

DESY Postdoctoral Fellow
Platanenallee 6
15738 Zeuthen, Germany

✉ chengchao.yuan@desy.de
☎ +49 0151 50721540
🔗 yuan-cc.github.io

Appointments

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

Education

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

Research Interests

- Astroparticle physics (CR acceleration, transport and radiation processes): theoretical & numerical
- Multimessenger astrophysics: gamma rays, neutrinos and cosmic rays from compact objects (e.g., GRBs, Kilonovae, and FRBs), TDEs, AGNs, and SMBH mergers

Fellowships & Awards

2024	DAAD (German Academic Exchange Service) Award , as a junior researcher w. Dr. Walter Winter & Dr. Maria Petropoulou
2023, 2024	DESY Postdoctoral Research Award (x2) , DESY
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	Merit Student , Education Department of Jiangsu Province, China
2015	REU Intern Travel Grant (host institution: Penn State), Nanjing University
2015	Duxia Scholarship , Nanjing University

Conferences and Scientific Talks

20 invited seminars and colloquia; 10 invited conference talks and lectures; 11 contributed conference talks and posters.

A full list is available at [Talks and Events](#)

Selected recent talks

03/2025	Invited talk, Institute of High Energy Physics, Beijing, China
02/2025	Invited talk, Workshop on Numerical Multi-Messenger Modeling, Zeuthen, Germany
12/2024	Invited talk, DESY "Matter and the Universe" Days, Hamburg, Germany
11/2024	Invited seminar, University of Athens, Greece
09/2024	Invited talk, Roma International Conference on AstroParticle Physics (RICAP-24), Italy
09/2024	Invited colloquium, NCfA Astrophysics Forum, UNLV, USA
08/2024	Talk, TeVPA 2024, Chicago, USA
02/2024	Invited talk, Paris Numerical Lepto-Hadronic Modeling Workshop
09/2023	Talk, TeVPA 2023, Napoli, Italy
08/2023	Invited talk, Panelist of HE Transients, NEMMA Workshop, Penn State University, USA

Software

Astrophysical Multi-Messenger Modeling (AM³)

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

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

Programming Skills

- Programming languages: C++, Python, Mathematica
- Extensive experience in using AM³ and CRpropa

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
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Master and Undergraduate Students

2024 -	Andre Neubauer , Humboldt-Universität zu Berlin (MSc, '23)
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

Oxford-Berlin Neutrino Physics Lecturer (Berlin, Germany, 2024)

Lecture Course on Neutrino Physics between Oxford University and Humboldt University Berlin

- Gave a lecture on time-dependent multi-messenger modeling using AM³ software

DESY Summer School Lecturer (Zeuthen, Germany, 2023)

DESY Summer School on Astroparticle Physics for Undergraduate and Master Students

- Gave a lecture on the physics of GRBs and on the radiation processes in astroparticle physics
- Guided students to complete the analytical/numerical modeling of GRB afterglow emissions

Penn State Graduate Teaching Assistant (State College, PA, USA, 2016–2022)

Coordinating experiments/labs, grading assignments, offering office hours, and proctoring exams for graduate (G) and undergraduate (UG) courses in the Physics Department

- Laboratory coordinator and lecturer: Electromagnetism (UG), Introductory Physics (UG)
- Grader and office hour leader: Quantum Mechanics (G), Special and General Relativity (UG), Methods of Theoretical Physics (G)

Professional and Outreach Activities

Referee	MNRAS, MNRAS Letters (since 2023); ApJ, ApJL (since 2024)
2024	Organizing Committee Member for the 3rd Numerical Lepto-Hadronic Modeling Workshop
2023	Organizing Committee Member for the DESY Astroparticle Division Retreat
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 co-organizer for the AstroFest (4-night outreach, 2500+ visitors)
2018	Astropy Demonstrator at K-12 Educators - Bring Cutting-Edge STEM Research into 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 |  INSPIRE

Refereed: 17; 1st-author publications: 11

1. **Yuan, C.**, Winter, W., Zhang, B. T., Murase, K., Zhang, B., (2024), "Revisiting X-ray Afterglows of Jetted Tidal Disruption Events with the External Reverse Shock", arXiv: 2411.07925, ApJ in press
2. Li, R., **Yuan, C.**, He, H., et al. (2024), "A neutrino flare associated with X-ray emission from TDE ATLAS17jr", arXiv: 2411.06440, submitted to ApJL
Contribution: theoretical model development, numerical calculation of neutrino and EM cascade emissions, paper writing
3. Plotko, P., Lunardini, C., Winter, W., **Yuan, C.** (2024), "Ultra-High-Energy Cosmic Rays from Neutrino-Emitting Tidal Disruption Events", arXiv: 2410.19047, submitted to ApJ
Contribution: model building, TDE source parameter justification, results interpretation, and paper writing
4. ***Yuan, C.**, Zhang, B. T., Winter, W., Murase, K., (2024), "Structured Jet Model for Multiwavelength Observations of the Jetted Tidal Disruption Event AT 2022cmc", ApJ 974 162
5. 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
Contribution: model building and results interpretation; neutrino figure production
6. **Yuan, C.**, Winter, W., Lunardini, C., (2024), "AT2021lwx: Another Neutrino-Coincident Tidal Disruption Event with a Strong Dust Echo?", ApJ 969 136
7. 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, Astrophys. J. Suppl. 275 1
Contribution: code development, tests, and documentation; TDE section writing
8. **Yuan, C.**, and Winter, W. (2023), "Electromagnetic Cascade Emission from Neutrino-Coincident Tidal Disruption Events", ApJ 956 30
9. 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
Contribution: model building and results interpretation; GRB code (AMES) developing
10. ***Yuan, C.**, Murase, K., Guetta, D., Pe'er, A., Bartos, I., & Mészáros, P. (2022) "GeV Signature of Short Gamma-Ray Bursts in Active Galactic Nuclei", ApJ 932 80
11. 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
Contribution: model building and results interpretation

12. ***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
13. **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
14. **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
15. **Yuan, C.**, Murase, K. & Mészáros, P. (2019) “Secondary Radio and X-ray Emissions from Galaxy Mergers”, *ApJ*, 878:76
16. **Yuan, C.**, Mészáros, P., Murase K. & Jeong, D. (2018) “Cumulative Neutrino and Gamma-Ray Backgrounds from Halo and Galaxy Mergers”, *ApJ*, 857:50
17. **Yuan, C.** & Wang, F. (2015) “Cosmological Test Using Strong Gravitational Lensing Systems”, *MNRAS*, 452:3

Publications in preparation

18. **Yuan, C.** et al., “TeV Very-high-energy γ -rays from low luminosity AGN NGC 4278”
19. Kruiswijk, K., **Yuan, C.**, Winter, W., Wasseige, G., “Sub-TeV neutrinos from thermal protons near GRB photospheres”
20. Zhang, B. T., Murase, K., **Yuan, C.**, “Ultra-high-energy cosmic rays from jets of TDEs”

Proceedings

1. **Yuan, C.**, Murase K. & Mészáros, P. (2019), “A Multi-Messenger Picture of Galaxy Mergers: Neutrinos and Electromagnetic Emissions” ICRC2019 1041.
2. **Yuan, C.** (2024), “Neutrinos from Tidal Disruption Events” RICAP-24 (in preparation)