

SungWon Kwak

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<https://swkwak.github.io/>

[Employment]

Postdoc at the Leibniz Institute for Astrophysics Potsdam (AIP)	2023.09- <i>present</i>
Postdoc at Seoul National University	Summer 2023
Research Assistant at Seoul National University	Summer 2019
Researcher at Korea Astronomy and Space Science Institute (Conscription)	2016-2019
Research Intern at CERN, Switzerland	Winter 2014

[Education]

Ph.D. in Astronomy at the University of Rome , joint by Sapienza and Tor Vergata	11/2019-03/2023
Thesis: The Formation and the Chemodynamical Evolution of the Milky Way and its Stellar Halo Advisor: Prof. Giuseppe Bono	
M.S. in Astronomy at Seoul National University	2014-2016
Thesis: Origin of Non-Axisymmetric Features of dE galaxies in the Virgo Cluster Advisor: Prof. Woong-Tae Kim	
B.S. in Physics & Astronomy at the University of Washington , Seattle	2009-2013
The Storm King High School, New York	2007-2009

[Ongoing Projects]

- **Stellar Halo**: Study the density distribution and the chemodynamical properties of old stellar Halo by comparing the observed RR Lyrae variables and the Auriga simulations and suggest a possible formation scenario of the Milky Way and M31.
- **Metal-rich RR Lyrae** : Study the chemodynamical properties of infalling progenitors in time evolution to understand the origin of the observed RRLs with disk dynamics.
- **Bulge/Disk**: Study bars, bulges, and disks in the Auriga simulations to understand three different gradients in the radial metallicity profiles of late-type galaxies found in observations.
- **Dark Matter Halo**: Find connection among bulge, stellar halo, and dark matter halo to conjecture the properties of the dark matter halo of the Milky Way.

[References]

Prof. Giuseppe Bono, University of Rome Tor Vergata, Italy	bono(at)roma2.infn.it
Prof. Federico Marinacci, University of Bologna, Italy	federico.marinacci2(at)unibo.it
Dr. Robert Grand, Liverpool John Moores University, UK	R.J.Grand(at)ljmu.ac.uk

[Scholarships]

- PhD Fellowship for the AASS program in Rome	2019-2022
- Kim In Ha Scholarship	2015-2016
- Brain Korea 21 Scholarship	2014-2016
- Erasmus Mundus Scholarship for 2 years, Category A (offered)	2014-2016

- Scholarship for the UM-CERN research semester by Richard Lounsbery Foundation Winter 2014

[Undergraduate Research Projects]

- SPH Simulation: the Stability of Protoplanetary Disks (Prof. Thomas Quinn) 2013
- Finding Superimposed High Redshift Spectra Using AstroML (Dr. Jake Vanderplas) 2013
- ATLAS-CERN Inner Tracker Upgrade (Prof. Shih-Chieh Hsu) 2013
- Radio Astronomy: (1) Estimating the Moon's temperature (2) Hydrogen distribution of the Galactic Plane (3) Continuum map of the Galactic Plan (Prof. Woodruff Sullivan) 2012-2013

[Programming]

Numerical Simulations and/or Output Analysis: *ChaNGa*, *GIZMO*, *Gadget2*, and *AREPO*

Data Analysis: *Python (Pynbody)*

Astronomical Image Analysis using *IRAF*

Engineering Modeling using *Solidworks*

[Publications]

(9) *The Formation and the Chemodynamical Evolution of the Stellar Haloes in the Auriga Simulations*

Kwak et al. (in prep.)

(8) *Understanding the Origin of Metal-rich RR Lyrae with Disk Dynamics through the Auriga Simulations*

Kwak et al. (in prep.)

(7) *The Shape of the Galactic Halo up to 150 kpc through RR Lyrae and the Auriga Simulations*

Kwak, SungWon; Grand, Robert J. J.; Bono, Giuseppe; Braga, Vittorio F.; Marinacci, Federico; Monachesi, Antonela; Gómez, Facundo A.; Dall'Orta, Massimo; Fabrizio, Michele; Ferraro, Ivan; Fiorentino, Giuliana; Iannicola, Giacinto; Marrese, Paola M.; Marinoni, Silvia; Monelli, Matteo (submitted)

(6) *On the Use of Field, RR Lyrae as Galactic Probes. VII. Mixed mode RR Lyrae variables in Fornax and in nearby dwarf galaxies*

Braga, V. F., **et al.**, MNRAS, 517, 5368B (2022)

(5) *On the Use of Field RR Lyrae as Galactic Probes. V. Optical and Radial Velocity Curve Templates*

Braga, V. F., **et al.**, APJ, 919, 85B (2021)

(4) *Origin of Non-axisymmetric Features of Virgo Cluster Early-type Dwarf Galaxies – II. Tidal Effects on Disk Features and Stability*

Kwak, SungWon; Kim, Woong-Tae; Rey, Soo-Chang; & Quinn, Thomas R., ApJ, 887, 139K (2019)

(3) *The Geometric Albedo of (4179) Toutatis Estimated from KMTNet DEEP-South Observation*

Bach, Yoonsoo P., **et al.**, JKAS, 52, 71B (2019)

(2) *Effects of Gas on Formation and Evolution of Stellar Bars and Gaseous Nuclear Rings in Disk Galaxies*

Seo, Woo-Young; Kim, Woong-Tae; **Kwak, SungWon;** Hsieh, Pei-Ying; Han, Cheongho; & Hopkins, Phil F., ApJ, 872, 5 (2019)

(1) *Origin of Non-axisymmetric Features of Virgo Cluster Early-type Dwarf Galaxies – I. Bar Formation and Recurrent Buckling*

Kwak, SungWon; Kim, Woong-Tae; Rey, Soo-Chang; & Kim, Suk, ApJ, 839, 24 (2017)

[**Talk/Poster**]

Poster: *Formation of Bar and Spirals of Infalling Dwarf Galaxies in Clusters*

Kwak, SungWon; Kim, Woong-Tae; Rey, Soo-Chang; & Quinn, Thomas

@ The 8th KIAS Workshop on Cosmology and Structure Formation in 2018 (Seoul, Korea)

E-Poster: *Are Disky Dwarf Galaxies Unstable to Formation of Bars and Spirals?*

Kwak, SungWon; Kim, Woong-Tae

@ 334th IAU Meeting 2018 (Vienna, Austria)

Talk: *Bar Formation and Recurrent Buckling Instability*

Kwak, SungWon

@ Korean Numerical Astrophysics Meeting in Sept. 2017 (Daejeon, Korea)

Talk: *Non-axisymmetric Features of Dwarf Elliptical Galaxies*

Kwak, SungWon; Kim, Woong-Tae; Rey, Soo-Chang; & Kim, Suk

@ id:GC-24, Korean Astronomical Society Meeting 2016 (Busan, Korea)

Talk: *Origin of Non-axisymmetric Features of dEs in the Virgo Cluster*

Kwak, SungWon; Kim, Woong-Tae; Rey, Soo-Chang; & Kim, Suk

@ id:202.08, 228th AAS Meeting 2016 (San Diego, CA, USA)