

# SungWon Kwak

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## EDUCATION

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- Ph.D.** in Astronomy at the **University of Rome**, joint by Sapienza and Tor Vergata 2019 – 2023  
Thesis: The Formation and the Chemodynamical Evolution of the Milky Way and its Stellar Halo  
Supervisor: Prof. Giuseppe Bono
- M.S.** in Astronomy at **Seoul National University** 2009 – 2013  
Thesis: Origin of Non-Axisymmetric Features of dE galaxies in the Virgo Cluster  
Supervisor: Prof. Woong-Tae Kim
- B.S.** in Physics & Astronomy at the **University of Washington**, Seattle 2009 – 2013  
Protoplanetary Disk Simulation (Prof. Thomas Quinn)  
Radio Astronomy (Prof. Woodruff Sullivan)  
ATLAS-CERN Inner Tracker Upgrade (Prof. Shih-Chieh Hsu)  
AstroML: Machine Learning and Data Mining (Dr. Jake Vanderplas)
- The Storm King High School, New York 2007 – 2009

## EMPLOYMENT

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- Postdoc** at the Leibniz Institute for Astrophysics Potsdam (AIP) 2023.09 – *present*
- Postdoc** at Seoul National University (Prof. Woong-Tae Kim) Summer 2023  
Research Assistant at Seoul National University (Prof. Woong-Tae Kim) Summer 2019  
Technical Personnel (military service) at Korea Astronomy and Space Science Institute 2016 – 2019  
Research Assitant at CERN, Switzerland Winter 2014

## PROJECTS/COLLABORATIONS

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- SMUGGLE-Ring**: Nuclear Ring & Bar Formation using Multiphase Hydrodynamics Model (SMUGGLE)  
N-body Simulation: Bar, Spirals, and Buckling Instability  
4-MOST Spectroscopic Survey: S3-Milky Way Bulge and Disk Low Resolution Survey  
Auriga SuperStars: Cosmological Zoom-in Simulations of the Milky Way-like Galaxies

## RESEARCH INTEREST

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- Galactic Dynamics, Bar, Spirals, Nuclear Ring, Disk Instabilities  
Galaxy Formation, Stellar Halo, Dark Matter Halo, Galaxy Cluster

## GRANTS/SCHOLARSHIPS

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- Computing Grant** at NHR@ZIB in Germany (Co-PI & Project Manager, **17.08M core hours**) 2026  
*The Galactic Hearts Chronicle: Chemodynamical Archives of Galaxy Evolution Histories in Nuclear Rings*
- PhD Fellowship** for the AASS program in Rome 2019 – 2022  
**Kim In Ha Scholarship** at Seoul National University 2015 – 2016  
**Brain Korea 21 Scholarship** at Seoul National University 2014 – 2016  
**AstroMundus Scholarship** (offered: 45,000 EUR/2 yr) 2014 – 2016  
**UM-CERN Internship Program** by Richard Lounsbery Foundation (10,000 USD/3 months) Winter 2014

## PROGRAMMING

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**Simulation** CHANGA, GIZMO, GADGET, and AREPO  
**Software** Pynbody (Python), IRAF, Solidworks

## PUBLICATION

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- (9) **Kwak, SungWon**; Minchev, Ivan; Steinmetz, Matthias; Yi, Sukyoung K. “*Effects of Resolution and Local Stability on Galactic Disks: 2. Halo Resolution and Softening on Bar Formation*” (In prep.)
- (8) **Kwak, SungWon**; Minchev, Ivan; Pfrommer, Christoph; Steinmetz, Matthias; Yi, Sukyoung K. “*Effects of Resolution and Local Stability on Galactic Disks: I. Multiple Spiral Mode Formation via Swing Amplification*” (Submitted to A&A)
- (7) Fiorentino, G. et al. including **Kwak, SungWon** “*On the early formation of the Galactic halo traced by RR Lyrae stars*” 2022MmSAI, 93d, 47F
- (6) Braga, V. F. et al. including **Kwak, SungWon** “*On the use of field RR Lyrae as galactic probes - VI. Mixed mode RR Lyrae variables in Fornax and in nearby dwarf galaxies*” 2022MNRAS, 517, 5368B
- (5) Braga, V. F. et al. including **Kwak, SungWon** “*On the Use of Field RR Lyrae as Galactic Probes. V. Optical and Radial Velocity Curve Templates*” 2021ApJ, 919, 85B
- (4) Bach, Yoonsoo P. et al. including **Kwak, SungWon** “*The Geometric Albedo of (4179) Toutatis Estimated from KMTNet DEEP-South Observations*” 2019JKAS, 52, 71B
- (3) **Kwak, SungWon**; Kim, Woong-Tae; Rey, Soo-Chang; Quinn, Thomas R. “*Origin of Nonaxisymmetric Features of Virgo Cluster Early-type Dwarf Galaxies. II. Tidal Effects on Disk Features and Stability*” 2019ApJ, 887, 139K
- (2) Seo, Woo-Young; Kim, Woong-Tae; **Kwak, SungWon**; Hsieh, Pei-Ying; Han, Cheongho; Hopkins, Phil F. “*Effects of Gas on Formation and Evolution of Stellar Bars and Nuclear Rings in Disk Galaxies*” 2019ApJ, 872, 5S
- (1) **Kwak, SungWon**; Kim, Woong-Tae; Rey, Soo-Chang; Kim, Suk “*Origin of Non-axisymmetric Features of Virgo Cluster Early-type Dwarf Galaxies. I. Bar Formation and Recurrent Buckling*” 2017ApJ, 839, 24K

## TALK/POSTER

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- Talk:* **Kwak, SungWon** “*The Effects of Resolution and Disk Stability on the Multi-armed Spiral Formation*” 10th East Asia Numerical Astrophysics Meeting (EANAM 10), September 2025, Jeju, Korea
- Talk:* **Kwak, SungWon** “*Spirals, Bar, Bulge, and Nuclear Ring*” Auriga Collaboration Meeting 2024, Durham, UK
- Colloquium:* **Kwak, SungWon** “*Assembly History of the Ancient Halo and Disk in the Auriga Simulation*” Yonsei University, November 2024, Seoul, Korea
- Talk:* **Kwak, SungWon** “*Bar and Nuclear Ring Formation*” Auriga Collaboration Meeting 2024, Munich, Germany
- Talk:* **Kwak, SungWon** et al. “*Origin of Non-axisymmetric Features of dEs in the Virgo Cluster*” AAS Meeting #228, id.202.08, June 2016, San Diego, USA
- Talk:* **Kwak, SungWon** et al. “*Non-axisymmetric Features of Dwarf Elliptical Galaxies*” KAS Meeting 2016BKAS, 41Q, 39K
- Poster:* Yoachim, P. et al. including **Kwak, SungWon** “*Bulge Kinematics of Giant Low Surface Brightness Galaxies*” AAS Meeting #223, id.453.06
- Poster:* Schmitz, D. et al. including **Kwak, SungWon** “*IFU Observations of Giant Low Surface Brightness Galaxies*” AAS Meeting #223, id.453.05