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Clara E. Brasseur

Education

Liverpool John Moores University, Liverpool, UK (2017-2019)
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 - present**
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).
    - Develop MAST module for Astroquery Python package
    - Lead trainings on usage of RESTful and Python APIs
    - Develop new API functionality for image cutouts
- Develop Astrocut python package for astronomical image cutouts
- Developed interactive plots for the MAST web interfaces exo.MAST and z.MAST.
- User support including responding to helpdesk questions.
- Sustaining engineering for general software maintenance and reduction of technical debt.
- Served as agile team Scrum Master for one year.
- Support summer 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.
- Explore Kepler flares in corresponding Kepler data to better understand flare energy fractionation and frequency distributions.

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.

Research Experience for Undergraduates **June - August 2006**
Canisius College, Buffalo, NY

- Explored the application of Kahzdan's property (T), defining an analog of property (T) for regular expander graphs. Lead to Brasseur et al, 2006.
- Extended the definition of combinatorical graph coverings to include weighted directed graphs. Led to Brasseur et al, 2009.

Publications

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.

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 (T) for Graphs." arXiv preprint math/0607351 (2006).

Software

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

- Sole 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 Travis continuous integration and Coveralls 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.

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

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, PR 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

***"Work smart not hard: How Astrocut/TESScut efficiently cuts TESS full-frame image sets."** April 2020 Open Planetary Lunch Talks.

***"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

"Kazhdan's Property (T) for Graphs." August 2006 Young Mathematicians Conference, The Ohio State University, Columbus, OH.

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#, 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

Python in Astronomy 2020, Science Organizing Committee member.
American Astronomical Society, member 2016-present.
2012 Cryptanalysis Development Program Showcase, organizer.

Teaching Experience

Using Python to Search NASA's Astrophysics Archives **January, June 2018-2020**
American Astronomical Society Meetings
Collaborates 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.