John "Jack" P. McGuire

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EDUCATION

Georgia State University, Atlanta, GA

- **Bachelor of Science in Physics** *Expected May 2026*
Institutional GPA: 3.82 Overall GPA: 3.73

- **Associate of Science in Physics** *Graduated with High Honors in May 2024*
Institutional GPA: 3.80 Overall GPA: 3.70

Honors: Global Scholar, Perimeter STAR Award in Physics, Dean's List (4x), President's List (x2)

SKILLS & INTERESTS

Technical: Python (NumPy, MatPlotLib, AstroPy, Astroquery, Specutils, Lightkurve), HTML, TOPCAT, LaTeX, MIST Isochrone & Mass Track Modeling, Arduino, geant4, LabVIEW, MacOS, Windows, Linux
Professional Interests: Observational & Theoretical Astrophysics Research, Space Exploration, Astrobiology, Science Communication, Physics & Astronomy Education, Product Design & Marketing
Professional Affiliations: Sigma Pi Sigma, Society for Physics Students

PUBLICATIONS & PRESENTATIONS

- **Broad-band Monitoring of 797 Montana.** *Minor Planet Bulletin*, pp. 207–208. *Bentz, Misty C., ..., McGuire, J.P., et al.* (2025).
- **Where Are the K & M Barium Dwarfs? Potential Answers in the 40 Eri System**, Undergraduate Research Symposium Presentation on August 7th, 2025.
- **AGB Post-Mass-Transfer Spectroscopic Ratios as WD tracers** poster presented at Georgia Regional Astronomy Meeting at Emory University, November 7th & 8th 2025.

OBSERVING EXPERIENCE

Observation with Center for High Angular Resolution Astronomy (CHARA) Array *November 2025*
Planned and lead 6 telescope interferometric observations with PI Becky Flores on 11/06/25 & 11/08/25 after reducing four nights of data in 2023 and 2024. Used two infrared instruments: MIRC-X (H-band) and MYSTIC (K-band) to observe M-dwarfs in binary systems to measure their angular diameters after reduction of light patterns and modeling visibility curves. Results are in preparation for publication and I will be **co-author on Becky Flores' paper** investigating radial inflation of M-dwarfs.

Binary Asteroid System Observations – Hard Labor Creek Observatory (HLCO) *February 2025*
Conducted photometric observations of binary system (757 Montana) for three nights in February on the 24" Miller telescope at HLCO. Operated telescope to carry out measurements and reduced photometric data using IRAF and IDL. Final results of period and amplitude led to a publication in the Minor Planet Bulletin.

RESEARCH EXPERIENCE

Raghavan Fellow - GSU USRP (Mentor: Dr. Russel White) *Summer & Fall 2025*
Investigated stellar mass transfer within the spectroscopically confirmed barium dwarfs by analyzing orbital separations, stellar parameters with Gaia DR3 data. Collaborated with Dr. Gray of Appalachian State to receive a null result in s-process abundance spectral analysis on GJ 166 C. Further investigations on local K+M WD+MS binaries will search for barium within the primaries. Reduced and modeled interferometric data from the CHARA array for GJ 166 A (K-type) and GJ 166 C (M4.5v). Utilized the reduction pipeline to calculate best-fit uniform-disk & limb-darkened diameters while documenting systematic errors. This experience continued into Fall 2025 & will continue until May 2026 as a student research assistant. The fall consisted of CHARA observations of binary systems <25 pc, evolutionarily splitting the sample of the 71 Ba Dwarf using isochrone models and investigations into broader AGB post-mass-transfer system types (CEMP-s, CH, and Ba stars).

Cosmic Ray Detector Assembly & Global Network Study of Muon Flux during Tidal Cycles (Mentor: Dr. Xiaochun He) *Spring & Fall 2025*
Performing statistical analysis of global muon detector data to correlate tidal cycles (high, low, spring, neap) with modulations in secondary cosmic ray flux on Earth's surface utilizing Dr. He's gLOWCOST muon detector network data which has been acquired nonstop from 2022 until the present. Assembled cosmic ray detectors in the gLOWCOST global muon detector network using aluminum framing and Raspberry Pi systems as an undergraduate research lab assistant. The goal is to monitor cosmic ray data around the world and scientific outreach, bringing detectors and lectures into primary & secondary schools, as well as universities globally.

PROFESSIONAL EXPERIENCE

Vertigo Pinball, LLC – Startup Consultant and Manager *Dec 2020 – Present*
- Spearheaded research on the "barcade" industry & developed a concept to integrate the pinball & craft beer scenes. Created profit-and-loss projections, selected the arcade machine lineup, and designed the physical layout.
- Founded and managed the Georgia Pinball Museum initiative, curating interactive exhibits that served hundreds of guests daily during summer 2023 and 2024.
- Led the creation of Blue Ridge Gourmet Popcorn: overseeing popping, production and packaging as well as developing new specialty flavors. Summer 2024 through Present.

British Swim School – Swim Instructor & Substitute *Spring 2022 – Present*
Taught private and group swim lessons for all ages, infants to elderly, focusing on safety and technique. Worked with client to train towards goals of their choosing and provided 'push goals' as well as motivation to achieve them. Returned in Winter 2024 & Winter 2025 as a substitute to support staff during shortages.

Huntcliff Club – Assistant Head Swim Coach *Summer 2016 – Summer 2021*
Introduced swimmers 4–18 to competitive swimming skills, bolstered competitive spirit, and promoted strong work ethic among the team. Utilized TeamUnify to create most effective lineups for each swim meet.

Camp-Run-A-Mutt *Spring 2020 – Spring 2022*
Worked to care for 5–25 dogs at a time at a daily/overnight cage-less dog boarding facility. Maintained constant communication with staff in order to ensure the safety of each pet and to ensure a seamless return of the pet to the parent upon pick-up.

LEADERSHIP & ACTIVITIES

Eagle Scout, Boy Scouts of America Troop 463 *Aug 2020 – Present*
Achieved Eagle Scout rank through dedication to merit badges and extensive community service.
Eagle Project: Planned and executed a landscape redesign for Mount Vernon Presbyterian Church, managing the installation of hundreds of grass bundles and three Japanese Maple Trees.

G.S.U. Perimeter SPACE Club – Secretary *Fall 2022 – Spring 2024*
Coordinated science outreach events for elementary schools, using physics simulations and VR demos of ISS experiments and operations to bring the joy of space science to students. Recorded club meetings and communications within the club for event logistics.

Rotary International Club – Secretary of Service *2017 – 2020*
Managed weekly meeting agendas to ensure productivity and focus. Planned and led service projects including tree planting at Big Trees Forest Preserve, support for PAWs Atlanta, and monthly veteran letter-writing workshops.

International Thespian Society – Secretary, Capstone Director *2018 – 2020*
After performing in 25+ plays & musicals at Mount Vernon throughout middle and high school, I was inducted to the International Thespian Society. Led our senior class' Capstone Project, overseeing all production aspects from scriptwriting and costume design to programming lighting/sound cues.

Varsity Swim Team Captain, Mount Vernon *2017 – 2020*
Voted captain for junior and senior seasons; led the team to the school's first two 1A class state championships (2018-19, 2019-2020 seasons).