

# Milena CRNOGORČEVIĆ

## PhD Candidate | Astronomy

Pronouns: she/her/hers

@ [mcrnogor@umd.edu](mailto:mcrnogor@umd.edu)

📍 ATL 1259 University of Maryland, College Park, MD 20742

🔗 [mcrnogor.github.io](https://mcrnogor.github.io) in [milena-crnogorčević](#)

Identifiers: 🆔 0000-0002-7604-1779, INSPIRE HEP: [M.Crnogorcevic.1](#), NASA/ADS

## 🔍 RESEARCH INTERESTS

- Axion-like particles in high-energy astrophysical environments: observational signatures and indirect searches
- $\gamma$ -ray instrumentation: sensitivity to indirect dark matter searches with the current and future instruments
- Precursor emission in gamma-ray bursts
- Multimessenger astronomy: searches for coincident electromagnetic and gravitational-wave or astrophysical neutrino emission to understand the origin and relevant production mechanisms

## 🎓 EDUCATION

- exp. April 2023 **Doctor of Philosophy, University of Maryland**, Department of Astronomy
- Thesis Title: *New Messengers & New Physics: A Survey of the High-energy Universe*
  - Thesis Committee: Dr. R. Caputo (NASA/GSFC)<sup>1</sup>, Prof. M. Meyer (Univ. of Hamburg), Prof. M. Ricotti (Univ. of Maryland), Prof. C. Miller (Univ. of Maryland), Prof. C. Reynolds (Univ. of Cambridge)
- 2019 **Master of Science, University of Maryland**, Department of Astronomy
- Thesis Title: *Axion-like Particles and Where to Find Them: Searching for ALP-induced Core-collapse Supernovae with Fermi*
- 2017 **Bachelor of Arts, Middlebury College**, major in physics and minor in mathematics
- Honors Thesis: *Probing into quasar/galaxy co-evolution using the OSIRIS data*
  - *magna cum laude* with high honors
- 2013 **Bi-lingual International Baccalaureate Diploma**, Li Po Chun United World College of Hong Kong

## 🧳 RESEARCH EXPERIENCE

- April 2018 **University of Maryland & NASA Goddard Space Flight Center,**  
now **Research Assistant to Dr. R. Caputo**
- Member of the *Fermi*-LAT Collaboration. Affiliated with the *Fermi*-GBM and *Swift*-BAT Teams.
- September 2016 **Department of Physics, Middlebury College,**  
May 2017 **Research Assistant to Prof. E. Glikman, *honors thesis***
- Investigating the co-evolution of post-merger galaxies and dust-redenned quasars using integral-field spectrography.
- May 2016 **Department of Physics, Middlebury College,**  
August 2016 **Research Assistant to Prof. N. Graham**
- Computing edge-correction coefficients to the proximity force approximation for the Casimir energy of an oblate spheroid facing a plane.
- May 2015 **Department of Physics, Middlebury College,**  
August 2015 **Research Assistant to Prof. E. Glikman**
- Spectral analysis of red and obscured quasars in SDSS Stripe 82.

<sup>1</sup>Primary advisor noted in italic

- 2022 Fermi GI Program Cycle 15: Principal Investigator (\$50k)  
*Light at the end of the Tunnel: Search for ALP dark matter in precursor emission of long GRBs*
- 2022 **Andrew S. Wilson Prize** for Excellence in Research, Department of Astronomy, University of Maryland
- 2022 **Department Service Award**, Department of Astronomy, University of Maryland  
*Honoring exceptional contributions to the department through service.*
- 2022 **Best Poster Award: The High Energy Astrophysics Division (HEAD)**, 19th Divisional Meeting of HEAD
- 2022 **Outstanding Graduate Research Assistant Award**, University of Maryland  
*Recognized as among the top 2% Graduate Assistants in a given year at the University of Maryland.*
- 2021 **Award for the best talk promotion video**, Kashiwa Dark Matter Symposium
- 2021 Price Prize nomination, Center for Cosmology and Astroparticle Physics at The Ohio State University
- 2020 John Mather Nobel Scholar (\$3k)
- 2019–20 College of Computer, Mathematical, and Natural Sciences Dean’s Fellowship (\$5k)
- 2017–18 Graduate School Dean’s Fellowship (\$10k)
- 2013–17 Davis UWC Scholar (\$20k per annum)
- 2011–13 Li Po Chun UWC, full merit-based scholarship (\$30k per annum)
- 2009 Junior Balkan Mathematical Olympiad, bronze medal

## PUBLICATIONS

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### First and second author:

3. C. Fletcher et. al on behalf of the Fermi-GBM Team; **M. Crnogorčević** et al. on behalf of the Swift-BAT Team, and the LVK Collaboration, (under LVK Collaboration review)  
*A Joint Fermi-GBM and Swift-BAT Analysis of Gravitational-Wave Events from the GWTC-3 Catalog\**<sup>2</sup>
2. M. Negro, **M. Crnogorčević**, E. Burns, E. Charles, K. Feng, and R. Caputo, submitted to *ApJ*, February 2023.  
*Search for spatial correlation between IceCube neutrino events and the Fermi-LAT unresolved gamma-ray sky\**
1. **M. Crnogorčević**, R. Caputo, M. Meyer, N. Omodei, and M. Gustafsson, 2021, *Phys. Rev. D.*, 104, 103001  
*Searching for Axion-like Particles from Core-Collapse Supernovae with Fermi LAT’s Low Energy Technique\**

### Currently working on:

2. **M. Crnogorčević**, M. Meyer, N. Omodei, and R. Caputo, in prep. (to be submitted in <2 months)  
*Long-GRB precursor emission: a comprehensive search for ALP signatures during precursor activity with Fermi-LAT Low Energy Technique*
1. **M. Crnogorčević**, M. Meyer, and R. Caputo, in prep. (to be submitted in <6 months)  
*Constraining Axion-like Particle properties with the Fermi Large Area Telescope observations of the near-by Gamma-ray Bursts*

### N-th author:

8. M. Ajello and 100 co-authors, incl. **M. Crnogorčević**, 2022, [arXiv:2209.12070]  
*The Fourth Catalog of Active Galactic Nuclei Detected by the Fermi Large Area Telescope—Data Release 3*
7. S. Abdollahi and 118 co-authors, incl. **M. Crnogorčević**, 2022, *ApJ*, 933, 204  
*Search for New Cosmic-Ray Acceleration Sites within the 4FGL Catalog Galactic Plane Sources*
6. Y. Liu and 132 co-authors, incl. **M. Crnogorčević**, 2022, *Science*, 376, 521-523  
*A gamma-ray pulsar timing array constrains the nanohertz gravitational wave background*
5. S. Abdollahi and 139 co-authors, incl. **M. Crnogorčević**, 2022, *ApJS*, 260, 53  
*Incremental Fermi Large Area Telescope Fourth Source Catalog*
4. I. Mereu and 114 co-authors, incl. **M. Crnogorčević**, 2021, *ApJS*, 256, 13  
*Catalog of Long-Term Transient Sources in the First 10 Years of Fermi-LAT Data*
3. M. Ajello and 108 co-authors, incl. **M. Crnogorčević**, 2021, *Nature Astronomy*, 5, 385-391  
*High-energy emission from a magnetar giant flare in the Sculptor galaxy*
2. M. Ajello and 123 co-authors, incl. **M. Crnogorčević**, 2019, *ApJ*, 878, 52  
*A Decade of Gamma-Ray Bursts Observed by Fermi-LAT: The Second GRB Catalog*

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<sup>2</sup>An asterisk indicates a significant contribution

1. E. Glikman and 13 co-authors incl. **M. Crnogorčević**, 2018, ApJ, 861, 37  
*Luminous WISE-selected Obscured, Unobscured, and Red Quasars in Stripe 82*

#### White papers:

1. R. Caputo et al. incl. **M. Crnogorčević**, Snowmass2021 Letter of Interest  
*Light Dark Matter Candidates with MeV gamma-ray signatures*

A full list of publications, including 14 GCN notices (real-time notices in the transient community), can be found at the [ADS website](#).

### INVITED TALKS

- › “Beyond the Visible: New Messengers and New Physics,” oral presentation at SED Director’s Seminar, NASA Goddard Space Flight Center, Greenbelt, MD (February, 2023)<sup>3</sup>
- › “Beyond the Visible: New Messengers and New Physics,” oral presentation at the Center for Neutrino Physics Seminar, Virginia Tech, Blacksburg, VA (April, 2023)
- › “Fermi Mentoring Program: lessons learned from near and far,” oral presentation at the Community Round Table, Department of Physics, Columbia University, New York City, NY (December, 2022)
- › “Light at the End of the Tunnel: Searching for Axion-like Particles in Gamma-ray Energies,” oral presentation at the HEP Seminar, Columbia University, New York City, NY (December, 2022)
- › “Light at the End of the Tunnel: Searching for Axion-like Particles in Gamma-ray Energies,” oral presentation at the SLAC Theory Group Seminar, Stanford University, Stanford, CA (October, 2022)
- › “New Physics through a Multimessenger Lens: an Exploration of the High-energy Universe,” oral presentation at the CCAPP Seminar Series, The Ohio State University, Columbus, OH (September, 2022)
- › “Astrophysical searches for axion-like particles in gamma-ray energies & multimessenger studies of the high-energy Universe,” oral presentation at the Department of Physics/WIPAC Seminar Series, University of Wisconsin, Madison, WI (September, 2022)
- › “Catching the next wave: Searching for gamma-ray counterparts to gravitational-wave events with Fermi-GBM and Swift-BAT,” oral presentation at the NASA Marshall Space Flight Center & University of Alabama, Huntsville, AL (July, 2022)
- › “Astrophysical searches for axion-like particles in gamma-ray energies & multimessenger studies of the high-energy Universe,” oral presentation at the THEAPA seminar, IoA, Cambridge, UK (June, 2022)
- › “Searching for Axion-like Particles from Core-Collapse Supernovae with Fermi LAT’s Low Energy Technique,” oral presentation at the CCAPP Seminar Series, The Ohio State University, Columbus, OH (November, 2021)
- › “Searching for Axion-like Particles from Core-Collapse Supernovae with Fermi LAT’s Low Energy Technique,” oral presentation at the NASA Astroparticle Physics Lab Seminar Series, Greenbelt, MD (August, 2021)
- › “Picture a Scientist,” panelist at the ICRC 2021 Diversity session, online (July, 2021)
- › “Equity, Diversity, and Inclusion initiatives at the University of Maryland Astronomy Department,” Multimessenger Diversity Network seminar, online (October, 2020)

### CONTRIBUTED TALKS

- › “New physics through a multimessenger lens: searching for axion-like particles from transient astrophysical events,” Dissertation Contributed Presentation at 241 AAS Meeting, Seattle, WA (January, 2023)
- › “Searching for Axionlike Particles from Gamma-ray Bursts with Fermi,” oral presentation at the TeVPA Meeting (August, 2022)
- › “Searching for Gamma- and hard X-ray Counterparts to Gravitational-wave events in GWTC-3 with Fermi-GBM and Swift-BAT,” oral presentation at the TeVPA Meeting (August, 2022)
- › “Searching for Axion-like Particles from Core-Collapse Supernovae with Fermi LAT’s Low Energy Technique,” oral presentation at the APS April Meeting (April, 2022)
- › “Searching for Gamma- and X-ray Counterparts to Gravitational-wave events with Fermi-GBM and Swift-BAT,” poster presentation at the APS April Meeting (April, 2022)
- › “Searching for Axion-like Particles from Core-Collapse Supernovae with Fermi LAT’s Low Energy Technique,” poster presentation at the 19th HEAD Meeting (March, 2022)
- › “Searching for Axion-like Particles from Core-Collapse Supernovae with Fermi LAT’s Low Energy Technique,” oral presentation at Kashiwa Dark Matter Symposium (November, 2021)
- › “Axion-like Particles from Core-collapse Supernovae: Investigating Fermi’s Sensitivity,” poster presentation at A Rainbow of Dark Sectors, Aspen Center for Physics (March, 2021)
- › “Axion-like Particles from Core-collapse Supernovae: Investigating Fermi’s Sensitivity,” oral presentation at the virtual *Fermi* Collaboration Meeting (March, 2020)
- › “ALP-induced Core-collapse Supernovae,” oral presentation at *Fermi* Collaboration Meeting, Santa Cruz, CA (September, 2019)
- › “Axion-like Particles and Where to Find Them,” oral presentation at *Fermi* Summer School, Lewes, DE (June, 2018)
- › “Quasar/Galaxy Co-evolution with OSIRIS,” oral presentation at Undergraduate Spring Research Symposium, Middlebury College (April, 2017)

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<sup>3</sup>Future talks noted in italic

- › “Quasar/Galaxy Co-evolution with OSIRIS,” oral presentation at APS Conference for Undergraduate Women in Physics, Harvard University (January, 2017)
- › “Edge Expansion of Scalar Casimir Energies,” poster presentation at Undergraduate Summer Research Symposium, Middlebury College (August, 2016)
- › “New Selection Criteria for Red and Obscured Quasars in Stripe 82,” poster presentation at APS Conference for Undergraduate Women in Physics, Syracuse University (January, 2016)
- › “New Selection Criteria for Red and Obscured Quasars in Stripe 82,” presentation at Keck Northeast Astronomy Consortium Undergraduate Symposium on Research in Astronomy, Williams College (October, 2015)
- › “New Selection Criteria for Red and Obscured Quasars in Stripe 82,” Keck Northeast Astronomy Consortium Undergraduate Research in Astronomy Journal (October, 2015)
- › “Hilbert’s Theorem 90,” oral presentation at the IX Conference of Scientific Research Center Petnica, Belgrade (September, 2010)

## TEACHING EXPERIENCE

**Teaching Assistant for Introductory Astronomy**, College Park, MD 2017–2018  
*Astronomical observations and history of astronomy, Solar system, stellar evolution, galaxy morphology and evolution, cosmology* • Instructors: Prof. Suvi Gezari (Fall 2017), Prof. Alberto Bolatto (Spring 2018)

**Astronomy Outreach & Telescope Operator**, Middlebury, VT 2015–2017  
*Conducting observatory events and operating telescopes at the Mittelman Observatory* • Advisor: Jonathan Kemp

**Tutor at the Center for Teaching, Learning, and Research**, Middlebury, VT 2014–2017  
*Newtonian Physics, Electricity and Magnetism*

**Teaching Assistant for Applied Mathematics to Physical Sciences**, Middlebury, VT 2016  
*Complex numbers and functions, sequences and series, ODE’s, Fourier analysis, multi-variable calculus, special functions, and vector calculus* • Instructor: Prof. Stephen J. Ratcliff

**Laboratory Assistant for Newtonian Physics**, Middlebury, VT 2015  
*Demonstrating techniques and instruments used in the experiments pertaining to classical mechanics: inertia, force, Newton’s laws of motion, work and energy, linear momentum, collisions, gravitation, rotational motion, torque, angular momentum, and oscillatory motion* • Instructor: Prof. Richard Wolfson

**Teaching Assistant for Electricity and Magnetism**, Middlebury, VT 2014–2015  
*Practical topics from electricity and magnetism, voltage, current, resistance, capacitance, inductance, and AC and DC circuits* • Instructor: Prof. Noah Graham

**Teaching Assistant for Newtonian Physics**, Middlebury, VT 2014  
*Introductory level classical mechanics* • Instructor: Prof. Anne Goodsell

## IN THE NEWS

- › [Brightest-Ever Space Explosion Reveals Possible Hints of Dark Matter, \*Quanta Science Podcast\*, March 2023](#)
- › [Brightest ever space explosion could help explain dark matter, \*Quanta Magazine\*, October 2022](#)
- › [Early-career Scientist Spotlight at NASA Goddard: Milena Crnogorčević, June 2022](#)

## SERVICE & OUTREACH

- › **Science coordinator of Dark Matter & New Physics working group**, *Fermi-LAT* 2022–now
- › **Journal reviewer for Physical Review Letters and Physical Review D** 2022–now
- › **Mentoring Program founder & organizer**, *Fermi-LAT/GBM Collaborations* 2020–now
- › **DEI Committee Member**, *Fermi-LAT* 2020–now
- › **Gamma-ray Burst Advocate**, ~10 week-long shifts/year, *Fermi-LAT* 2018–now
- › **GRAD-MAP Team co-lead**, University of Maryland 2019–2022
- › **BANG! Seminar lead organizer**, University of Maryland 2019–2021
- › **EDI Committee member**, Department of Astronomy, University of Maryland 2017–2021
- › **Fermi-LAT Reddit Ask Me Anything** August 2020
- › **ACE (formerly known as AGN) mentor to undergraduate students**, University of Maryland 2018–2019
- › **Equity Constellation, The Access Network member**, University of Maryland 2017–2018
- › **Women in Physics luncheon co-founder**, Middlebury College 2016–2017

I served on a number of short-term initiatives, including but not limited to: conducting graduate student interviews, participating in faculty searches, organizing the UMD Astronomy peer mentoring program, organizing and participating in a number of panels (e.g. applying to graduate school, GSFC/UMD connection, etc.), organizing visits to GSFC for prospective students, acting as a point person for the Department of Astronomy Mental Health Survey, organizing virtual check-in spaces during the Covid-19 pandemic, etc.

## SUMMER SCHOOLS, WORKSHOPS, AND COMPETITIONS

- Summer School in Astrostatistics and Astroinformatics, Center for Astrostatistics at the Pennsylvania State University (June, 2022)
- SSI 2020 “The Almost Invisibles: Exploring the Weakly Coupled Universe,” SLAC Summer Institute (August 2020)
- *Fermi* Summer School, Lewes, DE (June, 2018)
- The Access Network Assembly, Denver, CO (May, 2018)
- Four-time participant of the Mathematics Program at the Petnica Scientific Center, Petnica, Serbia (2010)
- Member of the Montenegrin National Team and a two-time participant of the Junior Balkan Mathematical Olympiad (JMBO)

## </> COMPUTING SKILLS

**Programming** Highly proficient in MATLAB, Python, XSPEC, *GtBurst*, Wolfram Mathematica,  $\text{\LaTeX}$ ; proficient in PyRAF, IDL, Adobe Illustrator, TOPCAT, DS9; beginner in Bash, C, Git, HTML/CSS.

**Operating Systems** macOS, Linux, Windows

## GENERAL INFORMATION

**MEMBERSHIP:** American Astronomical Society (AAS), American Physical Society (APS)

**LANGUAGES:** Serbian (native), English (bilingual proficiency), Italian (professional working proficiency), Spanish (elementary proficiency)

**HOBBIES:** Swimming (2022 US Masters Swimming (USMS) National Champion in 200 m breaststroke, 6-time USMS medalist (2022), 9-time USMS Top Ten fastest times in the U.S.), volleyball (member of the department team *Dirty Snowballs*), spoken-word poetry, creative writing, chess, fencing, crossword puzzles.

## “ REFERENCES

### Dr. Regina Caputo (overall)

*Research Astrophysicist*

NASA GODDARD SPACE FLIGHT CENTER

[regina.caputo at nasa dot gov](mailto:regina.caputo@nasa.gov)

### Dr. Manuel Meyer (research)

*Research Group Leader*

UNIVERSITY OF HAMBURG

[manuel.meyer at desy dot de](mailto:manuel.meyer@desy.de)

### Dr. Massimo Ricotti (research)

*Professor*

UNIVERSITY OF MARYLAND

[ricotti at umd dot edu](mailto:ricotti@umd.edu)

### Dr. Stuart Vogel (outreach)

*Professor*

UNIVERSITY OF MARYLAND

[svogel at umd dot edu](mailto:svogel@umd.edu)

### Dr. Coleman Miller (research)

*Professor*

UNIVERSITY OF MARYLAND

[mcmiller at umd dot edu](mailto:mcmiller@umd.edu)

### Dr. Christopher Reynolds (research)

*Plumian Professor*

UNIVERSITY OF CAMBRIDGE

[csr12 at cam dot ac dot uk](mailto:csr12@cam.ac.uk)