



DESY Postdoctoral Fellow
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Research Interests

- HE astrophysics (CR acceleration, transport and radiation processes): theoretical & numerical
- Multimessenger astrophysics (gamma rays, neutrinos and cosmic rays from extreme sources)

Employment History

2022 -	Postdoctoral Fellow , Deutsches Elektronen-Synchrotron DESY, Germany
2018 - 2022	Research Assistant , Dept. of Physics, Penn State, US
2016 - 2022	Teaching Assistant , Dept. of Physics, Penn State, US
Summer 2015	REU Intern , Dept. of Astronomy and Astrophysics, Penn State, US

Education

08/2022	Ph.D. in Physics, Pennsylvania State University, US Supervised by Prof. Péter Mészáros and Prof. Kohta Murase Thesis: <i>Neutrino and Electromagnetic Counterparts of Galaxy and Astrophysical Black Hole Mergers</i>
06/2016	B.Sc. in Astronomy, Nanjing University, China

Selected Honors & Awards

2022	TDLI Prize Postdoctoral Fellowship , Tsung-Dao Lee Institute (declined)
2021-2022	W. Donald Miller Graduate Fellowship (x2) , Pennsylvania State University
2019-2022	David C. Duncan Graduate Fellowship (x4) , Pennsylvania State University
2018	APS Graduate Student Travel Grant , American Physical Society
2017	Homer F. Braddock Scholarship , Pennsylvania State University
2016	School of Astronomy and Space Science Dean's Scholarship , Nanjing Univ.
2016	Outstanding Thesis Award , Nanjing University
2016	Merit Student , Education Department of Jiangsu Province
2015	REU Intern Travel Grant (host institution: Penn State), Nanjing University
2015	Duxia Scholarship , Nanjing University

Conferences and Scientific Talks

Invited talks & seminars

12/2023	HE Astrophysics Seminar, Nanjing University , " <i>Neutrino and Multi-Messenger Signals from TDEs</i> "
12/2023	Astrophysics Colloquium, USTC , " <i>Multi-Messenger Signals from TDEs</i> "
11/2023	DESY Astroparticle Seminar , " <i>TDEs in the Era of Multi-Messenger Astrophysics</i> "

- 08/2023 **Panelist of HE Transients, NEMMA Workshop, Penn State Univ.**
"Multi-Messenger Modeling of Neutrino-Coincident TDEs"
- 04/2023 **CP3 seminar, UCLouvain, Belgium** *"Multi-Messenger Signals of Tidal Disruption Events and Supermassive Black Hole Mergers"*
- 02/2023 **Lepto-Hadronic Workshop, Bochum, Germany** *"Modeling the Hadronic Cascade Emission from Neutrino-Emitting TDEs"*
- 11/2022 **DESY THAT Seminar** *"Neutrino and Electromagnetic Counterparts of Galaxy and Compact Binary Mergers"*
- 03/2022 **University of Maryland CTC talk series** *"The Multimessenger View of Galaxy and Compact Binary Mergers"*
- 12/2021 **Columbia University HEP Seminar** *"The Multimessenger View of Galaxy and Compact Binary Mergers"*
- 11/2021 **DESY THAT Seminar** *"The Multimessenger View of Galaxy and Compact Binary Mergers"*
- 10/2021 **UNLV Astronomy Colloquium** *"The Multimessenger View of Galaxy and Compact Binary Mergers"*
- 10/2020 **Tohoku University Astroparticle Seminar, Japan** *"Galaxy and Supermassive Black Hole Mergers in the Era of Multi-Messenger Astrophysics"*
- 10/2020 **CCAPP AstroParticle Lunch, Ohio State University** *"High-energy neutrino emission from super-massive black hole (SMBH) mergers"*
- 09/2020 **Penn State Astronomy Lunch Talk** *"High-energy neutrino emission subsequent to gravitational wave radiation from SMBH mergers"*
- 08/2020 **Time-Domain High-Energy Messenger Astrophysics Workshop, University of Kyoto, Japan (virtual)** *"High-energy neutrino emission subsequent to gravitational wave radiation from SMBH mergers"*
- 06/2019 **IGC@25: Multimessenger Universe Workshop** *"Neutrino and Secondary Electromagnetic Emissions from Galaxy Mergers"*
- 08/2015 **Penn State Astronomy Lunch Talk** *"High-Redshift Star-Forming Galaxies as Hidden Neutrino Sources"*

Contributed conference talks & posters

- 09/2023 **TeVPA 2023, Napoli, Italy** *"Neutrino and electromagnetic cascade models for tidal disruption events"*
- 07/2021 **EPS Conference on High Energy Physics** *"Jet-induced high-energy neutrino and electromagnetic counterparts of supermassive black hole mergers"*
- 04/2021 **APS April meeting (virtual)** *"Jet-induced high-energy neutrino and electromagnetic counterparts of supermassive black hole mergers"*
- 02/2021 **Institute for Gravitation and the Cosmos (IGC), Penn State (virtual)** *"High-energy neutrino emission subsequent to gravitational wave radiation from SMBH mergers"*

07/2019	Poster: 36th International Cosmic Ray Conference (ICRC), Madison, WI "A Multimessenger Picture of Galaxy Mergers: Neutrinos and Electromagnetic Emissions"
04/2018	APS April meeting, Columbus, OH "Cumulative Neutrino and Gamma-ray Backgrounds from Halo and Galaxy Mergers"

Software

Astrophysical Modeling with Multiple Messengers (AM³)

An open-source tool for time-dependent lepto-hadronic modelling of astrophysical sources

- <https://gitlab.desy.de/am3/am3/>
- **Documentation** - <https://am3.readthedocs.io/>
- **Developers:** Shan Gao, Marc Klinger, Annika Rudolph, Xavier Rodrigues, Chengchao Yuan, Gaëtan Fichet de Clairfontaine, Anatoli Fedynitch, Walter Winter, Martin Pohl
- **Contribution:** radiating blob expansion implementation; TDE examples; code tests; C++ documentation.

Programming Skills

- Programming languages: C++, Python, Mathematica and Fortran
- Extensive experience in using **CRpropa**, an astrophysical simulation code for the propagation of ultra-high-energy particles.

Mentoring

PhD Students

2023 - **Karlijn Kruiswijk**, Université catholique de Louvain '22, "GeV neutrinos from GRBs", co-mentored with Dr. Walter Winter and Prof. Gwenhaël de Wasseige

Master and Undergraduate Students

2024 **Andre Neubauer**, Humboldt-Universität zu Berlin (MSc, '23), "Multi-messenger emissions from collimated astrophysical jets"

2023 **Federico Testagrossa**, University of Padova (MSc, '22), DESY Summer School

2023 **David Raudales**, National Autonomous University of Honduras (BSc, '20), DESY Summer School

Teaching Experience

2021 F T.A., PHYS 561: Quantum Mechanics

2021 S T.A., PHYS 400: Electrodynamics

2020 F T.A., PHYS/MATH 479: Special and General Relativity

2018 S, 2020 S Lab. T.A., PHYS 250: Introductory Physics

2018 F T.A., PHYS 525: Methods of Theoretical Physics

2016 - 2017 Lab. T.A., PHYS 212: Electromagnetism

Selected Service and Outreach

Referee	MNRAS, MNRAS Letters (2023 -)
2023	DESY Astroparticle Division Retreat Co-organizer
2022 -	DESY Theoretical Astroparticle Seminar Organizer
2021	Abstract Sorting Committee of AAS 239th Annual Meeting
2021	Journal Club Organizer for the Center of Multimessenger Astrophysics
2017 - 2022	Guest Lecturer and A Tour of Universe Demonstrator at AstroFest (4-night outreach, 2500+ public visitors)
2018	Astropy Demonstrator at K-12 Educators - Bring Cutting-Edge STEM Research into your Classroom (2-day outreach, 100+ high-school teachers)

References

Dr. Walter Winter (walter.winter@desy.de)

Group leader theoret. astroparticle physics

Deutsches Elektronen-Synchrotron (DESY), Zeuthen

Dr. Kohta Murase (murase@psu.edu)

Professor, Physics and Astronomy & Astrophysics

Pennsylvania State University, USA

Dr. Cecilia Lunardini (cecilia.lunardini@asu.edu)

Professor, Department of Physics

Arizona State University, USA

Dr. Péter Mészáros (nnp@psu.edu)

Eberly Chair Professor Emeritus, Astronomy & Astrophysics and Physics

Pennsylvania State University, USA

Publications

 Google Scholar |  ADS Library |  iNSPIRE

1st-author publications: 10

1. **Yuan, C.**, Zhang, B. T., Winter, W., Murase, K., (2024), "Structured Jet Model for Multiwavelength Observations of the Jetted Tidal Disruption Event AT 2022cmc", arXiv: 2401.09320, ApJ in press
2. **Yuan, C.**, Winter, W., Lunardini, C., (2024), "AT2021lwx: Another Neutrino-Coincident Tidal Disruption Event with a Strong Dust Echo?", ApJ 969 136
3. **Yuan, C.**, and Winter, W. (2023), "Electromagnetic Cascade Emission from Neutrino-Coincident Tidal Disruption Events", ApJ 956 30
4. **Yuan, C.**, Murase, K., Guetta, D., Pe'er, A., Bartos, I., & Mészáros, P. (2021) "GeV Signature of Short Gamma-Ray Bursts in Active Galactic Nuclei", *ApJ* 932 80
5. **Yuan, C.**, Murase, K., Zhang, B. T., Kimura, S. S. & Mészáros, P. (2021) "Post-Merger Jets from Supermassive Black Hole Coalescences as Electromagnetic Counterparts of Gravitational Wave Emission", *ApJL*, 911 L15
6. **Yuan, C.**, Murase, K., Kimura, S. & Mészáros, P. (2020) "High-energy neutrino emission subsequent to gravitational wave radiation from supermassive black hole mergers", *Phys. Rev. D* 102, 083013
7. **Yuan, C.**, Murase, K. & Mészáros, P. (2020) "Complementarity of Stacking and Multiplet Constraints on the Blazar Contribution to the Cumulative High-Energy Neutrino Intensity", *ApJ*, 890:1
8. **Yuan, C.**, Murase, K. & Mészáros, P. (2019) "Secondary Radio and X-ray Emissions from Galaxy Mergers", *ApJ*, 878:76
9. **Yuan, C.**, Mészáros, P., Murase K. & Jeong, D. (2018) "Cumulative Neutrino and Gamma-Ray Backgrounds from Halo and Galaxy Mergers", *ApJ*, 857:50
10. **Yuan, C.** & Wang, F. (2015) "Cosmological Test Using Strong Gravitational Lensing Systems", *MNRAS*, 452:3

2nd-to-4th-author publications

11. Klinger, M., **Yuan, C.**, Taylor, A., Winter, W., (2024), "Lepto-Hadronic Scenarios for TeV Extensions of Gamma-Ray Burst Afterglow Spectra", arXiv:2403.13902, submitted to ApJ
12. Klinger, M., Rudolph, M., Rodrigues, X., **Yuan, C.**, Fichet de Clairfontaine, G., Fedynitch, A., Winter, W., Pohl, M., Gao, S. (2023), "AM3: An Open-Source Tool for Time-Dependent Lepto-Hadronic Modeling of Astrophysical Sources", arXiv: 2312.13371, submitted to ApJS
13. Zhang, T. B., Murase, K., **Yuan, C.**, Kimura, S. S. & Mészáros, P. (2020) "External Inverse-Compton Emission Associated with Extended and Plateau Emission of Short Gamma-Ray Bursts: Application to GRB 160821B", *ApJL* 908 L36

5th+-author publications

14. Zhang, B.T., Murase, K., Ioka, K., Song, D., **Yuan, C.**, Meszaros, P. (2023) "External Inverse-Compton and Proton Synchrotron Emission from the Reverse Shock as the Origin of VHE γ -Rays from Hyper-Bright GRB 221009A", ApJL 947 L14