Curriculum Vitae

CONTACT
Institute of High-Energy Physics, CAS, Beijing
TIANFU Cosmic Ray Research Center, Chengdu

Bing Theodore Zhang
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APPOINTMENTS

IHEP, China 2024.08 – present

Associate Professor
Institute of High-Energy Physics, Chinese Academy of Science

Kyoto University, Japan 2021.10 – 2024.08

Research Assistant Professor
Yukawa Institute for Theoretical Physics

The Pennsylvania State University, USA 2019.9 – 2021.9

Postdoctoral Research Scholar
Department of Physics, Institute for Gravitation & the Cosmos (IGC)
Mentored by Prof. Kohta Murase and Prof. Miguel Mostafa

The Pennsylvania State University, USA 2016.9 – 2017.9
Visiting Scholar

EDUCATION

Ph.D. of Astrophysics, Peking University, China 2013.9 – 2019.7
Thesis Title: The origin of ultrahigh-energy cosmic ray nuclei
Advisor: Prof. Zhuo Li, Peking Universiy
Co-advised by: Prof. Kohta Murase, Pennsylvania State University

B.C., Applied Physics, Harbin Institute of Technology, China 2009.9 – 2013.7

RESEARCH INTERESTS

Multimessenger astrophysics: The origin of ultra-high-energy cosmic rays, high-energy gamma-rays and high-energy neutrinos, particle acceleration and propagation, hybrid detection of extensive air showers

High-energy astrophysics: Supernova, Gamma-ray bursts, Tidal disruption events, Active galactic nuclei and Galaxy Clusters

AWARDS AND DISTINCTIONS

Outstanding Doctoral Thesis, Peking University	2019
China Scholarships Council Fellowship	2016

SKILLS

Programming: C++, Python
Software: Developer of Astrophysical Multimessenger Emission Synthesizer (AMES)
Public Software: Familiar with CRPropa, SOPHIA, CORSIKA, AIRES, Auger Offline

TEACHING EXPERIENCE

Peking University 2015.9 – 2016.1
Teaching Assistant in Radiative Processes in Astrophysics

PROFESSIONAL SERVICE

Peer review referee for ApJL	2024 – present
Peer review referee for JHEPA	2022 – present
Peer review referee for JCAP	2021 – present
Peer review referee for ApJ	2020 – present
Peer review referee for MNRAS	2020 – present
Organizing astrophysics seminar, YITP, Kyoto University	2022 – present
Organizing weekly Journal Club, IGC, Pennsylvania State University	2020 – 2021

COLLABORATIONS

Speakers Bureau Chair, LHAASO Collaboration 2024 –
Member, Giant Radio Array for Neutrino Detection (GRAND) Collaboration 2017 – 2022
– Work on the design of a conventional ground array (i.e., array of water-Cherenkov detectors) for hybrid detection of the extensive air showers for GRAND300.

CONFERENCES AND TALKS

The 7th symposium of ultrahigh energy cosmic rays (UHECR 2024), Argentina 2024.11
- *Inviteded review talk*

2nd Astro-COLIBRI multi-messenger astrophysics workshop, Institut Pascal 2023.11
- *Participate the Sciathon project*

AstroParticle Symposium 2023, Institut Pascal 2023.11
- *Invited talk: Theoretical perspective on multimessenger astrophysics*

New Evolution of MultiMessenger Astrophysics 2023, Penn State University 2023.8
- *Invited talk: Very-high-energy gamma-rays from compact mergers*

The 38 th international Cosmic Ray Conference, Nagoya 2023.07
- *Contributed talk: Reverse shock proton synchrotron emission from GRB 221009A*

Purple Mountain Observatory Youth Forum Issue 107, Nanjing 2023.06
- *Invited seminar: The origin of UHECRs and neutrinos*

The 1st LHAASO Symposium, Chengdu 2023.05
- *Invited talk: Nuclear and electron cascades induced by UHECRs*

Astrophysics Workshop on Numerical Multimessenger Modeling, Bochum 2023.02
- *Invited talk: Recent developments on GRB afterglow modeling in the VHE era*

Astronomical Institute, Tohoku University 2023.01
- *Invited colloquium: Very-high-energy gamma-rays from gamma-ray bursts*

Fast Radio Bursts and Cosmic Transients, YITP, Kyoto University 2022.06
- *Invited talk: Very-high-energy gamma-rays from short gamma-ray bursts*

Tsung-Dao Lee Institute (TDLI), Shanghai 2021.06
- *Invited seminar (Astronomy and astrophysics): Energetics of UHECRs*

APS April meeting 2021, Virtual 2021.04
- *Contributed talk: A neutral beam model for high-energy neutrino emission from the blazar TXS 0506+56*

Department of Physics, The Pennsylvania State University, State College, PA 2019.10
- *Invited seminar: The origin of UHECRs*

Benoziyo Center for Astrophysics 2019, Weizmann Institute of Science, Israel 2019.01
- *Invited talk: UHECR nuclei and neutrinos from engine-driven supernova*

TeV Particle Astrophysics 2018, Berlin, German 2018.08
- *contributed talk: LL GRBs as the sources of UHECR nuclei*

LHAASO Collaboration Meeting 2017, SDU, Weihai, China 2017.09
- *Contributed talk: High-energy gamma-rays from blazars*

TeV Particle Astrophysics 2017, Columbus, OH 2017.08
- *Contributed talk: High-energy cosmic ray nuclei from tidal disruption events*

973 Multimessenger Astronomy Frontier, CCNU, Wuhan, China 2015.12
- *Contributed talk: High-energy neutrinos from blazars*

PUBLICATIONS

[34] A. Das, K. Murase, **B. Theodore Zhang**, *Multimessenger Constraints on Production Sites of High-Energy Neutrinos from NGC 1068*, arXiv: 2604.01222 (2026)

[33] **B. Theodore Zhang**, S. Yu, *Microquasar Remnants as Pevatrons Illuminating the Galactic Cosmic Ray Knee*, arXiv: 2602.08940 (2026)

[32] F. Aharonian, **B. Theodore Zhang**, *A Minimal Interpretation of the Galactic Cosmic-Ray Proton and Helium Spectra from GeV to PeV Energies*, arXiv: 2602.08223 (2026)

[31] S. Yu, **B. Theodore Zhang**, *A Unified Framework for 10 TeV to EeV Diffuse Neutrino Sky and KM3-230213A*, Astrophys. J. Lett. **1002**, L45 (2026), arXiv: 2602.02372

[30] S. Yu, **B. Theodore Zhang**, *Multimessenger Modeling of Low-luminosity γ-Ray Bursts*, Astrophys. J. **998**, 275 (2026), arXiv: 2602.02367

[29] S. Chen, A. Das, **B. Theodore Zhang**, S. S. Kimura, K. Murase, Y. Liang, *Physical origin of very-high-energy gamma rays from the low-luminosity active galactic nucleus NGC 4278 and implications for neutrino observations*, arXiv: 2601.23242 (2026)

[28] R. Matsui, S. S. Kimura, K. Murase, **B. Theodore Zhang**, *Prediction of multi-wavelength emissions associated with X-ray flare and extended emission of GRBs*, arXiv: 2601.22749 (2026)

[27] W. Lian, H. Gao, S. Ai, **B. Theodore Zhang**, *Multimessenger Prospects for Low-Luminosity Gamma-Ray Bursts: Joint Neutrino and X-Ray Observations*, arXiv: 2601.10317 (2026)

[26] **B. Theodore Zhang**, S. S. Kimura, K. Murase, *Microquasar jet-cocoon systems as PeVatrons*, Phys. Rev. D **112**, 123015 (2025), arXiv: 2506.20193

[25] X.-F. Zhang, R.-Y. Liu, H.-M. Zhang, Y.-Y. Huang, **B. Theodore Zhang**, X.-Y. Wang, *Constraints on Cosmic-Ray Acceleration in Bright Gamma-Ray Bursts with Observations of Fermi*, Astrophys. J. **980**, 188 (2025), arXiv: 2501.09594

[24] C. Yuan, W. Winter, **B. Theodore Zhang**, K. Murase, B. Zhang, *Revisiting X-Ray Afterglows of Jetted Tidal Disruption Events with the External Reverse Shock*, Astrophys. J. **982**, 196 (2025), arXiv: 2411.07925

[23] C. Yuan, **B. Theodore Zhang**, W. Winter, K. Murase, *Structured Jet Model for Multiwavelength Observations of the Jetted Tidal Disruption Event AT 2022cmc*, Astrophys. J. **974**, 162 (2024), arXiv: 2406.11513

[22] **B. Theodore Zhang**, K. Murase, N. Ekanger, M. Bhattacharya, S. Horiuchi, *Ultraheavy Ultrahigh-Energy Cosmic Rays*, Phys. Rev. Lett. **136**, 181002 (2026), arXiv: 2405.17409

[21] Y.-J. Wei, J. Ren, H.-N. He, Y.-P. Yang, D.-M. Wei, Z.-G. Dai, **B. Theodore Zhang**, *A Novel Model for the MeV Emission Line in GRB 221009A*, Astrophys. J. Lett. **968**, L5 (2024), arXiv: 2405.10775

[20] A. Das, **B. Theodore Zhang**, K. Murase, *Revealing the Production Mechanism of High-energy Neutrinos from NGC 1068*, Astrophys. J. **972**, 44 (2024), arXiv: 2405.09332

[19] Y. Sato, K. Murase, M. Bhattacharya, J. A. Carpio, M. Mukhopadhyay, **B. Theodore Zhang**, *Two-component off-axis jet model for radio flares of tidal disruption events*, Phys. Rev. D **110**, L061307 (2024), arXiv: 2404.13326

[18] H.-N. He, **B. Theodore Zhang**, Y.-Z. Fan, *A Detectable Ultra-high-energy Cosmic-Ray Outburst from GRB 221009A*, Astrophys. J. **963**, 109 (2024), arXiv: 2401.11566

[17] **B. Theodore Zhang**, K. Murase, K. Ioka, B. Zhang, *The origin of very-high-energy gamma-rays from GRB 221009A: Implications for reverse shock proton synchrotron emission*, JHEAp **45**, 392–408 (2025), arXiv: 2311.13671

[16] Ž. Bošnjak, **B. Theodore Zhang**, K. Murase, K. Ioka, *Off-axis MeV and very-high-energy gamma-ray emissions from structured gamma-ray burst jets*, Mon. Not. Roy. Astron. Soc. **528**, 4307 (2024), arXiv: 2306.14729

[15] **B. Theodore Zhang**, K. Murase, *Nuclear and electromagnetic cascades induced by ultra-high-energy cosmic rays in radio galaxies: implications for Centaurus A*, Mon. Not. Roy. Astron. Soc. **524**, 76–89 (2023), arXiv: 2302.14048

[14] Y.-J. Wei, **B. Theodore Zhang**, K. Murase, *Multiwavelength afterglow emission from bursts associated with magnetar flares and fast radio bursts*, Mon. Not. Roy. Astron. Soc. **524**, 6004–6014 (2023), arXiv: 2301.10184

[13] **B. Theodore Zhang**, K. Murase, K. Ioka, D. Song, C. Yuan, P. Mészáros, *External Inverse-compton and Proton Synchrotron Emission from the Reverse Shock as the Origin of VHE Gamma Rays from the Hyper-bright GRB 221009A*, Astrophys. J. Lett. **947**, L14 (2023), arXiv: 2211.05754

[12] Y. Sato, K. Obayashi, **B. Theodore Zhang**, S. J. Tanaka, K. Murase, Y. Ohira, R. Yamazaki, *Synchrotron self-compton emission in the two-component jet model for gamma-ray bursts*, JHEAp **37**, 51–61 (2023), arXiv: 2208.13987

- Contribute to the synchrotron self-Compton calculation process.

[11] C. Yuan, K. Murase, **B. Theodore Zhang**, S. S. Kimura, P. Mészáros, *Post-Merger Jets from Supermassive Black Hole Coalescences as Electromagnetic Counterparts of Gravitational Wave Emission*, Astrophys. J. Lett. **911**, L15 (2021), arXiv: 2101.05788

- Contribute to the calculation of the energy spectrum.

[10] **B. Theodore Zhang**, K. Murase, C. Yuan, S. S. Kimura, P. Mészáros, *External Inverse-Compton Emission Associated with Extended and Plateau Emission of Short Gamma-Ray Bursts: Application to GRB 160821B*, Astrophys. J. Lett. **908**, L36 (2021), arXiv: 2012.09143

[9] **B. Theodore Zhang**, K. Murase, P. Veres, P. Mészáros, *External Inverse-Compton Emission from Low-luminosity Gamma-Ray Bursts: Application to GRB 190829A*, Astrophys. J. **920**, 55 (2021), arXiv: 2012.07796

[8] Y. Jiang, **B. Theodore Zhang**, K. Murase, *Energetics of ultrahigh-energy cosmic-ray nuclei*, Phys. Rev. D **104**, 043017 (2021), arXiv: 2012.03122

- Contribute to generate the main results and paper writing.

[7] K. Murase, S. S. Kimura, **B. Theodore Zhang**, F. Oikonomou, M. Petropoulou, *High-Energy Neutrino and Gamma-Ray Emission from Tidal Disruption Events*, Astrophys. J. **902**, 108 (2020), arXiv: 2005.08937

- Contribute to the calculation of the photohadronic interaction in the hidden wind model.

[6] **B. Theodore Zhang**, M. Petropoulou, K. Murase, F. Oikonomou, *A Neutral Beam Model for High-Energy Neutrino Emission from the Blazar TXS 0506+056*, Astrophys. J. **889**, 118 (2020), arXiv: 1910.11464

[5] **B. Theodore Zhang**, K. Murase, *Ultrahigh-energy cosmic-ray nuclei and neutrinos from engine-driven supernovae*, Phys. Rev. D **100**, 103004 (2019), arXiv: 1812.10289

[4] **B. Theodore Zhang**, K. Murase, S. S. Kimura, S. Horiuchi, P. Mészáros, *Low-luminosity gamma-ray bursts as the sources of ultrahigh-energy cosmic ray nuclei*, Phys. Rev. D **97**, 083010 (2018), arXiv: 1712.09984

[3] **B. Theodore Zhang**, K. Murase, F. Oikonomou, Z. Li, *High-energy cosmic ray nuclei from tidal disruption events: Origin, survival, and implications*, Phys. Rev. D **96**, 063007 (2017), arXiv: 1706.00391

[2] S. S. Kimura, K. Murase, **B. Theodore Zhang**, *Ultrahigh-energy Cosmic-ray Nuclei from Black Hole Jets: Recycling Galactic Cosmic Rays through Shear Acceleration*, Phys. Rev. D **97**, 023026 (2018), arXiv: 1705.05027

- Contribute to the propagation of UHECR nuclei.

[1] **B. Theodore Zhang**, Z. Li, *Constraints on cosmic ray loading and PeV neutrino production in blazars*, JCAP **03**, 024 (2017), arXiv: 1607.02211