SEAN MACBRIDE

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EDUCATION

Wheaton College, Norton Massachusetts Aug 2016 - May 2020
B.A. in Physics with honors GPA: 3.65 (cum laude)
Minor in Astronomy Physics GPA: 3.76

- ⋆ Active mentor, advisor, and collaborator of the Wheaton College physics club from 2016-2020
- ⋆ Studied spring 2019 at University College London
- ⋆ Elected captain of the Wheaton College men's rugby team during 2019-2020 season. Elected match secretary from 2017-2019. Elected club safety officer from 2017-2019.

Awards Wheaton Centennial Grant for tremendous academic promise
Boggess Family Foundation scholarship for achievements in physics

SKILLS

Communication	Active listening, collaborative discussion, constructive feedback, empathy
Management	Strong time management, organized and reliable, composure under stress
Presentation	Articulate public speaker, effective communication in technical writing
Tools and Design	Electrical measurement, hand, and power tools, 3-D printers, electronics
Laboratory Skills	Lasers, sample preparation, spectrometers, precise instrumentation
Astronomy Operations	Optical telescopes, CCD cameras, dome and instrument maintenance
Computer Systems	Expert with Mac, Windows, and Linux systems, adept with MS Office
Computer Languages	Python (Primary), MATLAB, C++, Shell, Mathematica, LaTeX, Git
Python Packages	Jupyter, MatPlotLib, Seaborn, Pandas, NumPy, SciPy, Emcee

RESEARCH EXPERIENCE

University College London & Wheaton College May 2019 - Present
Honors Thesis Student *Professor Amélie Saintonge (UCL) & Professor Dipankar Maitra (WC)*

- · Coordinated joint thesis project between UCL and Wheaton College. Authored honors thesis detailing scientific rationale, results, and central conclusions of study. Presented to Wheaton and UCL faculty and students for critique and discussion. Received highest marks from faculty of both schools
- · Designed and implemented python data pipeline for use with derived data from xCOLD GASS, JINGLE, and SDSS galaxy surveys. Developed a linear Markov-chain Monte Carlo sampler to constrain relationship of cold-gas and dust components of star-forming galaxies from Balmer emission
- · Generalized the MCMC sampler to include the effects of inclination-dependent reddening in the calibration. Preparing a paper for submission to the Astrophysical Journal

University College London Jan 2019 - Mar 2019
Group Lead *Professor Thanh Nguyen*

- · Led research group of 8 UCL students to determine the detection limits of lateral flow assays using photo-thermal heating of magnetic nanoparticles
- · Resolved conflicts between group members and determined group structure. Coordinated laboratory logistics and safety measures between student group and the Royal Institute of London
- · Prepared ferromagnetic nanoparticle solution and samples for observation. Designed setup of infrared laser and sample apparatus. Obtained and analyzed temperature data from a thermal camera for determination of optimal membrane type and solution concentration
- · Collaborated and authored report detailing group processes, results, & analysis. Received highest marks from UCL faculty and Royal Institute staff

Rutgers University New Brunswick May 2018 - Aug 2018
REU Research Assistant *Professor Carlton Pryor*

- Improved proficiencies in Pandas, NumPy, SciPy, and other data analysis tools to support investigations of dwarf satellite galaxies
- Designed, implemented, and modified data pipeline for use with Gaia DR-2 data selections of dwarf satellite galaxies. Discovered small scale tidal tail around central core of dwarf satellite galaxy Carina using radial density measurements
- Prepared and presented progress reports to Pryor on a weekly basis. Prepared and delivered final presentation at summer research symposium and to professors and graduate students of the physics and astronomy department

Project P.A.N.O.P.T.E.S. Sep 2017 - Dec 2018
External Collaborator *James Synge (Google Cambridge)*

- Communicated between professors at Wheaton and outside collaborators to install, operate, and maintain autonomous exoplanet telescope inside Wheaton College observatory dome
- Aligned P.A.N.O.P.T.E.S. unit for observation according to polar-alignment procedure using hand tools
- Performed maintenance on the astronomy dome to ensure continuous observation of P.A.N.O.P.T.E.S.
- Modified existing dome control code for weather-automated and manual remote operation of telescope

Wheaton College Aug 2017-Dec 2018
Student astronomy projects *Professor Dipankar Maitra*

- 3D printed a mount for projection of sunlight on a 4.5" reflector telescope. Obtained and analyzed solar spectrum using a spectroscope. Observed spectral limb-reddening resulting from gas densities similar to the chromosphere. Authored report detailing methods, results, and analysis
- Retrieved archived photometry from V404 Cygni outburst event obtained at Wheaton College in June 2015. Analyzed data using Aperture Photometry Tool. Identified two outburst events on the night of June 27, separated by roughly one hour. Authored report detailing methods, results, and analysis
- Determined specifications of diffraction grating for use with DSLR camera. Obtained spectrum of Vega and Capella using grating and 30s exposure. Identified iron absorption features in both stars. Authored report detailing methods, results, and analysis
- Retrieved x-ray binary data taken by MAXI instrument. Implemented Lomb-Scargle periodogram techniques to derive orbital periods of four different x-ray binary systems. Derived slight differences in period of binary 2S 1417-624. Authored report detailing methods, results, and analysis

NASA Langley Research Center May 2017 - Aug 2017
Summer Intern *Dr. Brian Walsh*

- Designed, built, and operated a 2.1 & 1.06 μm pump source for proof of concept atmospheric-monitoring mid-infrared Lanthanide-LuAG laser
- Performed spectroscopy on resonator components using mid-infrared and optical spectrometers
- Programmed a model to determine resonator stability based on resonator dimensions and elements. Determined resonator quality through spectroscopic tests. Optimized resonator setup from outcomes of spectroscopic tests and model predictions

Wheaton College Dec 2016 - May 2017
Undergraduate Assistant *Professor John Collins*

- Built and designed multiple Nd:YAG laser setups, including soldering a new trigger circuit for a q-switch
- Determined threshold energies for spontaneous emission using different resonator specifications
- Exercised safe and appropriate use of voltmeters, oscilloscopes, and other electric and optical equipment

OUTREACH

Wheaton College Physics Department August 2018 - December 2019
Teaching Assistant *Norton, MA, USA*

- Increased engagement of Introductory Physics I & II students with in-class problems & labs through effective communication and classroom instruction
- Performed laboratory setup and breakdown for class of 40 students in accordance with schedule
- Communicated student comprehension of specific topics to professors in an effort to increase classroom participation

Wheaton College Physics Department August 2018 - December 2018
Physics Tutor *Norton, MA, USA*

- Assisted intermediate physics students with problem sets, conceptual questions, and exam preparation during regular tutoring hours
- Increased engagement with struggling students by meeting outside of regular tutoring hours, communicated deficiencies to professors to optimize the classwork plan
- Participated in tutor development meetings to enhance instruction and communication skills

Wheaton College Astronomy Department August 2016 - May 2020
Observatory Guide *Norton, MA, USA*

- Showcased features of different telescopes to local tour groups at Wheaton College Observatory
- Operate and adjust telescopes to show appropriate stars, objects, and events based on weather and sky conditions
- Educated young children and adults in locating objects, as well as providing general knowledge about the objects on display

COURSEWORK

Astronomy
- ⋆ The Universe
- ⋆ Rocket Science
- ⋆ Intro to Astrophysics
- ⋆ Observational Astronomy
- ⋆ Interstellar Physics (UCL)
- ⋆ Physical Cosmology (UCL)

Physics
- ⋆ Classical Mechanics
- ⋆ Statistical Mechanics
- ⋆ Group Project (UCL)
- ⋆ Electricity & Magnetism
- ⋆ Quantum Mechanics
- ⋆ Fluid Mechanics

Math and CS
- ⋆ Robots, Games, & Problem Solving
- ⋆ Differential Equations
- ⋆ Multivariable Calculus
- ⋆ Scientific Computing
- ⋆ Data Structures
- ⋆ Linear Algebra

PRESENTATIONS

Poster Presentations

- Rutgers satellite galaxy research at Rutgers summer research symposium in August 2018
- Rutgers satellite galaxy research at 234th meeting of the American Astronomical Society in June 2019
- Project P.A.N.O.P.T.E.S. instrumentation at Northeast Astronomy Forum in April 2018

Oral Presentations

- Honors thesis defense to peers and faculty of Wheaton College and University College London in May 2020
- Rutgers satellite galaxy research to Wheaton College physics department in September 2018
- Rutgers satellite galaxy research to Rutgers University physics and astronomy department in August 2018