Mining Multi-wavelength Flares with Kepler and GALEX”, Space Telescope Science Institute Director’s Discretionary Research Fund Grant, PI Dr. Rachel Osten, **\$32,000**.

Talks * indicates invited

***“Hearing the Light: Astronomical Data Sonification”** January and March 2023 Edinburgh and Clydesdale Astronomy societies, available [online](#)

***“Software Development in Astronomy”** February 2023 St Andrews Interdisciplinary Science Conference, St Andrews, UK

“Stellar magnetic field manifestations: prominences and flares” July 2022 Cool Stars 21, Toulouse, France

***“Making Astronomy More Accessible for Blind and Visually Impaired Audiences”** February 2022 NASA Universe of Learning Science Briefing

“Sonifying Your Presentation for Accessibility” November 2021 SciAccess Conference

“Hearing The Light: How Sonification Deepens our Understanding of the Cosmos and Makes Astronomy More Accessible” November 2020 Space Telescope Science Institute Public Lecture Series, available [online](#)

“Astronify: listening to the stars” November 2020 Astronomical Data Analysis Software and Systems conference, available [online](#)

***“Stellar Flares in GALEX and Kepler”** July 2020 Centre for Fusion, Space and Astrophysics Seminar, Warwick University, Warwick, UK

***“Work smart not hard: How Astrocut/TESScut efficiently cuts TESS full-frame image sets.”** April 2020 Open Planetary Lunch Talks, available [online](#)

***“Short Duration Flares in GALAX Data.”** December 2019 Solar Focus Meeting, University of Colorado, Boulder, CO

***“Accessing TESS Data Programmatically: A MAST case study.”** July 2019 TESS/Kepler Asteroseismology Consortium workshop, MIT, Cambridge, MA

***“TESScut and ExoMAST: Working with TESS Time Series Data.”** February 2019 TESS Data Workshop, Space Telescope Science Institute, Baltimore, MD

“Astrocut: A cutout service for TESS full-frame image sets.” November 2018 Astronomical Data Analysis Software and Systems conference, College Park, MD

“Short Duration Flares in GALAX Data.” July 2018 COSPAR conference, Pasadena, CA

“The MAST API: Accessing Space Telescope Data Programmatically.” October 2017 Astronomical Data Analysis Software and Systems conference, Santiago, Chile

Poster Presentations

“zCut: extending Astrocut for deep fields.” Brasseur, C. & MAST Team. AAS 235, Honolulu, HI [109.21](2020)

“MAST APIs: Present to Future.” Brasseur, C and Donadson, T. Astronomical Data Analysis Software and Systems conference, Groningen, Netherlands (2019)

“AstroCut: A cutout service for TESS full-frame image sets” Brasseur, Clara; White, Rick; Fleming, Scott W.; Mullally, Susan E.; Phillip, Carlita; Hargis, Jonathan; Fox, Mike; Smith, Arfon M. AAS 233 [245.10] (2019)

“Short Duration Flares in GALAX Data.” Brasseur, Clara; Osten, Rachel A. AAS 232 [317.01] (2018)

Observing experience

Apache Point Observatory 3.5-meter telescope, 3 nights, ARC Telescope Imaging Camera, Dual Imaging Spectrograph

Technical skills

Python, C, C++, C#, Fortran, JavaScript, ExtJS, Perl, Tornado, HTML/CSS, MS SQL, Git, GitHub, Jupyter, LaTeX, Overleaf, DS9, Aladdin, Mathematica, VMware/vSphere, Linux, Bash, Condor, WinDbg, GNU Debugger, Valgrind, Visual Studio, Certified Scrum Master.

Community Engagement

Astro Hack Week 2022, Science Organizing Committee member.

Python in Astronomy 2020, Science Organizing Committee member.

American Astronomical Society, member 2016-2021.

2012 Cryptanalysis Development Program Showcase, organizer.

Teaching Experience

Computational Astrophysics Demonstrator

January-April 2022,2023

University of St Andrews, St Andrews, UK

Provided guidance for students in this third year course on both astronomy topics and Fortran programming.

Using Python to Search NASA's Astrophysics Archives

January, June 2018-2021

American Astronomical Society Meetings

Collaborated with a team of astronomers and software engineers from multiple NASA archives to present a hands-on tutorial/workshop that introduces participants to command-line data access tools specifically using virtual observatory protocols in Python.

TESS Data Workshop

February 2019

Space Telescope Science Institute, MD

Prepared and taught an hour and a half introduction to the use of the TESScut software.

Introduction to MAST APIs

June 2017

Space Telescope Science Institute, MD

Prepared and taught workshops on the usage of the MAST RESTful and Astroquery APIs.

Graduate Teaching Assistant

August 2009 – May 2010

Mills College, Oakland, CA

Prepared and taught two semesters of undergraduate Basic Musicianship II. Initiated restructuring of the Mills musicianship curriculum.

Awards

AURA Technology and Innovation Outstanding Achievement Award (2020)

Award presented annually to a single individual or team among all AURA centers for significant innovative contribution and demonstrated excellence in an area of technology. Sole recipient of the 2020 award in recognition of development work for Astrocut and associated cutout services.

STScI Team Award (2019)

Awarded in recognition of the TESS data archive release success.

Monetary bonus and vacation time-off awards (2012-2015)

Awarded in recognition of contributions to cryptanalytic successes.

Music Alumni Scholarship (2008-2009)

Awarded in support of graduate studies in music composition at Mills College.

Vance Mathematics scholarship (2004-2008)

Application-based scholarship awarded in support of mathematics study at Oberlin College.

John F Oberlin scholarship (2004-2008)

Merit-based scholarship awarded in support of undergraduate studies at Oberlin College.