

Taeho Ryu

CONTACT INFORMATION

The Max-Planck Institute for Astrophysics,
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Citizenship : Korean citizen
US permanent resident

PROFESSIONAL EXPERIENCE

The Max-Planck Institute for Astrophysics - MPA, Germany 2021– present
MPA fellow (100% independent)

Johns Hopkins University - JHU, USA 2018 – 2021
Postdoctoral research fellow

Stony Brook University - SUNY, USA 2019 – 2020
Visiting scholar

EDUCATION

Stony Brook University - SUNY, USA 2014 – 2018
Ph.D., Physics, 2018 (Advisor: Rosalba Perna)
M.A., Physics, 2014

Korea Institute for Advanced Study - KIAS, South Korea 2011 – 2012
Research Assistant to Professor Kimyeong Lee (Department of Physics)

Seoul National University - SNU, South Korea 2011
B.S. in Chemistry & Physics (Double-major/Cum Laude)
Teaching Practicum in

Department of Physics & Astrophysics, SNU, South Korea Winter 2010
Internship (Advisor: Professor Sunkee Kim)
World Class University - WCU - Center for High Energy Physics
Experiment preparations; Study of Neutron Detector control
Thesis: *Characterizing efficiencies of two different neutron detectors in efficiency*

Department of Chemistry, SNU, South Korea 2010 - 2010
Internship (Advisor: Professor Sangyoub Lee)
Theoretical & Computational Chemistry, Biophysics, Polymer Physics Laboratory
Topic: Computer Programming for Chemistry and Coding - CHARMM
Thesis: *Molecular dynamics simulation of a sodium chloride ion pair in water*

RESEARCH

Primary interests: Time domain Astronomy, Multi-messenger transients, Tidal disruption events, Gravitational waves, Formation of runaway/hypervelocity stars, Supermassive black hole binaries, Formation and interaction of Black Holes in the early universe - AGN & High-Mass X-ray Binaries, Dynamics of stellar clusters, Exoplanets.

Methods: Relativistic and Newtonian hydrodynamics simulation, N -body simulations, time-dependent Fokker-Planck integrator, stellar evolution simulation

HONORS, AWARDS AND AFFILIATION	IAU junior member , The International Astronomical Union	06/2022 - present	
	Member of LISA consortium	11/2022 - present	
	Member of KSEA	09/2014 - present	
	Dresden Prize (for outstanding theoretical thesis prize), SUNY	05/2018	
	Peter B. Kahn Fellowship , SUNY	05/2016	
	SNUANY Scholarship Award , Seoul National University Alumni Association of Greater New York -SNUANY	11/2014	
	SNUANY Scholarship Award , SNUANY	12/2013	
	The Benjamin Lee Award , SUNY	05/2013	
	SNU Outstanding Student award (Twice winner), SNU, South Korea	2009 - 2010	
	National Scholarship for Science & Engineering (Thrice winner), Korea Student Aid Foundation,	2009 - 2010	
	SNU Scholarship for Superior Academic Performance (Five-time winner), SNU, 2005 - 2007		
	SUPERCOMPUTING ALLOCATIONS	Principal Investigator: HLR5 (Stuttgart), project name : <i>Global Relativistic Magneto-hydrodynamics Simulations of the Long-term Evolution of Tidal Debris in Tidal Disruption Events of Stars</i> , amount : 55M cpu hours on Hawk	
INVITED TALKS	Department colloquium , The University of Tübingen, Germany	07/2022	
	Black hole workshop , The Niels Bohr Institute, Denmark	06/2022	
	MPA seminar , The Max-Planck Institute for Astrophysics, Germany	10/2021	
	Astro UdeC Seminar , the Universidad de Concepción, Chile	04/2021	
	CTC seminar , University of Maryland, USA	06/2019	
	Wine&Cheese seminar , Johns Hopkins University, USA	04/2019	
	Department seminar , Stony Brook University, USA	04/2018	
	Numerical scattering workshop , the Flatiron Institute, USA	12/2017	
	Talk for undergraduate students (AST200 by Prof. Jin Koda), SUNY	02/2017	
	Black Hole Network Workshop , the Flatiron Institute, USA	12/2016	
	MODEST-16 NYC Gas and Gravitational Dynamics , USA	09/2016	
	Saint-Petersburg WORKSHOP 2016 , Russia	09/2016	
	Frontier Research in Astrophysics – II , Italy	05/2016	
	Astronomy Seminar , Columbia University, USA	05/2016	
CONTRIBUTION TALKS	the XMM-Newton Workshop 2022 , Spain	06/2022	
	Growing black holes: Accretion and mergers , Nepal	05/2022	
	SESTAS meeting , The Max-Planck Institute for Astrophysics	10/2021	
	HotSci@JHU/STScI , STScI	08/2021	

	European Astronomical Society Annual Meeting , Leiden	07/2021
	Tidal Disruptions in Kyoto: Confronting Theory with Observations , Yukawa Institute for Theoretical Physics, Kyoto university, Japan	01/2020
POSTER	Distorted Astrophysical disks , University of Cambridge	05/2021
	The 7th Annual Johns Hopkins Postdoctoral Conference , JHU	04/2021
PROFESSIONAL SERVICE	Referee for <i>Monthly Notices of the Royal Astronomical Society</i> , <i>The Astrophysical Journal</i>	
OUTREACH EXPERIENCE	Member of the MPA planetarium team	04/2022 - present
	Present a planetarium show, lecture or talk to students visting MPA	
	Making a movie with NASA for the annual event “Black Hole Friday”	
	0.3M views on YouTube in less than a week (https://www.youtube.com/watch?v=ALnZcRoQDY&t=23s)	
	The Johns Hopkins Korean Graduate Student Association , JHU, USA	09/2019
	Invited public talk for Networking night (annual event)	
	Language Education Institute , SNU, South Korea	Spring 2011
	Teaching Assistant Program: Korean and Korean Culture for International Students	
	SNU Obstacle Person Support Center , SNU, South Korea	Spring 2009
	Assistant to a hearing-impaired student, and provider of study aid	
	Seoul Metropolitan Office of Education , SNU, South Korea	Spring 2009
	Teaching Assistant, high-school mathematics, Donghaeng Project	
	Kyujanggak Institute for Korean Studies , SNU, South Korea	Spring 2011
	Docent Program: Improving public understanding of Documentary Heritage of Chosun Dynasty	
	Museum of Art , SNU, South Korea	Spring 2011
	Docent Program: Improving public understanding of interactive media art in The Garden of Forking Paths	
STUDENT SUPERVISION	Alonso Herrera (Master student, co-supervised with prof. Nathan Leigh), Universidad de Concepción	
	José Pinto (Master student, co-supervised with prof. Nathan Leigh), Universidad de Concepción	
LEADERSHIP EXPERIENCE	Seminar organizer , the Stellar Department at MPA	09/2021 - 09/2022
	Role: invite speakers (typically two speakers for each week), schedule seminars and chair the sessions for talks and discussions (along with two other organizers)	
	Department of Chemistry , SNU, South Korea	2005 - 2006

Department Activities Representative and Organizer
(Student competitions, membership training, freshmen welcoming, etcetera)

SNU Campus Life and Culture Center, SNU, South Korea 2010 - 2011
Mentor-team Manager in SNU Compliance/Mentoring Program
Elected Leader (30 members, My team chosen Best Team of the Year)

TECHNICAL
EXPERIENCE

Computing skills: Fortran, C++, Python
Code: development of multi-domain infrastructure PATCHWORKMDH, usage of GRMHD code HARM3D, Moving-mesh magnetodyhanics code AREPO (<https://arepo-code.org/>), Newtonian AMR hydrodynamics code CASTRO (<https://amrex-astro.github.io/Castro/>)
Analysis: python, Matplotlib, Paraview, mathematica, GNUplot
Presentation: Latex, Overleaf, Wordpress, Microsoft Office, GitLab, GitHub
High Performance computing: the US (Frontera, Stampede, Rockfish, Seawulf), Germany (Hawk hrs, SuperMUC Leibniz, Cobra, Raven, Freya)

Communication skills: Spoken languages: Korean (native), English (Advanced proficiency in Reading, Writing, Listening, Speaking), Germany (beginner level)

CERTIFICATION

Korean National Teacher Certification 2011
Craftsman Information Processing Certification - HR Development Service of Korea 2009

EXTRA-
CURRICULAR
ACTIVITY

Central Library, SNU, South Korea Spring 2009
Teaching Assistant
Program: Enhancing librarians' grasp of basic scientific concepts in chemistry and physics

Seoul, South Korea Summer 1997
Runner-up, national kendo competition sponsored by the city of Seoul

MILITARY SERVICE

Military Required Service, South Korea 2007 – 2009
Rank of Sergeant
Served inter alia in Food/Water Inspectorate (Laboratory) plus assist. mgmt.

COLLABORATORS

Selma de Mink (MPA), Rosalba Perna (SUNY), Julian Krolik (JHU), Tsvi Piran (Hebrew University of Jerusalem), Zoltan Haiman (Columbia), Nathan Leigh (University of Concepcion), Alessandro Trani (University of Tokyo), Ruediger Parkmor (MPA), Yihan Wang (University of Nevada, Las Vegas), Mark Avara (University of Cambridge)

References

Prof. Rosalba Perna, Professor,
Department of Physics and Astronomy, Stony Brook University,
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Prof. Selma de Mink, Scientific Director,
The Stellar Department, the Max Planck Institute for Astrophysics,
Karl-Schwarzschild-Str. 1, 85748, Garching, Germany
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Prof. Julian Krolik, Professor
Department of Physics And Astronomy, Johns Hopkins University,
Bloomberg Center for Physics and Astronomy,
3400 N. Charles Street, Baltimore, MD 21218, USA
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Prof. Tsvi Piran, Schwartzman Chair for Theoretical Physics
Racah Institute for Physics, The Hebrew University of Jerusalem
Edmond J. Safra Campus, Jerusalem 9190401, Israel
Telephone: +972 26584233
Email: tsvi.piran@mail.huji.ac.il

Publications

Articles in refereed Journals

19. **Ryu, T.**, Perna, R., Wang, Y. *Close Encounters of Stars with Stellar-mass Black Hole Binaries*, MNRAS, 516, 2204 (2022), arXiv: 2206.00603
18. **Ryu, T.**, Trani, A. A. , Leigh, N.W.C. *Tidal Disruption Events by Compact Supermassive Black Hole Binaries*, MNRAS, 515, 2430 (2022), arXiv: 2202.07668
17. McKernan, B., Ford, K.E.S., Cantiello, M., Graham, M.J., Jermyn, A.S., Leigh, N.W.C., **Ryu, T.**, Stern, D. *Starfall: A heavy rain of stars in 'turning on' AGN*, MNRAS, 514, 3 (2022), arXiv: 2110.03741
16. **Ryu, T.**, Krolik, J., Piran, T. *The Impact of Shocks on the Vertical Structure of Eccentric Disks*, ApJ, 920.2, 130, arXiv: 2105.09434 (2021)
15. **Ryu, T.**, Krolik, J., Piran, T. *Measuring stellar and black hole masses of tidal disruption events*, ApJ, 904.1, 73 (2020), arXiv: 2007.13765
14. Krolik, J., Piran, T., **Ryu, T.** *Tidal Disruptions of Main Sequence Stars – V. The Varieties of Disruptions*, ApJ, 904.1, 68 (2020), arXiv: 2001.03234
13. **Ryu, T.**, Krolik, J., Piran, T., Noble, N. *Tidal Disruptions of Main Sequence stars – IV. Relativistic effects and dependence on black hole mass*, ApJ, 904.2, 101 (2020), arXiv: 2001.03504
12. **Ryu, T.**, Krolik, J., Piran, T., Noble, N. *Tidal Disruptions of Main Sequence stars – III. Stellar mass dependence of the character of partial disruptions*, ApJ, 904.2, 100 (2020), arXiv: 2001.03503
11. **Ryu, T.**, Krolik, J., Piran, T., Noble, N. *Tidal Disruptions of Main Sequence stars – II. Simulation methodology and stellar mass dependence of the character of full tidal disruptions*, ApJ, 904.2, 99 (2020), arXiv: 2001.03502
10. **Ryu, T.**, Krolik, J., Piran, T., Noble, N. *Tidal Disruptions of Main Sequence Stars – I. Observable Quantities and their Dependence on Stellar and Black Hole Mass*, ApJ, 904.2, 98 (2020), arXiv: 2001.03501
9. **Ryu, T.**, Zingale, M., Perna, R. *Turbulence-driven thermal and kinetic energy in the atmospheres of hot Jupiters*, MNRAS, 481, 5517 (2018)
8. Ibragimov, T., Leigh, N., W. C., **Ryu, T.**, Panurach, T., Perna, R. *When do star clusters become multiple star systems? II. Toward a half-life formalism for arbitrary particle masses*, MNRAS, 477, 4213 (2018)
7. **Ryu, T.**, Perna, R., Haiman, Z., Ostriker, J. P., Stone, N. C. *Interactions between multiple supermassive black holes in galactic nuclei: a solution to the final parsec problem*, MNRAS, 473, 3410 (2018)
6. Belczynski, K., **Ryu, T.**, Perna, R., Berti, E., Tanaka, T. L., Bulik, T. *On the likelihood of detecting gravitational waves from Population III compact object binaries*, MNRAS, 471, 4702 (2017)
5. **Ryu, T.**, Leigh, N., W. C., Perna, R. *Formation of runaway stars in a star-cluster potential*, MNRAS, 470, 3049 (2017)

4. **Ryu, T.**, Leigh, N. W. C., Perna, R. *An analytic method for identifying dynamically-formed runaway stars*, MNRAS, 470, 2 (2017)
3. **Ryu, T.**, Leigh, N. W. C., Perna, R. *Numerical study of the $N = 4$ binary-binary scatterings in a background potential*, MNRAS, 467, 4447 (2017)
2. **Ryu, T.**, Tanaka, T. L., Perna, R., Haiman, Z. *Intermediate-mass black holes from Population III remnants in the first galactic nuclei*, MNRAS, 460, 4122 (2016)
1. **Ryu, T.**, Tanaka, T. L., Perna, R. *Formation, disruption and energy output of Population III X-ray binaries*, MNRAS, 456, 223 (2016)

Articles in conference proceedings

1. **Ryu, T.**, Tanaka, T. L., Perna, R. *Population III X-Ray Binaries*, in “Frontier Research in Astrophysics – II”, Italy, (2016).