

Curriculum Vitae

CONTACT

Yukawa Institute for Theoretical Physics
Kyoto University
Kitashirakawa Oiwakecho, Sakyo-ku, Kyoto 606-8502 Japan

Bing Theodore Zhang
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APPOINTMENTS

Kyoto University, Japan 2021.10 – present
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. Miguel Mostafa and Prof. Kohta Murase

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 University
Co-advised by: Prof. Kohta Murase, Pennsylvania State University

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

RESEARCH INTERESTS

Astroparticle physics: 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 – 2017

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 JHEP

2022 – present

Peer review referee for JCAP

2021 – present

Peer review referee for Astrophysical Journal

2020 – present

Peer review referee for Monthly Notices of the Royal Astronomical Society

2020 – present

Organizing YITP astrophysics seminar

2022 – present

Organizing IGC weekly Journal Club

2020 – 2021

COLLABORATIONS

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 38 th international Cosmic Ray Conference

2023.07

- *Oral talk: Reverse shock proton synchrotron emission as the origin of VHE gamma-rays from GRB 221009A* ”

Purple Mountain Observatory Youth Forum Issue 107

2023.06

- *invited talk: The origin of UHECRs and neutrinos*”

The 1st LHAASO Symposium

2023.05

- *invited talk: Nuclear and electron cascades induced by UHECRs* ”

Astrophysics Workshop on Numerical Multimessenger Modeling

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
◦ <i>Invited talk: Very-high-energy gamma-rays from short gamma-ray bursts</i>	
Tsung-Dao Lee Institute (TDLI), Shanghai	2021.06
◦ <i>Invited seminar (Astronomy and astrophysics): Energetics of UHECRs</i>	
APS April meeting 2021	2021.04
◦ <i>Oral talk: A neutral beam model for high-energy neutrino emission from the blazar TXS 0506+56</i>	
Department of Physics, The Pennsylvania State University, State College, PA	2019.10
◦ <i>Invited seminar: The origin of UHECRs</i>	
Benozio Center for Astrophysics 2019, Weizmann Institute of Science, Israel	2019.01
◦ <i>Oral talk: UHECR nuclei and neutrinos from engine-driven supernova</i>	
TeV Particle Astrophysics 2018, Berlin, German	2018.08
◦ <i>Oral talk: LL GRBs as the sources of UHECR nuclei</i>	
LHAASO Collaboration Meeting 2017, SDU, Weihai, China	2017.09
◦ <i>Oral talk: High-energy gamma-rays from blazars</i>	
TeV Particle Astrophysics 2017, Columbus, OH	2017.08
◦ <i>Oral talk: High-energy cosmic ray nuclei from tidal disruption events</i>	
973 Multimessenger Astronomy Frontier, CCNU, Wuhan, China	2015.12
◦ <i>Oral talk: High-energy neutrinos from blazars</i>	
Chinese Astronomical Society (CAS) Annual Meeting, PKU, Beijing	2015.10
The High Energy Astroparticle Physics Frontier, PKU, Beijing	2015.09

PUBLICATIONS

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- [18] Bošnjak, Željka and **Zhang, B. Theodore** and Murase, Kohta and Ioka, Kunihiro, Off-axis MeV and very-high-energy gamma-ray emissions from structured gamma-ray burst jets, 2023, MNRAS submitted, arXiv: [2306.14729](#)
- [17] **B. T. Zhang** and K. Murase, Nuclear and electromagnetic cascades induced by ultrahigh-energy cosmic rays in radio galaxies: Implications for Centaurus A, 2023, MNRAS in press, arXiv: [2302.14048](#)
- [16] Y. Wei, **B. T. Zhang**, and K. Murase, Multi-wavelength afterglow emission from bursts associated with magnetar flares and fast radio bursts, 2023, MNRAS submitted, [2301.10184](#)
- [15] **B. T. Zhang**, K. Murase, K. Ioka, D. Song, C. Yuan, and 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, ApJL 947, L14, 2023, arXiv: [2211.05754](#)
- [14] 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 (2023) 51, arXiv: [2208.13987](#)

- Contribute to the synchrotron self-Compton calculation process.

[13] Simeon Reusch, Robert Stein, Marek Kowalski, Sjoert van Velzen, Anna Franckowiak, Cecilia Lunardini, Kohta Murase, . . . , **B. Theodore Zhang**, Erez Zimmerman, The candidate tidal disruption event AT2019fdr coincident with a high-energy neutrino, *PhysRevLett.*128.221101, 2021, arXiv: [2101.05788](#)

- Provide the theoretical spectrum of neutrinos from hidden wind model.

[12] Chengchao Yuan, Kohta Murase, **B. Theodore Zhang**, Shigeo S. Kimura, Peter Mészáros, Post-merger Jets from Supermassive Black Hole Coalescences as Electromagnetic Counterparts of Gravitational Wave Emission, *ApJL* 911L15, 2021, arXiv: [2101.05788](#)

- Contribute to the calculation of the energy spectrum.

[11] **B. Theodore Zhang**, Kohta Murase, Chengchao Yuan, Shigeo S. Kimura, Peter Mészáros, External Inverse Compton Emission Associated with Extended and Plateau Emission of Short Gamma-Ray Bursts: Application to GRB 160821B, *ApJL* **908** L36, 2021, arXiv: [2012.09143](#)

[10] **B. Theodore Zhang**, Kohta Murase, Péter Veres, Peter Mészáros, External Inverse Compton Emission from Low-Luminosity Gamma-Ray Bursts: Application to GRB 190829A, *ApJ* **920** 55, 2021, arXiv: [2012.07796](#)

[9] Jiang Yu, **B. Theodore Zhang**, Kohta Murase, *Energetics of ultrahigh-energy cosmic-ray nuclei*, *Phys. Rev. D*104 (2021) 4, 043017, arXiv: [2012.03122](#)

- Contribute to generate the main results and paper writing.

[8] Kohta Murase, Shigeo S. Kimura, **B. Theodore Zhang**, Foteini Oikonomou, Maria Petropoulou, *High-energy Neutrino and Gamma-Ray Emission from Tidal Disruption Events*, the *Astrophysical Journal*, 902(2), 108, 2020, arXiv: [2005.08937](#)

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

[7] **B. Theodore Zhang**, Maria Petropoulou, Kohta Murase, Foteini Oikonomou, *A Neutral Beam Model for the Neutrino Emission of TXS 0506+056*, the *Astrophysical Journal*, 889(2), 118., 2020, arXiv: [1910.11464](#)

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

[5] **GRAND Collaboration**, *The Giant Radio Array for Neutrino Detection (GRAND): Science and Design*, , *Sci. China Phys. Mech. Astron.* **63** (2020) 219501, arXiv: [1810.09994](#)

- Contribute to the discussion of particle detector array.

[4] **B. Theodore Zhang**, Kohta Murase, Shigeo S. Kimura, Shunsaku Horiuchi, Peter 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**, Kohta Murase, Foteini Okonomou, Zhuo Li, *High-energy cosmic ray nuclei from tidal disruption events: Origin, survival, and implications*, *Phys. Rev. D***96**, 063007, 2017, arXiv: [1706.00391](#)

[2] Shigeo S. Kimura, Kohta 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**, Zhuo Li, *Constraints on cosmic ray loading and PeV neutrino production in blazars*, *JCAP*, **1703**, 024, 2017, arXiv: [1607.02211](#)