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🐙 GitHub Profile

## EDUCATION

### •Ease China University of Science and Technology

Sep. 2014 - June 2018

Undergraduate: Applied Physics

Advisor: Prof. Wei Liao

### •Peking University

Sep. 2018 - June 2024

Ph.D graduate: Astrophysics

Ph.D Supervisor: Prof. Kohei Inayoshi

## INVOLVED PROJECTS

### •Project 1: RHD simulations on supercritical accretion onto BH in its vicinity

*We perform long-term RHD simulations to study BH's response to supercritical inflows, resolving Million orbital timescales.*

- Code: PLUTO + Flux Limited Diffusion (FLD)
- Result 1: Only a small fraction of inflow gas is actually fed to BH due to strong outflow
- Result 2: The outflow regulated growth model can grow overmassive SMBHs in massive DM halos.
- Impacts: A possible solution to grow high-z SMBHs: Moderate super-Eddington accretion from supercritical inflows regulated by outflows. A subgrid feeding and feedback model for cosmological simulations involving supercritical accretion at cosmic dawn to connect the simulation to high-z observables.

### •Project 2: Dynamics and morphology of AGN-driven outflows in galaxy clusters

*We study the formation and evolution of radiative cooling AGN-driven outflows in galaxy clusters.*

- Code: ENZO + AMR + Ray-tracing
- Result 1: We safely reproduce horse-shoe like structure as observed in Perseus cluster
- Result 2: The slopes of velocity structure function retain the signature of super/subsonic origin for the outflows.
- Impacts: simulation supports for the formation and evolution of supersonic cold gas filaments in galaxy clusters; A detailed approach to study and interpret the signature for the interplay between AGN and host galaxies.

### •On going project: Feedback Regulated Growth of Seed BHs in Co-evolution with Early Bulge Formation

*We study the co-evolution of seed BH growth regulated by supercritical accretion wind with early bulge formation.*

- Code: PLUTO + FLD + Ray-tracing + Nonequilibrium thermochemistry
- Expectation: Provide insights onto growth pathway of seed BHs in BH mass-Galaxy mass diagram in cosmic dawn.

## PUBLICATION LIST

### •Project 1

- Hu, H., Inayoshi, K., Haiman, Z., Quataert, E. & Kuiper, R. Long-term Evolution of Supercritical Black Hole Accretion with Outflows: A Subgrid Feedback Model for Cosmological Simulations. *Astrophys. J.* 934, 132 (2022).
- Hu, H., Inayoshi, K., Haiman, Z., Quataert, E. Li, W., & Kuiper, R. Supercritical Growth Pathway to Overmassive Black Holes at Cosmic Dawn: Coevolution with Massive Quasar Hosts. *Astrophys. J.* 935, 140 (2022).

### •Project 2

- Qiu, Y., Hu, H., Inayoshi, K., Ho, L. C., Bogdanović, T., & McNamara, B. R. Dynamics and Morphology of Cold Gas in Fast, Radiatively Cooling Outflows: Constraining AGN Energetics with Horseshoes. *Astrophys. J. Lett.* 917, L7 (2021).
- Hu, H., Qiu, Y., Gendron-Marsolais, M., Bogdanović, T., Hlavacek-Larrondo, J., Ho, L. C., Inayoshi, K., & McNamara, B. R. Signature of Supersonic Turbulence in Galaxy Clusters Revealed by AGN-driven H $\alpha$  Filaments. *Astrophys. J. Lett.* 929, L30 (2022).

## TECHNICAL SKILLS AND INTERESTS

**Languages:** English & Chinese

**Programming Languages:** c/c++ & Python

**Soft Skills:** basic Linux, L<sup>A</sup>T<sub>E</sub>X, VisIt, Cloudy, Matlab and etc

**Courses:** Accretion power in astrophysics, The first galaxies in the Universe, Cosmology, Galaxy structure and evolution, Galactic dynamics, Physics of the Interstellar And Intergalactic medium.

**Areas of Interest:** SMBH physics, BH accretion, AGN feedback, Co-evolution between SMBHs and host galaxies, High-z Quasars, AGN outflow/wind/jet, numerical simulations and etc