CONTACT INFORMATION	Institution: Michigan State University Email: kochocki@msu.edu Website: https://user-web.icecube.wisc.edu/~akochocki/		
RESEARCH INTERESTS	• Characterization of the disk-jet system in astrophysical sources.		
	• Cosmic-ray acceleration, multimessenger emission from active galactic nuclei (AGN) and X-ray binaries.		
	• The impact of active galactic nuclei on their environments.		
EDUCATION	<b>Michigan State University</b> Doctor of Philosophy in Physics (intended). GPA: 3.888	September 2021 - January 2026	
	<b>University of California, Los Angeles</b> Bachelor of Science in Physics. GPA: 3.893 Magna Cum Laude, Highest Departmental Honors	September 2017 - March 2021	
SELECTED PUBLICATIONS	• (In prep) The IceCube Collaboration. 2025 "Timing Resolution of	Tthe IceCube Upgrade mDOM".	
	• ( <i>In prep</i> ) Alina Kochocki, Sam Hori, Emma Kun. 2025 "Delayed Gamma-ray and Radio Flaring Ac- tivity in a Selection of Fermi LAT AGN".		
	• <i>(In prep)</i> Alina Kochocki and Xavier Rodrigues. 2025 "Leptohadronic Modeling of the Gamma-ray Flare and Delayed Radio Flare from TXS 0506+056".		
	• <i>(In prep)</i> Alina Kochocki and Xavier Rodrigues. 2025 "A Leptonic Jet Model for Delayed Radio Flares in Neutrino Blazars".		
	• ( <i>In prep</i> ) The IceCube Collaboration. 2025 "A Time-Dependent S Flaring X-ray Binaries".	Search for Neutrino Emission from	
	• ( <i>Paper under internal review, for submission to ApJ</i> ) The IceCube Collaboration and Atacama Cosmology Telescope. 2024 "A Search for Millimeter-Bright Blazars as Astrophysical Neutrino Sources".		
	• Alina Kochocki for the IceCube-Gen2 Collaboration. 2023 "Forecasted Sensitivity of IceCube-Gen2 to the Astrophysical Diffuse Spectrum". <i>PoS</i> , ECRS, 100		
	• Alina Kochocki, Volodymyr Takhistov, Alexander Kusenko and Nathan Whitehorn. 2021 "Contribution of Secondary Neutrinos from Line-of-Sight Cosmic Ray Interactions to the IceCube Diffuse Astrophysical Flux". <i>ApJ</i> , 914, p.91		
TALKS AND PRESENTATIONS	• ( <i>Invited</i> ) Northwestern CIERA Theory Seminar (Evanston, USA) Production in the Disk-Jet System."	– April 2025. Spoke on, "Neutrino	
	<ul> <li>(Invited) UCLA TEPAPP Seminar (Los Angeles, USA) – March Neutrino: Clues from the Inner-Hundred Parsecs."</li> </ul>	n 2025. Spoke on, "From Radio to	
	• American Physical Society Global Physics Summit (Anaheim, US ing Sense of Neutrino Bright Blazars."	SA) – March 2025. Spoke on, "Mak-	
	<ul> <li>(Invited) PACIFIC (Moorea, French Polynesia) – August 2024. Spoke on, "Flaring Signatures of Ice- Cube Blazar AGN."</li> </ul>		
	<ul> <li>(Invited) Turbulence in Astrophysical Environments (Santa Barba "A Multimessenger View of Acceleration in AGN Cores."</li> </ul>	nra, USA) – February 2024. Talk on,	

<ul> <li>Turbulence in the Universe (Santa Barbara, USA) – February 2024. Poster on, "Neutrino Production in Turbulent AGN Cores"</li> </ul>		
<ul> <li>TeV Particle Astrophysics (Napoli, Italy) – September 2023. Contribute Millimeter-Bright AGN as Astrophysical Neutrino Sources."</li> </ul>	ed talk on, "Investigating	
• 27th European Cosmic Ray Symposium (Nijmegen, the Netherlands) - July 2022. Oral presentation on the "Forecasted Sensitivity of IceCube-Gen2 to the Astrophysical Diffuse Spectrum."		
• 237th Meeting of the American Astronomical Society - January 2021. Spoke Explanations for the IceCube Diffuse Spectrum in Context of New Constra from AGN and Starburst Galaxy Populations."	on "Reevaluating Possible aints on the Neutrino Flux	
• UCLA Undergraduate Research Virtual Showcase - May 2020. Gave an ora the Acceleration Mechanisms Powering the Twelve Pulsar Wind Nebulae (	l presentation, "Modeling Observed by VERITAS."	
<ul> <li>UCLA Undergraduate Research Poster Fair - May 2019. Presented poster Spectral Analysis of Binary Gamma Ray Source HESS J0632+057 with VEI</li> </ul>	:, "A New Periodicity and RITAS."	
Michigan State University STEM Ambassador, STEMAP National Science Foundation GRFP – Honorable Mention University Distinguished Fellowship, Michigan State University College of Natural Science Fellowship, Michigan State University Recruiting Fellowship, Michigan State University USRA Distinguished Undergraduate Award - Honorable Mention Honors Summer Research Stipend Award, UCLA College Honors Frederick R. Waingrow Peterson Publishing Company Scholarship Invited Member of UCLA College Honors Program	February 2023 April 2022 August 2021 August 2021 August 2021 August 2020 June 2020 April 2019 April 2017	
<ul> <li>University Distinguished Fellow</li> <li>Advised by Nathan Whitehorn, Michigan State University.</li> <li>Exploring the spatial origin of neutrino and gamma-ray blazar AGN flar multiwavelength data (Fermi-LAT, RATAN-600) and VLBI morphologica for a population of over 100 blazar jets. The analysis will test the impact on plasma potentially loaded into the jet at distances within the photon-de analysis will also quantify the prevalence of 'gamma-radio-delayed' flares, activity follows a gamma-ray flaring state, likely linked to particle loading</li> <li>Developed a novel, time-evolving, leptonic jet model to explain the multi (from initial, heightened gamma-ray activity) observed from the two morphight blazars, TXS 0506+056 and PKS 1424+240. Model tracks the evolu loaded at the jet base (gamma-ray flare) and eventual shock or interaction tron plasma at ~20 pc-scales (subsequent radio flare). Extension to a lep provide a successful explanation and spatial origin for radio, gamma-ray ar</li> <li>Searching for neutrino emission from X-ray microquasars through time-det their soft and hard X-ray and gamma-ray activity (MAXI, Swift, Fermi-L/likely jet activity and stages of accretion disk hysteresis.</li> <li>Performed a correlation between a first catalog of millimeter-wavelength the Atacama Cosmology Telescope and IceCube data. Unabsorbed millim is expected to well-trace particle loading at the jet base.</li> <li>Developed a new analysis to utilize the morphology of conventional and trino interactions within a study of the all-sky IceCube diffuse flux. The un deposition of both the cosmic-ray muon bundle and cascade-like neutrino prove sensitivity to the atmospheric neutrino spectrum.</li> </ul>	August 2021 - present res with a combination of l observations (MOJAVE) of gamma-ray absorption nse broad line region. The in which increased radio at the jet base. i-year delayed radio flares ost prominent, neutrino- ution of material initially n with an additional elec- tohadronic jet model can nd neutrino observations. pendent correlations with AT). Analysis probes both a blazar light curves from atter-wavelength emission prompt atmospheric neu- ique, coincident radiative interaction is used to im-	
	<ul> <li>Turbulence in the Universe (Santa Barbara, USA) – February 2024. Poster in Turbulent AGN Cores"</li> <li>TeV Particle Astrophysics (Napoli, Italy) – September 2023. Contribute Millimeter-Bright AGN as Astrophysical Neutrino Sources."</li> <li>27th European Cosmic Ray Symposium (Nijmegen, the Netherlands) - Jul on the "Forecasted Sensitivity of IceCube-Gen2 to the Astrophysical Diffu 237th Meeting of the American Astronomical Society - January 2021. Spoke Explanations for the IceCube Diffuse Spectrum in Context of New Constration AGN and Starburst Galaxy Populations."</li> <li>UCLA Undergraduate Research Virtual Showcase - May 2020. Gave an ora the Acceleration Mechanisms Powering the Twelve Pulsar Wind Nebulae 6</li> <li>UCLA Undergraduate Research Poster Fair - May 2019. Presented poster Spectral Analysis of Binary Gamma Ray Source HESS J0632-057 with VED Michigan State University STEM Ambassador, STEMAP National Science Foundation GRFP – Honorable Mention University Distinguished Fellowship, Michigan State University College of Natural Science Fellowship, Michigan State University USRA Distinguished Undergraduate Award - Honorable Mention Honors Summer Research Stipend Award, UCLA College Honors Frederick R. Waingrow Peterson Publishing Company Scholarship Invited Member of UCLA College Honors Program</li> <li>University Distinguished Fellow</li> <li>Advised by Nathan Whitehorn, Michigan State University.</li> <li>Exploring the spatial origin of neutrino and gamma-ray blazar AGN flar multiwavelength data (Fermi-LAT, RATAN-600) and VLBI morphologica for a population of over 100 blazar jets. The analysis will est the impact on plasma areay flaring state, likely linked to particle loading for a population of over 100 blazar jets. The analysis will est the impact on plasma areay flaring state, likely linked to particle loading for a population of over 100 blazar jets. The analysis will est the impact on plasma areay flaring state, likely linked to particle loading tor popu</li></ul>	

- Oversaw commissioning of the IceCube Upgrade mDOM optical module (MSU production lot) optical and environmental testing – 2M USD in sensor hardware. Leading first studies of sensor timing resolution.
- Forecasted IceCube-Gen2 diffuse sensitivity with track and cascade-like event selections. Involvement was a continuation of detector performance studies completed at UCLA.

# Undergraduate Research Scholar

## Advised by Alexander Kusenko, University of California, Los Angeles.

- Developed an analysis to test the presence of an exotic, heavy dark matter candidate particle with IceCube data. Project was funded by the UCLA Undergraduate Research Center (UCLA-URC).
- Completed a search for IceCube emission correlated with AGN and starburst galaxy populations, assuming secondary neutrino production from intermediate cosmic-ray interactions with extragalactic background light. Work was jointly advised by Nathan Whitehorn.

## Undergraduate Research Scholar

# Advised by Rene Ong, University of California, Los Angeles.

• Carried out a study of 14 VERITAS (Very Energetic Radiation Imaging Telescope Array System) candidate pulsar wind nebulae. Performed radiative modeling of their associated spectral energy distributions and numerical simulation of dynamical evolution. Funded by UCLA-URC.

# Undergraduate Research Fellow

# Advised by Rene Ong, University of California, Los Angeles.

- Analysis and periodicity study of ten years of HESS J0632+057 VERITAS observations, a compact object of unknown nature in orbit with a Be-class star.
- Preliminary analysis of PSR J2032+4127.

## Undergraduate Research Assistant

# Advised by Rene Ong, University of California, Los Angeles.

- Study of multiple revisions to the custom SiPM-preamplifier to be used onboard GAPS (General Anti-Particle Spectrometer) time-of-flight system.
- Designed, and debugged a new lab testing bed to automate the testing of 400+ preamplifier/SiPM (silicon photomultiplier) components. Machined custom parts. Wrote procedures for tests and produced the necessary analysis pipeline.

# Summer Undergraduate Research Student

# Advised by Rene Ong, University of California, Los Angeles.

• Tested gain linearity of \$13360 series SiPMs with custom preamplifier boards for GAPS. Produced original analysis scripts to identify and address varying sources of unexpected noise, greatly improving single photoelectron resolution, gain calculations, and general understanding of the device. A writeup of these results was shared with the device's principle engineers (Hamamatsu).

TECHNICAL	Programming Languages: C, C++, Python, Bash, Perl.	
SKILLS	High-Level Languages: Mathematica, SOLIDWORKS.	
	Relevant Software: XGBoost, TensorFlow, Pythia, Geant4, ROOT, Arduino, SCPI.	
	Analysis Packages: IceTray (high-energy neutrino and cosmic-ray data processing), VEGAS (IACT	
	gamma-ray data processing), Fermitools.	
	Distributed Computing: TORQUE, Sun Grid Engine, Slurm, HTCondor.	
	Communication: GitHub, LaTeX, Overleaf, Wiki Markup, Microsoft Office, Google Apps.	
	Backend/Frontend Development: JAVA, HTML, CSS.	

SERVICE MSU Physics Graduate Organization President President of the MSU Physics Graduate Organization. Involvement in departmental advisory. Supported student-organized services and representatives. Assisted departmental leadership in commu-

# August 2020 - August 2021

August 2019 - August 2020

December 2018 - August 2019

December 2018 - August 2020

December 2018 - August 2019

July 2024 - present

nicating effectively with the student body during periods of funding instability and policy changes. Provided students with resources during periods of instability.

#### IceCube Neutrino-Sources Technical Lead

Technical lead for the IceCube Collaboration Neutrino-Sources (astrophysics) working group. Oversee software reviews for analyses, provide assistance with software, likelihood implementation, data and computing resources.

March 2024 - present

July 2023 - December 2024

### Graduate Colloquium Committee Representative July 2023 - October 2024

Organized and hosted student-postdoctoral lunches with visiting colloquium speakers. Worked with local colloquium committee to improve departmental colloquium experience and attendance.

#### **HEP Social Organization**

Hosted socials and happy hours for the high-energy physics group at MSU.

# OUTREACHAstronomy on Tap,"IceCube and Astrophysical Neutrinos"July 2024

Invited to speak on IceCube and neutrino astrophysics for a public audience in East Lansing, Michigan.

Outreach Activity, "Academic Research and Community with IceCube" January 2023 Developed an outreach event for high school students at St. Catherine of Siena Academy (Wixom, MI) interested in physics, astronomy and computer science. Presented on my own work with IceCube, entering science and academia, and led a guided discussion with small groups to consider the lifestyle of a researcher, bridging potential misconceptions held about STEM education and careers.

# STEM Ambassador ProgramSeptember 2022 - February 2023Accepted into the 2022 cohort of the NSF-supported STEM Ambassador Program (STEMAP). At-<br/>tended a set of regular workshops to learn best practices for outreach and in building community trust<br/>in science. Developed and carried out a novel outreach activity.

# UCLA Exploring Your Universe (EYU) Science FairNovember 2018, 2020Presenter at UCLA's Exploring Your Universe fair. Helped manage organization of the 2020 cosmologyand astroparticle physics virtual booth. Explored aspects of astroparticle physics experimentation anddetection with participants of all ages and backgrounds.

Head Telescope Operator, UCLA Public Viewing NightsSeptember 2017 - February 2019Organized weekly shows, presented scientific background to audiences, and mentored club members.

# TEACHINGElementary Particle Physics LaboratorySeptember 2020 - December 2020EXPERIENCEA cosmic-ray detector is simulated and built from a photomultiplier tube and scintillator. Contributed<br/>to development of the virtual course syllabus structure and content. Responsible for creation and over-<br/>sight of the simulation component of this course; produced a cookbook for the construction of opti-<br/>cal physics simulations catered towards students with minimal background in experimental particle<br/>physics. Produced original Python analysis and Geant4 simulation tutorials presented in class.

# SELECTEDISAPP 2023: Neutrino Physics, Astrophysics and Cosmology (Varenna, Italy)GRADUATEExtragalactic AstrophysicsCOURSEWORKRadiative AstrophysicsSpecial Topics in High-Energy Physics – Collider Phenomenology<br/>Quantum Field Theory<br/>Modeling Environmental and Social Systems

LANGUAGESEnglish – NativeSpanish – Limited working proficiency (five years of classroom study)German – Elementary proficiency (one year of classroom study)