

Taeho Ryu

CONTACT INFORMATION

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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 - SBU, USA 2019 – 2020
Visiting scholar

EDUCATION

Stony Brook University - SBU, USA 2014 – 2018
Ph.D., Physics, 2018 (Advisor: Professor 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 2005 – 2011
B.S. in Chemistry & Physics (Double-major/Cum Laude)
Teaching Practicum in

Department of Physics & Astrophysics, SNU, South Korea 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
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), SBU	05/2018	
	Peter B. Kahn Fellowship , SBU	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 , SBU	05/2013	
	SNU Outstanding Student award (Twice winner), SNU,	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: <i>HLRS</i> (Stuttgart tier 1), 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	2022 MIAPP Conference “The Fundamental Role of Stellar Multiplicity in Stellar Dynamics and Evolution” , MIAPP, Germany	11/2022
Department colloquium , the University of Tübingen, Germany		07/2022	
Black hole workshop , the Niels Bohr Institute, Denmark		06/2022	
MPA seminar , MPA, 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 , SBU, USA		04/2018	
Numerical scattering workshop , the Flatiron Institute, USA		12/2017	
AST200 course (by Prof. Jin Koda, talk for undergradate students), SBU		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 , MPA	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
TEACHING EXPERIENCE	Teaching Assistant , Department of Physics and Astronomy, SUNY, USA	2012-2014
	Teaching practicum , Seoul National University Girls' Middle School, South Korea	Spring 2011
	Teaching Assistant , Language Education Institute, SNU, South Korea	Spring 2011
	Teaching Assistant , Central Library, SNU, South Korea - Enhancing librarians' grasp of basic scientific concepts in chemistry and physics	Spring 2009
	Teaching Assistant , Hansung high school, South Korea - Volunteer work to teach mathematics for high-school students	Spring 2009
OUTREACH EXPERIENCE	Member of the MPA planetarium team Present a planetarium show, lecture or talk to students visiting MPA	04/2022 - present
	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=ALnlZcRoQDY&t=23s)	
	The Johns Hopkins Korean Graduate Student Association , JHU Invited public talk for Networking night (annual event)	09/2019
	SNU Obstacle Person Support Center , SNU, South Korea Assistant to a hearing-impaired student, and provider of study aid	Spring 2009
	Kyujanggak Institute for Korean Studies , SNU, South Korea Docent Program: Improving public understanding of Documentary Heritage of Chosun Dynasty	Spring 2011
	Museum of Art , SNU, South Korea Docent Program: Improving public understanding of interactive media art in The Garden of Forking Paths	Spring 2011
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	
PROFESSIONAL SERVICE	Referee for <i>Monthly Notices of the Royal Astronomical Society</i> , <i>The Astrophysical Journal</i>	

LEADERSHIP EXPERIENCE	<p>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)</p> <p>Department of Chemistry, SNU, South Korea 2005 - 2006 Department Activities Representative and Organizer (Student competitions, membership training, freshmen welcoming, etcetera)</p> <p>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)</p>
TECHNICAL EXPERIENCE	<p>Computing skills: Fortran, C/C++, Python</p> <p>Code: development of multi-domain infrastructure PATCHWORKMDH, usage of GRMHD code HARM3D, Moving-mesh magnetohydrodynamics code AREPO (https://arepo-code.org/), Newtonian AMR hydrodynamics code CASTRO (https://amrex-astro.github.io/Castro/)</p> <p>Analysis: python, Matplotlib, Paraview, mathematica, GNUplot</p> <p>Presentation: Latex, Overleaf, Wordpress, Microsoft Office, GitLab, GitHub</p> <p>High Performance computing: the US (Frontera, Stampede, Rockfish, Seawulf), Germany (Hawk hrs, SuperMUC Leibniz, Cobra, Raven, Freya)</p> <p>Communication skills: Spoken languages: Korean (native), English (Advanced proficiency in Reading, Writing, Listening, Speaking), Germany (beginner level)</p>
CERTIFICATION	<p>Korean National Teacher Certification 2011</p> <p>Craftsman Information Processing Certification - HR Development Service of Korea 2009</p>
EXTRA- CURRICULAR ACTIVITY	<p>Runner-up, national kendo competition sponsored by the city of Seoul, South Korea 1997</p>
MILITARY SERVICE	<p>Military Required Service, South Korea 2007 – 2009 Rank of Sergeant Served inter alia in Food/Water Inspectorate (Laboratory) plus assist. mgmt.</p>
COLLABORATORS	<p>Selma de Mink (MPA), Rosalba Perna (SBU), Volker Springel (MPA), Julian Krolik (JHU), Zoltan Haiman (Columbia), Tsvi Piran (Hebrew University of Jerusalem), Ruediger Parkmor (MPA), Stephen Justham (MPA), Jing-Ze Ma (MPA), Pavan Vynatheya (MPA), Earl Bellinger (MPA), Robert Farmer (MPA), Jakub Klenchi (ESO), Tiara Battich (MPA), Deepika Bollimpalli (MPA), Chen Wang (MPA), Valeriya Korol (MPA), Nathan Leigh (University of Concepcion), Alessandro Trani (University of Tokyo), Yihan Wang (University of Nevada, Las Vegas)</p>

References

Prof. Rosalba Perna, Professor
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Email: tsvi.piran@mail.huji.ac.il

Publications

Articles in refereed Journals

21. **Ryu, T.**, Perna, R., Parkmor, R., Ma, J., Farmer, R., de Mink, S. *Close Encounters of Tight Binary Stars with Stellar-mass Black Holes*, accepted for publication in MNRAS (2023), arXiv: 2211.02734
20. **Ryu, T.**, Krolik, J., Piran, T. *Extremely Relativistic Tidal Disruption Events*, submitted to ApJL (2022), arXiv: 2211.00059
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).