

Donghyeon J. Khim (Kim)

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Education

Yonsei University, Seoul, Republic of Korea (https://www.yonsei.ac.kr/en_sc/ & <http://astro.yonsei.ac.kr/>)

Certificate of Passing Qualifying Examination (Ph.D.): Astronomy 2018–2021

- Research Topic: “The origin of the star-gas misalignment in Horizon-AGN”

- Supervisor: Professor Sukyoung K. Yi

◦ Total GPA 4.20 / 4.3 4.00 / 4.0

- Relevant Courses: Stellar Evolution & Populations, Advanced Astronomical Computation and Statistics, Galaxies Formation and Evolution, External Galaxies, Observational Techniques (graduate), Space Instruments, Special Lecture on Observational Astronomy, Special Lecture on Computational Astronomy, Machine Learning and its Application, Mathematical Physics, Galactic Structure

Bachelor of Science: Astronomy & Physics (Double majors) 2011–2018

◦ Total GPA 4.12 / 4.3 3.91 / 4.0

◦ Astronomy GPA 4.28 / 4.3 4.00 / 4.0

- Relevant Courses: Observational Techniques (undergraduate), Galaxies and Universe, Space Astronomy, Scientific Image Data Processing, Stellar Evolution, Astrodynamics, Astronomical Optics, Astrophysics, Cosmology, Computational Physics, Mechanics, Electricity&Magnetism, Quantum Mechanics, Thermal Physics, Statistical Physics

Research Experience

Star-gas misalignment in “Horizon-AGN”, a cosmological large-volume simulation 2018–2021

- Supervised by Prof. Sukyoung K. Yi

- Analyzed physical properties and environment of the star-gas misaligned galaxies in the Horizon-AGN simulation and compared the result with those of the Sydney-AAO Multi-object Integral field spectrograph (SAMI) Galaxy Survey.

- Investigated the origin of star-gas misalignment in the simulation.

Finding jellyfish galaxies in “Horizon-AGN” based on deep learning technique 2019–present

- Classified the jellyfish galaxies based on the convolutional neural network (CNN) technique

- Analyzed physical properties and the number of jellyfish galaxies as a function of time

Analyzing the properties of the simulated galaxies in “Horizon-AGN” and “New Horizon” 2019–2021

- Supervised by Prof. Sukyoung K. Yi

- Measured physical properties (Mass, V/σ , star formation history, etc.) of simulated galaxies for the Middle-Ages Galaxy Properties with Integral Field Spectroscopy (MAGPI) survey paper

- Analyzed rotation motions of star, gas, and dark matter particles in the New Horizon simulation

CCD Photometry of the variable stars in the regions of BX-Dra, M34, and NGC 6871 2009–2015

- Supervised by Dr. Young-Beom Jeon (KASI, Korea Astronomy and Space Science Institute)

- Performed a multiple-frequency analysis and found new variable stars with a time-series BV CCD photometry

- Found 5 new variable stars in the region of BX-Dra, 25 variable stars in M34, and 54 variable stars in NGC 6871

Computer program developments

- Developed the Surveillance program for United Nations Command Security Battalion – Joint Security Area 2015–2016

◦ Calculated the coordinates, ground speed, and elevation of targets & automatically classified events

- Developed the telescope operating system for Yonsei University’s Ilsan Observatory 2011–2013

Selected Conference Talks & Seminars

- 2021 Korea Astronomy Society Spring Meeting (Talk) Apr 2021
- Galaxy Evolution Workshop 2020 (Talk) Feb 2021
- Numerical Galaxy Formation Mini-Workshop (Talk) Jan 2021
- 2020 Korea Astronomy Society Fall Meeting (Talk) Oct 2020
- 2019 RAMSES Users Conference Copenhagen, Denmark (Talk) Sept 2019
- SAMI Busy week, Sydney, Australia (Talk) Feb 2019
- 2019 Korea Astronomy Society Spring Meeting, Busan, Korea (Poster) Apr 2019
- Mini-workshop on Numerical Modeling of Galaxy Formation and Evolution, Yonsei University (Talk) May 2019
- Galaxy formation workshop, Yonsei University (Talk) Jan 2019
- Mini-workshop on Galaxy Evolution, Yonsei University (Talk) Nov 2018

Publications

First Authored Publications

[3] “Star-Gas Misalignment in Galaxies. II. Origins Found from the Horizon-AGN Simulation”

Khim, Donghyeon J.; Yi, Sukyoung K.; Pichon, Christophe; Dubois, Yohan; Devriendt, Julien; Choi, Hoseung; Bryant, Julia J.; Croom, Scott M.; 2021, **The Astrophysical Journal Supplement Series**, Volume 254, Issue 2, id.27

[2] “Star-Gas Misalignment in Galaxies. I. The Properties of Galaxies from the Horizon-AGN Simulation and Comparisons to SAMI”

Khim, Donghyeon J.; Yi, Sukyoung K.; Dubois, Yohan; Bryant, Julia J.; Pichon, Christophe; Croom, Scott M.; Bland-Hawthorn, Joss; Brough, Sarah; Choi, Hoseung; Devriendt, Julien; Groves, Brent; Owers, Matt S.; Richards, Samuel N.; Sande, Jesse van de; Sweet, Sarah M.; 2020, **The Astrophysical Journal**, Volume 894, Issue 2, id.106

[1] “*CCD photometry of new variable stars and BX Dra*”

Kim, Donghyeon; Jeon, Young-Beom; Lee, Uiryeol; Jang, Hye-Eun; Cho, Sungyoon; Park, Yoon-Ho; 2009, Information Bulletin on Variable Stars, No. 5872, #1.

Co-authored Publications

[4] “*The MAGPI Survey - mapping galaxy transformation with MUSE: science goals, design, observing strategy and early results*”

Foster, C.; Mendel, J. T.; Lagos, C. D. P.; [and 38 others, including **Khim D. J.**]; 2020, *Accepted to Publications of the Astronomical Society of Australia (PASA)*.

[3] “*Variable Stars in the Region of the Open Cluster NGC 1039 (M34)*”

Jeon, Young-Beom; Park, Yoon-Ho; Lee, Sang-Min; [and 4 others, including **Kim D.**]; 2015, Publications of The Korean Astronomical Society, vol. 30, issue 3, pp. 821-832

[2] “*Variable Stars in the Region of CYG OB3 Association Centered on the Open Cluster NGC 6871 II*”

Jeon, Young-Beom; Park, Yoon-Ho; Lee, Uiryeol; **Kim, Donghyeon**; Jang, Hye-eun; Cho, Sungyoon; 2013, Publications of The Korean Astronomical Society, vol. 28, issue 3, pp. 83-93

[1] “*Variable Stars in the Region of CYG OB3 Association Centered on the Open Cluster NGC 6871 I: δ Scuti Type Stars*”

Jeon, Young-Beom; Lee, Uiryeol; Park, Yoon-Ho; **Kim, Donghyeon**; Jang, Hye-eun; Cho, Sungyoon; 2012, Publications of The Korean Astronomical Society, vol. 27, issue 5, pp. 399-409

Extracurricular Activities

- “**Universe Express**” Participated in the astronomy outreach program via Youtube (Korean language), Served as the project student director.
- “**Kiss the Universe**” Participated in the production of astronomy documentary film to be aired in 2021, KBS (Korean Broadcasting System, the national public broadcaster of South Korea). Scripting and work reviews.
- “**Would You Like**” Magazine aiming to popularize astronomy. Writing and design work of articles and nationwide distribution were performed. Founding member, Served as the chief editor. (<http://wouldyoulike.org/>)
- “**AstroNet**” A computational astronomy club. Served as the club vice president.
- “**Beol-A-Rum**” An astronomy observation club. Developer and science educator.
- “**Yonsei University Student Council**” Served at <The Office of Education Support>.
- “**Yonsei University Student Club Council**” Served as the director of <The Office of Sports>.
- “**Astro Graduates General Meeting**” Served as a member of <The Primary Assembly of the Astro Graduates General Meeting>.

Awards & Fellowships

Yonsei University, Seoul, Republic of Korea (Graduate course)

- **Yonsei Honor's Scholarship Program - Graduate Course (A three-year full-tuition)** 2018-2020
- Brain Korea 21 Plus Fellowship, Brain Korea 21 Project 2018-2021
- Yonsei Merit Academic Paper award Dec 2020
- 2019 Korea Astronomy Society Spring Meeting, Poster award (Khim & Yi) Apr 2019
- 2019 The 2nd Yonsei Astro Poster Jamboree, The best poster award Feb 2019

Yonsei University, Seoul, Republic of Korea (Undergraduate course)

- **Korea Presidential Science Scholarship (A four-year full-tuition)** 2011-2018
- **Yonsei Honor's Scholarship Program (A four-year full-tuition)** 2011-2018
- **Awarded High Honors at Graduation (*Magna Cum Laude*)** Feb 2018
- Awarded the Highest Honors (3) Aug 2011, Feb 2014, Feb 2018
- Awarded High Honors Feb 2012
- Awarded Honors (3) Aug 2012, Aug 2014, Aug 2017

Korea Science Academy, Busan, Republic of Korea

- The 3rd International Olympiad on Astronomy and Astrophysics (IOAA), Silver Medal Oct 2009

Teaching & Mentoring Experience

- Participated in the 1st GeCAA as a Korea international team mentor (<https://gecaa.ee/>) Fall 2020
- Teaching assistant at Yonsei University “Understanding of Space” Fall 2019
- Science educator at Songam Space Center (<http://www.starsvalley.com/>) - Part-time job 2012-2018
- Teaching assistant for “Korea Astronomy Olympiad Summer/Winter School” 2012-2018
- Military Squad Counselor 2016

Military Service: UNCSB-JSA (United Nations Command Security Battalion – Joint Security Area)

- United Nations Command Security Battalion – Joint Security Area, Panmunjomm (<https://8tharmy.korea.army.mil/uncsb/>)
- Service period: Oct 2014 – Jul 2016 (Honorably discharged as Sergeant, Surveillance Squad Leader)
- Performed 180+ VIP guard missions (President of Germany, Secretary-General of NATO, U.S. the Secretary of Defense, etc.)
- Certificate of Commendation (ROK Army Intelligence School), JSA Battalion Commendation (JSA), Certificate of Appreciation (JSA)

Skills & Activities

- Languages: Korean (Native), English
- Computational Skills: (Proficient) Python, C++, Cython, Latex
(Intermediate) MATLAB, FORTRAN, RAMSES, CASA, IRAF

- Activities: “Yonsei Skin-Scuba Diving Team”, Served as club president.
 - 250+ Scuba dive logs, NAUI Master Scuba Diver (Certified in 2013), PADI Enriched Air Diver (Certified in 2019)
- “Yonsei Korean Traditional Archery Club” Membership
- Taekwondo – Certified a Third-degree black belt (The 3rd Dan)