Doosoo Yoon

Curriculum Vitae

Contact Information

Postdoctoral Fellow
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Education

PhD, Astronomy, University of Wisconsin-Madison, 2015

- Thesis Topic: *"Headwinds and Bow shocks: The Interaction of Relativistic Outflows from Compact Objects with Interstellar Matter"*
  -Supervisor: Prof. Sebastian Heinz

MS, Physics and Astronomy, Seoul National University, 2008

- Thesis Topic: *"Evolution of Self-gravitating Gaseous Disks in Barred Galaxies"*
  -Supervisor: Prof. Woong-Tae Kim

BA, Physics and Astronomy, Seoul National University, 2006

- Thesis Topic: *"Growth of Self-gravitating Structures in Models of Galactic Gas Disk"*
  -Supervisor: Prof. Woong-Tae Kim

Research Experience

Postdoctoral Researcher - Anton Pannekoek Institute, 2018-present

- performed general relativistic magneto-hydrodynamic (GRMHD) simulations to study the dynamical evolution of accretion disk and jets
- developed the GPU-enabled parallelized GRMHD code, H-AMR, and worked with general-relativistic radiative transfer code, BHOSS and iGRmonty
- programmed with c++, CUDA, Fortran and analysed/visualized with Python
- run the simulations on super-computer & GPU clusters (SUMMIT cluster in Oak Ridge Leadership Computing Facility, Beluga cluster in ComputeCanada)

Advisor: Prof. Sera Markoff

Postdoctoral Researcher - Shanghai Astronomical Observatory, 2015-2018

- performed multi-dimensional hydrodynamic simulations to study the effects of active galactic nuclei Feedback on the evolution of early-type galaxies
- worked with ZEUS-MP code which is a parallelized hydrodynamic algorithm
- programmed with Fortran, and analysed/visualized with Python and IDL
- run the simulations on super-computer clusters in SHAO (LN01: 1792 processors, Bright60: 600 processors, Bright61: 512 processors)

Advisor: Prof. Feng Yuan

Research Assistant - University of Wisconsin-Madison, 2009-2015

- performed 3 dimensional hydrodynamic simulations to study the interaction of a microquasar jet or a pulsar wind with interstellar medium
- worked with FLASH code which is a modular, parallel, and an adaptive mesh refinement algorithm
- programmed with Fortran, and analysed/visualized with Python and IDL

- run the simulations on MEDUSA (Department Cluster; assigned to 192 processors), Advanced Computing Infrastructure (UW-Madison; assigned to 400 processors), and Extreme Science and Engineering Discovery Environment (XSEDE No. AST140042; assigned to 1 million CPU-Hours)

  Supervisor: Prof. Sebastian Heinz

Research Assistant - Seoul National University, 2006-2009

- performed 2.5 dimensional hydrodynamic simulations to investigate the dynamics of gaseous disk in barred spiral galaxy
- worked with both grid based codes including ZEUS, TVD, CMHOG and a smoothed-particle code, GADGET
- programmed with Fortran, C, C++, and analysed with IDL

  Supervisor: Prof. Woong-Tae Kim

Teaching Experience

Teaching Assistant - University of Wisconsin-Madison, 2011 & 2015
Astronomy 103 *"The Evolving Universe"* (Fall 2011 & Spring 2015)

- led 6 discuss sections per week including planetarium sessions, and guided students with quizzes and office-hour interactions.

Teaching Assistant - Seoul National University, 2007-2009
Astronomy 046.006 *"Human and Universe"* (Spring 2007), Astronomy 046.007 *"The Evolving Universe"* (Spring 2009)

- aided introductory astronomy laboratory exercises, observing sessions and graded exams and reports

Honors & Awards

- Awarded NSFC Research Grant starting from Sep., 2016, Chinese Academic of Science (Grant 11650110427)
- Awarded CAS PIFI Fellowship starting from Jan., 2016, Chinese Academic of Science
- Awarded allocation of high-end computational resources in the XSEDE (1 million cpu-hours, TG-AST140042, PI: Sebastian Heinz)
- Awarded Vilas Conference Presentation Grant: Fall 2014, University of Wisconsin-Madison
- Awarded the AAS International Travel Grant: Summer 2014, AAS
- Awarded Vilas Conference Presentation Grant: Spring 2014, University of Wisconsin-Madison

Publications

Chatterjee, K., Markoff, S., Neilsen, J., Younsi, Z., Witzel, G., Tchekhovskoy, A., **Yoon, D.**, Ingram, A., van der Klis, M., Boyce, H., Do, T., Haggard, D., Nowak, M. *"General relativistic MHD simulations of non-thermal flaring in Sagittarius A*"* (2021) submitted to the publication in MNRAS (https://arxiv.org/abs/2011.08904)

Yoon, D., Chatterjee, K., Markoff, S., van Eijnatten, D., Younsi, Z., Lisk, M., Tchekhovskoy, A. *"Spectral and Imaging properties of Sgr A* from High-Resolution 3D GRMHD Simulations with Radiative Cooling"* (2020) MNRAS, Vol. 499, Issue 3, p. 3178

Chatterjee, K., Younsi, Z., Liska, M., Tchekhovskoy, A., Markoff, S., **Yoon, D.**, van Eijnatten, D., Hesp, C., Ingram, A., van der Klis, M. *"Observational signatures of disk and jet misalignment in images of accreting black holes"* (2020) MNRAS, Vol. 499, issue 1, p. 362

Yoon, D., Yuan, F., Ostriker, J.P., Ciotti, L., Zhu, B. (2019) *"On the Role of the Hot Feedback Mode in Active Galactic Nuclei Feedback in an Elliptical Galaxy"* (2019) ApJ, Vol. 885, Issue 1, p. 16

Yoon, D., Yuan, F., Gan, Z., Ostriker, J.P., Li, Y., and Ciotti, L. *"Active Galactic Nucleus Feedback in an Elliptical Galaxy with the Most Updated AGN Physics (II): High-Angular Momentum Case"* (2018) ApJ, Vol. 864, Issue 1, p. 6

Li, Y., Yuan, F., Mo, H., **Yoon, D.**, Gan, Z., Ho, L., Wang, B., Ostriker, J.P., and Ciotti, L. *"Stellar and AGN feedback in isolated early-type galaxies: the role in regulating star formation and ISM properties"* (2018) ApJ, Vol. 866, Issue 1, p. 70

Yuan, F., **Yoon, D.**, Li, Y., Gan, Z., Ho, L.C., and Guo, F. *"Active Galactic Nucleus Feedback in an Elliptical Galaxy with the Most Updated AGN Physics (I): Low-Angular Momentum Case"* (2018) ApJ, Vol. 857, Issue 2, p. 121

Yoon, D. and Heinz, S. *"Bow-shock pulsar-Wind nebulae passing through density discontinuities"* (2017) MNRAS, Vol. 464, Issue 3, p. 3297

Morsony, B., Gracey, B.T., Workman, J.C., and **Yoon, D.** *"G2 and Sgr A*: A Cosmic Fizzle at the Galactic Center"* (2017) ApJ, Vol. 843, Issue 1, p. 29.

Yoon, D., Zdziarski, A. A., and Heinz, S. *"Formation of recollimation shocks in jets of high-mass X-ray binaries"* (2016) MNRAS, Vol. 456, Issue 4, p. 3638.

Yoon, D. and Heinz, S. *"Global Simulations of the Interaction of Microquasar Jets with a Stellar wind in High-Mass X-ray Binaries"* (2015) ApJ, Vol. 801, Issue 1, P. 55.

Kim, W., Seo, W, Stone, J.M., and **Yoon, D.**, Teuben, P.J. *"Central Regions of Barred Galaxies: Two-dimensional Non-self-gravitating Hydrodynamic Simulations"* (2012) ApJ, Vol. 747, Issue 1, p. 60.

Yoon, D., Morsony, B., Heinz, S., Wiersema, K., Fender, R.P., Russell, D., and Sunyaev, R. *"Jet Trails and Mach Cones: The Interaction of Microquasars with ISM"* (2011) ApJ, Vol. 742, Issue 1, p. 25.

Talks & Posters

Markoff, S., **Yoon, D.**, Chatterjee, K., Younsi, Z. "Spectral Properties of Sgr A* from 3D GRMHD Simulations with Radiative Cooling" AAS Meeting; Honolulu, HI; January, 2020

Yoon, D., Yuan, F., Gan, Z. " Effects of AGN Feedback on the evolution of Early-Type Galaxies" HEAD meeting; Sun Valley, ID; August, 2017

Heinz, S., **Yoon, D.**, Zdziarski, A.A. "The interaction of microquasar jets with the companion wind" HEAD meeting; Sun Valley, ID; August, 2017

Yoon, D., Heinz, S. "Global Simulations of the Interaction of Microquasar Jets with a Stellar wind in High-Mass X-ray Binaries" AAS Meeting; Seattle, WA; January, 2015

Yoon, D., Heinz, S. "Global Simulations of the Interaction of Microquasar Jets with a Stellar wind in High-Mass X-ray Binaries" Chandra Symposium; Boston, MA; November, 2014

Yoon, D., Heinz, S. "The effects of Ambient Density Discontinuity on the Evolution of Bow-shock Pulsar Wind Nebula" HEAD meeting; Chicago, IL; August, 2014

Yoon, D., Heinz, S. "The Interaction of Microquasar Jets with a Stellar Wind in High-Mass X-ray Binaries" Asia-Pacific Regional IAU Meeting, S. Korea; August, 2014

Yoon, D., Heinz, S. "The Dynamics of Microquasars Jets in Circum-binary Environment of HMXBs" AAS Meeting; Washington D.C. 223; January, 2014

Service & Outreach

- give a lecture in Astronomy Summer Course, organized by the STEDU Association: June, 2021
- organized the summer school, Advancing Theoretical Astrophysics in Amsterdam: July, 2019
- organized the Science Lunch for Young Researchers as a chair: 2017-2018
- organized the "Meet the Speaker" which is an informal meeting between graduate students and an invited speaker: 2011-2013
- operated the public opening of Washburn Observatory for three nights in a year: 2009-2015