

# Peter A. Craig

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## CONTACT INFORMATION

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## RESEARCH INTERESTS

**Multiwavelength Observations of Classical, Recurrent, and Symbiotic Novae:** shocks and dust formation in novae, Type Ia SN progenitors, the potential and structure of the Milky Way, dark matter substructure, gravitational lensing, and the Hubble tension.

## PROFESSIONAL EXPERIENCE

- Postdoctoral Researcher at Michigan State University, East Lansing, MI
  - Multiwavelength observations of classical novae 09/2023 to present
  - Working with Dr. Laura Chomiuk and Dr. Elias Aydi
  - Includes experience taking spectra with the SOAR Telescope

## EDUCATION

### Rochester Institute of Technology, Rochester, NY

Ph.D., Astrophysical Sciences and Technology, August 2023

- Thesis Title: “*Examining the Universe with Galaxies: From Dynamical Models to the Inference of Cosmological Parameters*”
- Adviser: Dr. Sukanya Chakrabarti

M.S., Astrophysical Sciences and Technology, July 2020

- Thesis Title: “*Galaxies as Probes of the Universe: From Dynamical Models to the Inference of Cosmological Parameters*”
- Adviser: Dr. Sukanya Chakrabarti
- GPA: 4.0

### Rensselaer Polytechnic Institute, Troy, NY

B.S., Physics and Mathematics, June 2018

- *Summa cum Laude* Dual Major in Physics and Mathematics
- GPA: 3.93

## PUBLICATION LIST

- [1] Aydi, E., Monnier, J., Mérand, A., ..., **Craig, P.** et al. Multiple outflows and delayed ejections revealed by early imaging of novae, *Nature Astronomy*
- [2] Chakrabarti, S., Chang, P., Profumo, S., **Craig, P.** Constraints on a dark matter sub-halo near the Sun from pulsar timing, Accepted by *Physical Review Letters*
- [3] Frincke, T., Yaginuma, A., Noonan, J., Hsieh, H., Seligman, D., Holt, C., Strader, J., Do, T., **Craig, P.**, Molina, I. Near-Discovery SOAR Photometry of the Third Interstellar Object: 3I/ATLAS, Submitted to *Monthly Notices of the Royal Astronomical Society* 2025

- [4] **Craig, P.**, Aydi, E., Chomiuk, L., et al. What determines the  $\gamma$  – ray luminosities of classical novae?, Accepted by *Monthly Notices of the Royal Astronomical Society* 2025
- [5] **Craig, P.**, Chakrabarti, S. et al. A map of the outer gas disk of the Galaxy with direct distances from young stars, *The Astrophysical Journal* 2025
- [6] **Craig, P.**, Aydi, E., Chomiuk, L., et al. Revisiting the Classics: On the Optical Colours of Novae as Standard Crayons, *Monthly Notices of the Royal Astronomical Society* 2025
- [7] Kyer, R., Subhroja, R., Strader, J., Urquhart, R., Molina, I., **Craig, P.**, Chomiuk, L., Multiwavelength Evidence for Two New Candidate Transitional Millisecond Pulsars in the Sub-luminous Disk State: 4FGL J0639.1–8009 and 4FGL J1824.2+1231, Accepted by *The Astrophysical Journal* 2025
- [8] Chong, A., Aydi, E., **Craig, P.**, et al. Revisiting the Classics: On the Statistics of Dust Formation in Novae *Monthly Notices of the Royal Astronomical Society* 2025
- [9] **Craig, P.**, O'Connor, K., Chakrabarti, S. et al. A targeted search for strongly lensed supernovae and expectations for targeted searches in the Rubin era, *Monthly Notices of the Royal Astronomical Society* 2024
- [10] Molina, I., Chomiuk, L., Linford, J., Aydi, E., Mioduszewski, A., Mukai, K., Sokolovsky, K., Strader, J., **Craig, P.**, et al. The symbiotic recurrent nova V745 Sco at radio wavelengths *Monthly Notices of the Royal Astronomical Society* 2024
- [11] Chakrabarti, S., Simon, J., **Craig, P.** et al. A non-interacting Galactic black hole candidate in a binary system with a main-sequence star, *AAS Journals* 2023
- [12] **Craig, P.**, Chakrabarti, S., Sanderson, R., Nikakhtar, F. Building an Acceleration Ladder with Tidal Streams and Pulsar Timing, *The Astrophysical Journal Letters* 2023
- [13] **Craig, P.**, Chakrabarti, S., Baum, S., and Lewis, B. An estimate of the mass of the Milky Way from the Magellanic Stream, *Monthly Notices of the Royal Astronomical Society* 2022
- [14] **Craig, P.**, Chakrabarti, S., Newberg, H., and Quillen, A. Dynamically produced moving groups in interacting simulations, *Monthly Notices of the Royal Astronomical Society* 2021
- [15] Chakrabarti, S., Wright, J., Chang, P., Quillen, A., **Craig, P.** et al. Toward a Direct Measure of the Galactic Acceleration, *The Astrophysical Journal Letters* 2020
- [16] Gaspard, M., **Craig, P.**, Bergland, E., An Integro-Differential Model of Language Competition, SIAM Undergraduate Research Online, 12, 94-104, 2019

INVITED TALKS	<p>[1] <b>Craig, P.</b>, Aydi, E., et al. Spectroscopic Evolution of Classical Novae In: <i>Golden Age of Cataclysmic Variables and Related Objects VII</i>, Sept 3–6, 2025, Mondello, IT</p> <p>[2] <b>Craig, P.</b>, Aydi, E., Chomiuk L., et al. What determines the <math>\gamma</math>-ray luminosities of classical novae? In: <i>Golden Age of Cataclysmic Variables and Related Objects VII</i>, Sept 3–6, 2025, Mondello, IT</p>
CONFERENCE TALKS	<p>[1] <b>Craig, P.</b>, Aydi, E., Chomiuk, L., et al. On the Optical Colours of Novae as Standard Crayons In: <i>Symbiotic stars, weird novae, and related embarrassing binaries</i>, June 3–7, 2024, Prague CZ</p> <p>[2] <b>Craig, P.</b>, Chakrabarti, S., Sanderson, R., Nikhathar, F., Reino, S. Building an Acceleration Ladder with Tidal Streams and Pulsar Timing. In: <i>Towards Real-Time Galactic Dynamics</i>, July 25–29 2022. Lorentz Center, Leiden, NL</p> <p>[3] <b>Craig, P.</b>, Chakrabarti, S., Sanderson, R., Nikhathar, F., Reino, S. Building an Acceleration Ladder with Tidal Streams and Pulsar Timing. In: <i>AAS Division on Dynamical Astronomy meeting #53</i>, April 25–28, 2022. Flatiron Institute, New York, NY</p> <p>[4] <b>Craig, P.</b>, Newberg, H., Chakrabarti, S. Do Perturbations from Dwarf Galaxies Produce Moving Groups in the Milky Way Disk? In: <i>KITP Program Dynamical Models for Stars and Gas in Galaxies in the Gaia Era</i>, March 4–18, 2019. Santa Barbara, CA, USA.</p>
SUCCESSFUL PROPOSALS	<p>[1] Science PI, “Comparison of Gamma-Ray and Supersoft X-ray Emission in Nova Eruptions”, Fermi Proposal, Accepted by science committee – current status is uncertain due to program budget uncertainty; Anticipated award of \$80,000, 2025</p> <p>[2] Co-Principal Investigator, “Fundamental Galactic parameters from Direct Acceleration Measurements”, VLT/ESPRESSO 2021, Awarded 35 hours</p> <p>[3] Co-Principal Investigator, “Lensed Supernovae at Low Redshift”, LCO Proposal 2019, Awarded 100 hours</p> <p>[4] Co-Principal Investigator, “Lensed Supernovae at Low Redshift”, LCO Proposal 2019, Awarded 205 hours</p> <p>[5] Co-Principal Investigator, “Lensed Supernovae at Low Redshift”, LCO Proposal 2018, Awarded 200 hours</p>
STUDENT MENTORING	<ul style="list-style-type: none"> <li>• Advised summer research projects for PAREDS students 2024, 2025</li> <li>• Mentored undergraduates as part of an REU program 2022, 2023</li> </ul>

AWARDS	<ul style="list-style-type: none"> <li>• 1-year DOE Office of Science Graduate Student Research (SCGSR) Program at Lawrence Berkeley National Laboratory 09/2021 - 09/2022</li> <li>• Inducted into the Phi Kappa Phi honor society 2021</li> <li>• RPI Founders award 2017</li> </ul>
TEACHING EXPERIENCE	<p><b>Rochester Institute of Technology</b>, Rochester, NY</p> <p>Teaching Assistant 08/2018 - 05/2019</p> <ul style="list-style-type: none"> <li>• Introduction to Special Relativity</li> <li>• Electricity and Magnetism</li> </ul> <p><b>Rensselaer Polytechnic Institute</b>, Troy, NY</p> <p>Tutoring 08/2016 - 05/2018</p> <ul style="list-style-type: none"> <li>• RPI drop-in tutoring for differential equations and multivariable calculus</li> </ul> <p><b>Rochester Chess Center, Rochester NY</b></p> <p>Chess Teaching 08/2018 - 03/2020</p> <ul style="list-style-type: none"> <li>• Taught chess to young students at local elementary schools</li> </ul>
PROGRAMMING SKILLS	<p>Programming Languages and Analysis Techniques</p> <ul style="list-style-type: none"> <li>• Python, Fortran, C, SQL/ADQL</li> <li>• Experienced with data analysis and MCMC methods</li> <li>• Image analysis, difference imaging, and algorithm development</li> <li>• Data reduction with IRAF</li> <li>• Analyzing multi-wavelength data</li> </ul>
OUTREACH AND LEADERSHIP	<ul style="list-style-type: none"> <li>• American Association of Variable Star Observers (AAVSO) board member           <ul style="list-style-type: none"> <li>• Appointed position, 12/2025 - 12/2026</li> </ul> </li> <li>• Public Observing at the MSU Observatory 2023 - Present</li> <li>• Presented at Astronomy on Tap in Lansing 2025</li> <li>• Star parties in the Adirondacks and at an independent school 2020 - 2022</li> <li>• Designed astronomy demos and presented at Imagine RIT 2019</li> <li>• Rensselaer Astrophysical Society President / Vice President 2016 - 2018</li> <li>• Outreach Coordinator for the RPI Society of Physics Students 2016</li> </ul>