

# 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

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<b>Kyoto University, Japan</b>	2021.10 – present
Research Assistant Professor Yukawa Institute for Theoretical Physics	

<b>The Pennsylvania State University, USA</b>	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	

<b>The Pennsylvania State University, USA</b>	2016.9 – 2017.9
Visiting Scholar	

## EDUCATION

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

<b>B.C., Applied Physics</b> , Harbin Institute of Technology, China	2009.9 – 2013.7
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## RESEARCH INTERESTS

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**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

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

## SKILLS

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**Programming:** C++, Python

**Software:** Developer of Astrophysical Multimessenger Emission Synthesizer (AMES)

**Public Software:** Familiar with CRPROPA, SOPHIA, CORSIKA, AIRES, AUGER OFFLINE

## TEACHING EXPERIENCE

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**Peking University**

2015.9 – 2016.1

Teaching Assistant in Radiative Processes in Astrophysics

## PROFESSIONAL SERVICE

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Peer review referee for JHEP

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

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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

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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
◦ <i>Invited colloquium: Very-high-energy gamma-rays from gamma-ray bursts</i>	
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, Virtual	2021.04
◦ <i>Contributed 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>	
Benoziyo Center for Astrophysics 2019, Weizmann Institute of Science, Israel	2019.01
◦ <i>Invited talk: UHECR nuclei and neutrinos from engine-driven supernova</i>	
TeV Particle Astrophysics 2018, Berlin, German	2018.08
◦ <i>contributed talk: LL GRBs as the sources of UHECR nuclei</i>	
LHAASO Collaboration Meeting 2017, SDU, Weihai, China	2017.09
◦ <i>Contributed talk: High-energy gamma-rays from blazars</i>	
TeV Particle Astrophysics 2017, Columbus, OH	2017.08
◦ <i>Contributed talk: High-energy cosmic ray nuclei from tidal disruption events</i>	
973 Multimessenger Astronomy Frontier, CCNU, Wuhan, China	2015.12
◦ <i>Contributed talk: High-energy neutrinos from blazars</i>	

## PUBLICATIONS

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- [20] H. He, **B. Theodore Zhang**, Y. Fan, A Detectable Ultra-high-energy Cosmic-Ray Outburst from GRB 221009A, ApJ 963, 109, 2024, arXiv:[2401.11566](#)
- [19] **B. Theodore Zhang**, K. Murase, K. Ioka and B. Zhang, The origin of very-high-energy gamma-rays from GRB 221009A: implications for reverse shock proton synchrotron emission, 2023, MNRAS submitted, arXiv: [2311.13671](#)
- [18] B. Željka, **B. Theodore Zhang**, K. Murase and K. Ioka, Off-axis MeV and very-high-energy gamma-ray emissions from structured gamma-ray burst jets, MNRAS, 528, 3, 2024, arXiv: [2306.14729](#)
- [17] **B. Theodore Zhang** and K. Murase, Nuclear and electromagnetic cascades induced by ultrahigh-energy cosmic rays in radio galaxies: Implications for Centaurus A, MNRAS, 524, 76, 2023, arXiv: [2302.14048](#)
- [16] Y. Wei, **B. Theodore Zhang**, and K. Murase, Multi-wavelength afterglow emission from bursts associated with magnetar flares and fast radio bursts, MNRAS, 524, 6004, 2023, [2301.10184](#)
- [15] **B. Theodore 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, 2019, 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](#)