YICI ZHONG

D.O.B. & P.O.B: 1998/03/04, China
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EDUCATION

The University of Tokyo *Tokyo, Japan, 2021.10 -*
Doctor of Philosophy (Ph.D.)
Department of Physics

The University of Tokyo *Tokyo, Japan, 2019.10- 2021.09*
Master of Science (M.Sc) GPA: 3/3
Department of Physics
Thesis topic: Study on the effect of supernova fallback on the neutron star diversity

Central South University *Hunan, China, 2015.09-2019.06*
Bachelor of Engineering (B.E.) GPA: 2.88/3
Department of Materials Science and Engineering

EXPERIENCE

Princeton University *New Jersey, U.S., 2022.09-*
1-year graduate exchange, supervised by Prof. Anatoly Spitkovsky
Department of Astrophysical Sciences

Monash University *VIC, Australia, 2019.01-2019.06*
1-semester undergraduate exchange, fully supported by China Scholarship Council
Department of Materials Science and Engineering

University of California, Berkeley *Berkeley, U.S., 2018.06-2018.08*
Summer Session GPA: 4/4
Department of Physics

Massachusetts Institute of Technology *Cambridge, U.S., 2016.07-2016.08*
Summer School
Department of Civil and Environmental Engineering

HONORS & AWARDS

1. JSPS Research Fellowship for young scientists *2023.04-*

2. University-wide Student Exchange Program between the University of Tokyo and Princeton University, with Go-Global scholarship *2022.09-*

3. International Graduate Program for Excellence in Earth-Space Science (IGPEES) *2020.04-*

4. Outstanding Graduates of Central South University *2019.06*

5. The First Class Scholarship at the School of Material Science and Engineering *2017.09*

6. Golden Prize of China Undergraduate Physics Tournament (CUPT) at Central South University *2017.08*

7. Innovation Practice Training Program for Undergraduates held by Chinese Academy of Sciences at The Institute of High Energy Physics (IHEP) *2017.04-2019.06*

RESEARCH ACTIVITIES

Wind from strongly magnetized rapidly spinning white dwarf
with Kazumi Kashiyama and Shinsuke Takasao *2021.12-*

· *Kashiyama et al. (2019)* consistently explained the properties of WD J005311 using a newly constructed one dimensional wind solution, in which the optically thick outflow is launched from the carbon-burning shell on an oxygen–neon core and accelerated by the rotating magnetic field to become supersonic and unbound well below the photosphere. Their 1-D model constrains the surface magnetic field, spin angular frequency and central mass to be $B_* \sim 10^7$ G, $\omega \sim 0.2$ s^{-1} and $M_* \sim 1.3 M_\odot$, respectively. They predicted it to either spin down through magnetic torque until joining the known sequence of WDs, or appear as a new high-energy source. Based on their results, we would like to carry 2-D magnetohydrodynamical (MHD) simulations to test the feasibility of blowing this kind of wind and its wind struture.

"Half Dome" simulations
with Jia Liu, Yu Feng and Adrian Bayer *2021.11-*

· A major issue in modern cosmology is the modeling of astrophysics - messy processes related to stars, gas, and black holes that affect the study of fundamental physics such as dark energy and neutrino masses. Currently, no astrophysical effects are modeled in these N-body, dark matter only simulations, since one such simulation alone would already require the entire Wisteria/BDEC-01 Odyssey Supercomputer. To solve this issue, we plan to include astrophysics as post-processing of our "Half Dome" N-body simulations (BoxSize: 5 Gpc), with the help of a large set of small-box hydrodynamic simulations and machine learning techniques. This will be used for future surveys such as CMS-S4, Simons Observatory, and LSST.

A Necessary Condition for Supernova Fallback Invading Newborn Neutron-star Magnetosphere
with Kazumi Kashiyama, Toshikazu Shigeyama and Shinsuke Takasao *2019.11-2021.06*

· We numerically investigated the dynamics of a supernova fallback accretion confronting with a relativistic wind from a newborn NS under one dimensional spherical symmetry and obtained the critical condition for the fallback matter to reach the near NS surface. With combining the condition for the fallback matter to bury the surface magnetic field under the NS crust, we discussed the possibility that the trifurcation of NSs into rotation-powered pulsars, central compact objects (CCOs), and magnetars can be induced by supernova fallback. This work was published in *The Astrophysical Journal 917 71.*

PUBLICATION

- "Super-sample covariance of the power spectrum, bispectrum, halos, voids, and their cross-covariances", Bayer, Adrian E. and Liu, Jia and Terasawa, Ryo and Barreira, Alexandre and **Zhong, Yici** and Feng, Yu, arXiv, **2210.15647**, Oct. (2022).
- "A Necessary Condition for Supernova Fallback Invading Newborn Neutron-star Magnetosphere", **Y. Zhong**, K. Kashiyama, T. Shigeyama, and S. Takasao, ApJ, **917**, 71 (2021).
- "Anchoring Pt Single Atoms on Te Nanowires for Plasmon-Enhanced Dehydrogenation of Formic Acid at Room Temperature", L. Han, L. Zhang, H. Wu, H. Zu, P. Cui, J. Guo, R. Guo, J. Ye, J. Zhu, X. Zheng, L. Yang, **Y. Zhong**, S. Liang, L. Wang, Adv. Sci., **6**, 1900006 (2019).

PRESENTATION

1. **Y. Zhong**, "Wind from strongly magnetized rapidly spinning white dwarf", International School of Cosmic Ray Astrophysics, Maurice M. Shapiro, 22nd Course: From cosmic particles to gravitational waves: now and to come, Erice, Sicily, Italy (2022.08)
2. **Y. Zhong**, "Study on the effect of the outflow from young neutron stars and supernova fallback on the neutron star diversity", YITP workshop: Extreme Outflow in Astrophysical Transients, Kyoto (2021.08)

3. **Y. Zhong**, "A necessary condition for supernova fallback invading newborn neutron-star magnetosphere", UTokyo-Research Center for the Early Universe Summer School (2021.08)

4. **Y. Zhong**, "How much supernova fallback can invade newborn pulsar wind and magnetosphere?": ASJ Spring Annual Meeting (2021.03); 2020 Rironkon symposium and High Energy Astrophysics 2020 (2020.12)

MISCELLANEOUS

1. Programming: python, C++, Fortran, matlab

2. Language: Chinese (native), English, Japanese (3-yr kids level)