Doosoo Yoon

Curriculum Vitae

Contact Information

Postdoctoral Fellow
Anton Pannekoek Institute for Astronomy
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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 for Astronomy, University of Amsterdam, 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-computing CPU & GPU clusters (SUMMIT cluster in Oak Ridge Leadership Computing Facility, Beluga & Narval clusters in ComputeCanada)

Advisor: Prof. Sera Markoff

PIFI Postdoctoral Research fellow - 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 help students with small group discussions and office-hour individual 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

Mentoring Experience

- Co-advising PhD students in the University of Amsterdam, León Sosapanta and Wanga Mulaudzi, for building their research projects on GRMHD simulations and GRRT post-processing: August, 2021 - present
- supervising a master's student in the University of Amsterdam, Robin Leichtnam for his master thesis, *"The role of Electron Heating on the Dynamics of Hot Accretion Flows"*: September, 2020 – present
- Mentoring postdoctor Yaping Li in the Shanghai Astronomical Observatory for the numerical study of AGN feedback, which resulted in 1 peer-reviewed publication: September, 2016 – May, 2018

Honors & Awards

- Awarded an AAS and IOP Publishing China one of Top 1% Cited Papers Award in the Astrophysical Journal *"Active Galactic Nucleus Feedback in an Elliptical Galaxy with the Most Updated AGN Physics. I. Low Angular Momentum Case"*: September, 2021, IOP Publishing
- Awarded allocation of GPU clusters from the Resources for Research Group (RRG) Competition in Compute Canada: 2019–, 40 GPU-year in total, PI: Daryl Haggard
- Awarded NSFC Research Grant: September, 2016, Chinese Academic of Science (Grant 11650110427)
- Awarded CAS PIFI Fellowship: January, 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

Service & Outreach

- gave a lecture in Astronomy Summer Course, organized by the STEDU Association: June, 2021
- organized the group meetings and the group blog which is designed to communicate with the public readers: September, 2018 – present
- conducted a local organizing committee (LOC) at the summer school, Advancing Theoretical Astrophysics in Amsterdam: July, 2019
- organized the Science Lunch for Young Researchers in the Shanghai Astronomical Observatory as a chair: 2017-2018
- gave public lectures in "universe in the park" program in the University of Wisconsin-Madison: 2012-2014
- 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

Immigrant Status

hold a permanent resident card that was issued in September, 2021.

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) MNRAS, Vol. 507, Issue 4, p. 5281

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., **Yoon, D.**, and 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.

EHT-Related Publications

Janssen, M., Falcke, H., Kadler, M.,..., **Yoon, D.**,... *"Event Horizon Telescope observations of the jet launching and collimation in Centaurus A"* (2021) Nature Astronomy, DOI:10.1038/s41550-021-01417-w

Kocherlakota, P., Rezzolla, L., Falcke, H.,..., **Yoon, D.**,... *"Constraints on black-hole charges with the 2017 EHT observations of M87*"* (2021) Physical Review D, Vol. 103, Issue 10, article id.104047

Narayan, R., Palumbo, D., Johnson, M.,...,**Yoon, D.**,... *"The Polarized Image of a Synchrotron-emitting Ring of Gas Orbiting a Black Hole"* (2021) ApJ, Vol. 912, Issue 1, p. 35.

EHT MWL Science Working Group,...,**Yoon, D.**,... *"Broadband Multi-wavelength Properties of M87 during the 2017 Event Horizon Telescope Campaign"* (2021) ApJL, Vol. 911, Issue 1, p. L11.

Goddi, C., Martí-Vidal, I., Messias, H.,...,**Yoon, D.**,... *"Polarimetric Properties of Event Horizon Telescope Targets from ALMA"* (2021) ApJL, Vol. 910, Issue 1, p. L14.

Akiyama, K., Algaba, J., Alberdi, A.,...,**Yoon, D.**,... *"First M87 Event Horizon Telescope Results. VIII. Magnetic Field Structure near The Event Horizon"* (2021) ApJL, Vol. 910, Issue 1, p. L13.

Akiyama, K., Algaba, J., Alberdi, A.,...,**Yoon, D.**,... *"First M87 Event Horizon Telescope Results. VII. Polarization of the Ring"* (2021) ApJL, Vol. 910, Issue 1, p. L12.

Kim, J., Krichbaum, T., Broderick, A.,...,**Yoon, D.**,... *"Event Horizon Telescope imaging of the archetypal blazar 3C 279 at an extreme 20 microarcsecond resolution"* (2020) A&A, Vol. 640, p. A69.

Wielgus, M., Akiyama, K., Blackburn, L.,...,**Yoon, D.**,... *"Monitoring the Morphology of M87* in 2009-2017 with the Event Horizon Telescope"* (2020) ApJ, Vol. 901, Issue 1, p. 67.

Gold, R., Broderick, A., Younsi, Z.,...,**Yoon, D.**,... *"Verification of Radiative Transfer Schemes for the EHT"* (2020) ApJ, Vol. 897, Issue 2, p. 148.

Broderick, A., Gold, R., Karami, M.,...,**Yoon, D.**,... *"THEMIS: A Parameter Estimation Framework for the Event Horizon Telescope"* (2020) ApJ, Vol. 897, Issue 2, p. 139.

Psaltis, D., Medeiros, L., Christian, P.,...,**Yoon, D.**,... *"Gravitational Test beyond the First Post-Newtonian Order with the Shadow of the M87 Black Hole"* (2020) Physical Review Letters, Vol. 125, Issue 14, article id.141104

Non-Refereed Publications

Liska, M., Chatterjee, K., Tchekhovskoy, A., **Yoon, D**. van Eijnatten, D., Hesp, C., Markoff, S., Ingram, A., and van der Klis, M. *"*`H-AMR`*: A New GPU-accelerated GRMHD Code for Exascale Computing With 3D Adaptive Mesh Refinement and Local Adaptive Time-stepping"* (2019) eprint arXiv:1912.10192

Yuan, F., Ostriker, J., **Yoon, D.**, Li, Y., Ciotti, L., Gan, Z., and Guo, F. *"Numerical study of active galactic nucleus feedback in an elliptical galaxy with* `MACER`*"* (2018) eprint arXiv:1807.05488

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