

# Liza Sazonova

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PhD graduate from Johns Hopkins University, researching the structural evolution of quenching galaxies using machine learning and multi-wavelength data, with further interests in outreach and advocacy.

## Education

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**Johns Hopkins University: PhD in Physics** 2017 – 2022

**Supervisors: Katherine Alatalo, Kate Rowlands & Timothy Heckman**

Research interests: galaxy evolution, post-starburst galaxies, galaxy clusters, galaxy morphology, computational methods, image analysis, machine learning.

**University of Waterloo: B.Sci in Mathematical Physics** 2013-2017

**Research Supervisors: Francis Poulin & Avery Broderick**

Pure Mathematics Minor & Astrophysics Specialization — Graduated on Dean's Honours List

## Publications

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ORCID [0000-0001-6245-5121](https://orcid.org/0000-0001-6245-5121)

1. **Sazonova E.**, Alatalo K., Lotz J., Rowlands K., Snyder G. F., Boone K., Brodwin M., Hayden B., Lanz L., Perlmutter S., Rodriguez-Gomez V., *The morphology-density relationship in  $1 < z < 2$  clusters*, ApJ, 899, 85 (2020)
2. **Sazonova E.**, Alatalo K., Rowlands K., Deustua S. E., French D., Heckman T. M., Lanz L., Lisenfeld U., Luo Y., Medling A. M., Nyland K., Otter J., Petric A., Snyder G. F., Urry C. M., *Are all post-starbursts mergers? HST reveals hidden disturbances in the majority of PSBs*, ApJ, 899, 85 (2021)
3. Abdurro'uf et al. (SDSS IV collaboration, including **Sazonova E.**), *The Seventeenth Data Release of the Sloan Digital Sky Surveys: Complete Release of MaNGA, MaStar, and APOGEE-2 Data*, ApJS, 259, 35
4. Lanz L., Stepanoff S., Hickox R. C., Alatalo K., French K. D., Rowlands K., Nyland K., Appleton P., Lacy M., Medling A., Mulchaey J. S., **Sazonova E.**, Urry C. M., *Are Active Galactic Nuclei in Post-Starburst Galaxies Driving the Change or Along for the Ride?*, ApJ (2022)

## Selected talks and presentations

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- Dec. 2021 **Oxford University**, Oxford, UK  
*The need for deep, high-resolution data to study galaxy structure... could be resolved?*, talk
- Nov. 2021 **University of Nottingham**, Nottingham, UK  
*The need for deep, high-resolution data to study galaxy structure... could be resolved?*, talk
- Oct. 2021 **Johns Hopkins University**, Baltimore, MD, USA  
*Summary of the IPCC 2021 Report - Physical Basis of Climate Change*, presentation
- July 2021 **National Astronomy Meeting 2021**, conference (virtual)  
*True galaxy morphology in the era of wide surveys*, talk
- June 2021 **Statistical Challenges in Modern Astronomy VII**, conference (virtual)  
*Measuring true galaxy morphology with machine learning*, poster
- Dec. 2021 **Johns Hopkins University**, Baltimore, MD, USA (virtual)  
*Introduction to Convolutional Neural Networks for astronomy applications*, talk
- Oct. 2020 **The College of New Jersey**, Ewing, NJ, USA (virtual)  
*Dying Galaxies in Distant Clusters: Story Told through Their Shapes*, **invited talk**
- Jan. 2020 **AAS 235<sup>th</sup> Meeting**, conference  
*The Build-Up of Compact Quiescent Galaxies in  $1 < z < 2$  Clusters*, poster

- Aug. 2019 **St Andrews University**, St Andrews, UK  
*The build-up of compact galaxies in  $1 < z < 2$  clusters*, talk
- Aug. 2019 **University of Nottingham**, Nottingham, UK  
*The build-up of compact spheroidal galaxies in  $1 < z < 2$  clusters*, talk

## Awards

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- University of Oxford – Balzan Fellowship** **Jan. 2022 – March 2022**  
 Fellowship as part of the Balzan Centre for Cosmological Studies Program to work at University of Oxford during the 2022 Hillary Term. Collaboration project with Dr. C. Lintott.
- Gemini Observatory – Principal Investigator – 16 hours, Band 3** **June 2021**  
 Proposal accepted for additional observations titled *Demystifying the Path to Quiescence: Gas Suppression and Outflows in Shocked Post-Starburst Galaxies*
- STScI Director’s Discretionary Research Fund – Co-Investigator – \$54,752** **Mar. 2021**  
 Proposal accepted for funding titled *Measuring unbiased galaxy morphology with Machine Learning* (PI: K. Alatalo, Co-Is: E. Sazonova, K. Rowlands)
- STScI Director’s Discretionary Research Fund – Co-Investigator – \$57,020** **Sep. 2021**  
 Proposal accepted for funding titled *The role of AGN in galaxy transformation through a radio lens* (PI: K. Rowlands, Co-Is: Y. Luo, K. Alatalo, S. Lebowitz, E. Sazonova)
- Gemini Observatory – Principal Investigator – 16 hours, Band 1** **June 2020**  
 Proposal accepted observations titled *Demystifying the Path to Quiescence: Gas Suppression and Outflows in Shocked Post-Starburst Galaxies*
- Johns Hopkins University – GRO Travel Grant – \$300** **Apr. 2020**
- Johns Hopkins University – Space@Hopkins Fellowship** **May 2019 – May 2020**
- Johns Hopkins University – EJ Rhee Teaching Award – \$1,000** **May 2019**
- University of Waterloo – Dean’s Honours List** **June 2017**

## Leadership Roles

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- P&A Graduate Students President – Johns Hopkins University** **Feb. 2020 – Dec. 2020**  
 Main point of communication between Physics & Astronomy graduate students and faculty, raising concerns of students to staff. Organized of graduate and departmental events, including teaching training and departmental Open House. Surveyed for student concerns and problem-solving during the COVID-19 crisis.
- Space@Hopkins Fellow – Johns Hopkins University** **May 2019 – May 2020**  
 Organized astronomy & space technology-themed events at the university; solicited, evaluated and served on a selection panel for the Space@Hopkins Seed Grant proposals; organized Space@Hopkins Maryland-wide workshops; website maintenance.
- International Students Representative – Johns Hopkins University** **Sep. 2019 – Feb. 2020**  
 Point of contact for international students at the Physics & Astronomy department.
- University of Waterloo – Physical Sciences Peer Leader** **Sep. 2014 – Sep. 2015**  
 Mentor to the first year students pursuing Physical Sciences major. Organized talks with local professors, academic development and social events.

## Outreach Activities

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- Astrobites writer** **Aug. 2021**  
 Writes regular Astrobites articles summarizing recent papers on galaxy evolution to the wider community of physics undergraduate students.

**'I'm a Scientist' Contributor** **Apr. 2020 – Dec. 2020**

Contributor to the *'I'm a Scientist, Get me out of here!'* online outreach platform, answering school children's questions about physics, STEM and academic careers via online forums and chats.

**'Letters to a Pre-Scientist' Participant** **Jan. 2020 – Mar. 2020**

Participant of the 'Letters to a Pre-Scientist' program to write regular hand-written letters to children from disadvantaged schools, answer science questions and talk about STEM career paths.

## Science community work

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**Reviewer for the Astrophysical Journal** **2021 – 2022**

**Reviewer for the Gemini Observatory** **June 2022**

**Small Space Missions Workshop organizer** **June 2019**

## Teaching & Employment

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**Laboratory Teaching Assistant – Johns Hopkins University** **Sep. 2017 – May 2019**

Instructed undergraduate physics laboratory class. Developed a new Python-based laboratory syllabus alongside with the primary instructor. Developed a Python tutorial hub for undergraduate students.

**Received an E.J. Rhee Teaching Award.**

**Research Assistant – University of Waterloo, ON, Canada** **Sep. 2016 – May 2017**

Worked on building a magnetohydrodynamical model of the solar tachocline with Prof. Francis Poulin.

**Data Scientist – Pitstop, Kitchener, ON, Canada** **Apr. 2016 – Aug. 2016**

Developed a Python graph-based machine learning algorithm for a fuzzy word search and classification of car maintenance data in a PostgreSQL database (part-time).

**Data Scientist – Mercator BioLogic, Salt Lake City, UT, USA** **Jan. 2014 – Sep. 2014**

Developed Java algorithm to detect mutated patterns in sequenced DNA data (part-time, remote).

## Open-source Python projects

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**GalaxyLib – [github.com/astro-nova/galaxylib](https://github.com/astro-nova/galaxylib)**

Library to store and analyze multi-wavelength astronomical data using hierarchical HDF5 file structure, where one data file contains all data for a physical object. Includes data reduction, morphological analysis, and plotting tools.

**Astro3Words – [github.com/astro-nova/astro3words](https://github.com/astro-nova/astro3words)**

Library to convert astronomical coordinates into "What 3 Words" strings to be used in talks and outreach events. Developed as part of the 2021 Code/Astro workshop.

## Technical Skills

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Programming: Python, Bash, MATLAB, SQL, Java

Scientific Python: AstroPy, SciPy, Scikit-Learn, Scikit-Image, statmorph, CCDProc, PyTorch, Keras

Data analysis: Regression, PCA, KDE, Monte Carlo resampling, Decision trees, Neural networks

Astronomical software: Source Extractor, GALFIT, ds9, PyRAF, IRAF, TOPCAT

Web development: HTML5, CSS3, JavaScript, jQuery, Flask, WordPress, Bootstrap, Responsive design

Other computing: Adobe Creative Suite, AutoCAD, L<sup>A</sup>T<sub>E</sub>X