Seok-Jun Chang

Postdoctoral Researcher

Multiphase Gas Group leaded by Max Gronke
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PERSONAL INFO

Born: 7 Jun 1991, Seoul, Republic of Korea

Nationality: South Korea

Languages: Korean, English

EDUCATION

2016.03 – 2021.08: PhD, Department of Astronomy and Space Science, Sejong University

Advisor: Professor Hee-Won Lee

Thesis Title: Radiative Transfer in Highly Thick Media through Rayleigh and Raman Scattering with atomic hydrogen

2010.03 – 2016.02: BSc. Department of Astronomy and Space Science, Sejong University

Dual Major: Physics

(Military Service: 2010.12.27 – 2012.09.30, Artillery, Korean Army)

REASEARCH EXPERIENCES

2022.02 – : Postdoctoral Researcher, Multiphase Gas Group, Max Planck Institute for Astrophysics

2021.09 – 2022.01: Postdoctoral Researcher, Department of Physics and Astronomy, Sejong University

2019.06 – 2021.08: PhD Student Training Program in Korea Astronomy and Space Science Institute
Advisor: Dr. Yujin Yang

RESEARCH INTERESTS

- Radiative Transfer
- Circum-galactic Medium (CGM)
- Lyα Nebulae and Lyα Emitter
- Scattering Processes in Astrophysical Gas
- Protoplanetary Disk

SOFTWARE SKILLS

- OS: Linux, Windows
- Programming: Fortran, MPI, shell script, gnuplot, python
- Software: Photoionization code CLOUDY, Radiation GRMHD code Athena++
- **Handled 3D Monte-Carlo Radiative Transfer Code**
  LaRT (Lyman-alpha Radiative Transfer)
  Mocafe (Monte Carlo radiative transfer)
  STaRS (**S**ejong Radiative **Tra**nsfer through **R**aman and Rayleigh **S**cattering) (made by myself)
  RT-Scat developed in Chang & Gronke 2024 (made by myself)

AWARDS

- 2014 Korean Astronomical Society Fall Meeting – Best Poster Presentation
  Title: H alpha - H beta Foramtion in Optically Thick Media
- 2019 Korea Physical Society Spring Meeting – Outstanding Presentation Award
  Title: Lyman Alpha Blobs and Monte Carlo Imaging Polarimetry of Lyman Alpha
- 2021 Graduate School of Sejong University – Outstanding Research Award

PUBLICATIONS

Refereed Journal Paper

[1] **Seok-Jun Chang,** Max Gronke, submitted to MNRAS (arXiv:2403.11524), **Probing cold gas with Mg II and Lyα radiative transfer**

[2] **Seok-Jun Chang,** Nicole Arulanantham Nicole, Max Gronke, Gregory J. Herczeg, Edwin A. Bergin, 2024, MNRAS, 529, 2656, **First detection and modeling of spatially resolved Lyα in TW Hya**

[3] Beomdu Lim, Yael Naze, Seok-Jun Chang, Damien Hutsemekers, 2024, ApJ, 961, 71, **A Morphokinematic Study of the Enigmatic Emission Nebula NGC 6164/5 Surrounding the Magnetic O-type Star HD 148937**

[4] Gregory J. Herczeg, Yuguang Chen, Jean-Francois Donati, Andrea K. Dupree, ... **Seok-Jun Chang**, ..., 2023, ApJ, 956, 102, **Twenty-Five Years of Accretion onto the Classical T Tauri Star TW Hya**

[5] Vale González Lobos, Fabrizio Arrigoni Battaia, Seok-Jun Chang, Max Gronke, Guinevere Kauffmann, Chian-Chou Chen, Hai Fu, Aura Obreja, Emanuele P. Farina, 2023, A&A, 679, A41, Circumgalactic Lyα emission around submillimeter-bright galaxies with different

[6] **Seok-Jun Chang,** Hee-Won Lee, Jiyu Kim, Yeon-Ho Choi, 2023, ApJ, 949, 106, **Distribution and Kinematics of H I through Raman He II Spectroscopy of NGC 6302**

[7] **Seok-Jun Chang**, Yujin Yang, Kwang-Il Seon, Ann Zalbudoff, Hee-Won Lee, 2023, ApJ, 945, 100**,** Radiative Transfer in Lyα Nebulae. I. Modeling a Continuous or Clumpy Spherical Halo with a Central Source

[8] Nicole Arulanantham, Max Gronke, ... **Seok-Jun Chang**, ..., 2023, ApJ, 944, 185A, Lyα Scattering Models Trace Accretion and Outflow Kinematics in T Tauri Systems

[9] Kwang-Il Seon, Hyunmi Song, and **Seok-Jun Chang,** 2022, ApJS, 259, 3S Ly-alpha Radiative Transfer: A Stokes Vector Approach to Ly-alpha Polarization

[10] **Seok-Jun Chang**, Hee-Won Lee, 2020, JKAS, 53, 169C, STaRS: 3D Grid-Based Monte Carlo Code for Radiative Transfer through Raman and Rayleigh Scattering with Atomic Hydrogen

[11] Bo-Eun Choi, **Seok-Jun Chang**, Ho-Gyu Lee, and Hee-Won Lee, 2020, ApJ, 899, 12C, Line Formation of Raman-scattered He ii λ 4851 in an Expanding Spherical He i Shell in Young Planetary Nebulae

[12] **Seok-Jun Chang**, Hee-Won Lee, Ho-Gyu Lee, Narae Hwang, Sang-Hyeon Ahn, Byeong-Gon Park, 2018, ApJ, 866, 129C, Broad Wings around Hα and Hβ in the Two S-type Symbiotic Stars Z Andromedae and AG Draconis

[13] **Seok-Jun Chang**, Hee-Won Lee, Sang-Hyeon Ahn, Ho-Gyu Lee, Rodolfo Angeloni, Tali, Palma, Francesco Di Mille, 2018, JKAS, 51, 5C, Escape of Resonantly Scattered Lyβ and Hα from Hot and Optically Thick Media

[14] **Seok-Jun Chang**, Hee-Won Lee, Yujin Yang, 2017, MNRAS, 464, 5018C, Polarization of Rayleigh Scattered Lyman Alpha in Active Galactic Nuclei

[15] Young-Min Lee, Dae-Sub Lee, **Seok-Jun Chang**, Jeong-Eun Heo, Hee-Won Lee, Narae Hwang, Byeong-Gon Lee, Ho-Gyu Lee, 2016, ApJ, 833, 75L, A Monte Carlo Study of Flux Ratios of Raman Scattered O VI Features at 6825 and 7082 Å in Symbiotic Stars

[16] **Seok-Jun Chang**, Jeong-Eun Heo, Francesco Di Mile, Rodolfo Angeloni, Tali Palma, Hee-Won Lee, 2015, ApJ, 814, 98C, Formation of Raman Scattering Wings around H alpha, H beta, and Pa alpha in Active Galactic Nuclei

Conference Paper

[1] **Seok-Jun Chang,** Jeong-Eun Heo, Chea-Lin Hong, Hee-Won Lee, 2016, JPhCS, 728, 7, Formation of broad Balmer wings in symbiotic stars

[2] Jeong-Eun Heo, **Seok-Jun Chang**, Hee-Won Lee, 2015, IAUGA, 2256827: Raman O VI Spectroscopy of Accretion Flows in the S-type Symbiotic Star V455 Sco

ACTIVITIES

Professional Service

- **LOC Co-Chair** of Conference "12th Pacific Rim Conference on Stellar Astrophysics"
  Oct. 23-27, 2023, Sejong University, Korea
- **LOC Member** of Conference, "The Multiphase CGM"
  Feb. 26-1, 2023, Ringberg Castle, Germany
- **Chair of Organizing Committee**, Korean Young Astronomer Meeting (2018.6. – 2019.12)
- **Organizing Committee**, Korean Young Astronomer Meeting (2016 – 2019)
- **LOC Member** of Conference, "K-GMT Science Program Users Meeting 2019"
  Feb. 13-16, 2019, Korea Astronomy and Space Science Institute, Daejeon, Korea
- **LOC Member** of Conference, "First Korean Lyα Workshop"
  Jan. 23-25, 2019, Sejong University, Seoul, Korea
- **LOC Member** of Conference, "SDSS-IV Collaboration Meeting 2018"
  Jun. 18-22, 2018, Sejong University, Seoul, Korea
- **LOC Member** of Conference, "First Chile-Korea-Gemini Workshop on Stellar Astrophysics - Accretion Processes in Symbiotic Stars and Related Objects"
  Dec. 4-7, 2016, La Serena, Chile
- **LOC Member** of Conference, "10th Pacific Rim Conference on Stellar Astrophysics"
  May. 27-31, 2013, Sejong University, Seoul, Korea

Observation Experience

Visitor Mode (2014 – 2021)

Bohyunsan Optical Astronomy Observatory, Youngcheon, Korea - 1.8m BOAO Telescope

Instrument: Bohyunsan Optical Echelle Spectrograph (BOES), BOES-Pol

Teaching Experience

Teaching Assistant

2015 Spring – Single Variable Calculus, undergraduate course (freshman)

2015 Fall – Multi Variable Calculus, undergraduate course (freshman)

2016 Spring – Stellar Astronomy, undergraduate course (sophomore)

2016 Fall – Galactic Astronomy, undergraduate course (sophomore)

2017 Spring – General Physics and Laboratory 1, undergraduate course (freshman)

2018 Fall – Introduction to Astronomical Spectroscopy, undergraduate course (junior)

Invited Talk & Colloquium

2024

- Special Seminar, Leibniz-Institute for Astrophysics Potsdam (AIP), 20 March 2024
  Title: Probing cold gas with Mg II and Lyα radiative transfer

2023

- AstroBicocca Seminar, University of Milano Bicocca, 8 June 2023
  Title: The Dynamic Duo: Lyman-Alpha & Mg II as tracers of cold CGM
- Special Colloquium, SNU, 13 October 2023
  Title: First Detection and Modeling of Spatially Resolved Lyα in TW Hya

2022

- MPA Seminar, MPA, 5 April 2022
  Title: Raman Scattered Features in Astrophysics

2021

- Colloquium of Physics & Astronomy, Sejong University, 1 December 2021
  Title: Lyα radiative transfer in Lyα Blobs

Conferences & Workshops

2024

- ULLYSES: Continuing the Voyage of Discovery
  Oral: First Detection and Modeling of Spatially Resolved Lyα in TW Hya

2023

- Escape of Lyman radiation from galactic labyrinths 2023
  Oral: The dynamic duo: Lyα & Mg II as tracers of cold gas in CGM
- The Multiphase CGM in Ringberg Castle
  Oral: Mg II and Lyα Radiative Transfer in the Cold CGM

2022

- IAU GA 2022 in Busan, Korea
  Oral: Radiative Transfer in Lyα Nebulae: Modeling Continuous or Clumpy Spherical Halo with Central Source
  Poster: Lyα Radiative Transfer for Spatially Resolved Lyα Spectra from T-Tauri Star, TW Hydrae

2021

- 2021 Korean Astronomical Society Fall Meeting
  Oral for PhD Thesis: Radiative Transfer in Highly Thick Media through Rayleigh and Raman Scattering with Atomic Hydrogen
  Poster: STaRS Gen 2: Sejong Radiative Transfer through Raman and Rayleigh Scattering in Dusty Medium

2020

- 235th AAS Meeting at Hawaii
  Poster: Line Formation of Lyman Alpha in Clumpy CGM and IGM

2019

- 2019 Korean Astronomical Society Fall Meeting
  Poster : Activity of KYAM in 2019
- 2019 Korean Physical Society Fall Meeting
- 2019 Korean Astronomical Society Spring Meeting
  Poster : Activity of KYAM in 2018-2019
- 2019 Korean Physical Society Spring Meeting
  Oral : Lyman Alpha Blobs & Monte Carlo Imaging Polarimetry of Lyα
- 1st Korean Lyman Alpha Workshop (Homepage : https://korea-lya.weebly.com/)
  Oral : Lyman Alpha Radiative Transfer & Polarimetric Modeling for LABd05

2018

- XXXth IAU General Assembly, Wien, Austria
  Poster : Raman and Thomson Wings around Balmer Lines in the S-type Symbiotic Stars Z Andromedae and AG Draconis
- Sakura Cosmic Lyman-Alpha Workshop (SakuraCLAW), Tokyo, Japan
  Poster : Simulated Imaging Polarimetry of Lyα Scattered in a Thick Neutral Medium : Preliminary Results
- 2018 Korean Astronomical Society Fall Meeting
- 2018 Korean Astronomical Society Spring Meeting
  Oral : Statistical Momentum Analysis of the Strong DLA Profiles

2017

- Snowbird Cosmic Lyman-Alpha Workshop (SnowCLAW), Utah
  Presentation : A Basic Monte Carlo Study of Polarization of Lyα Rayleigh Scattered in the Early Universe
- 2017 Korean Astronomical Society Fall Meeting
  Oral : Broad Wings around Hα and Hβ in the S-type Symbiotic Stars
- 2017 Korean Astronomical Society Spring Meeting
  Oral : Escape of Lyβ from Hot and Optically Thick Media

2016

- The 46th Saas-Fee Course: Lyman-alpha as an Astrophysical and Cosmological Tool, La Diablerets, Switzerland
- The 6th KGMT Summer School
- The 7th KIAS CAC Summer School on Scientific Computing and Deep Learning
- 2016 Korean Astronomical Society Fall Meeting
  Oral : Unification Model and Rayleigh Scattered Lyα in Active Galactic Nuclei
- 2016 Korean Astronomical Society Spring Meeting
  Poster : Polarization of Rayleigh Scattered Lyman alpha in AGN

2015

- The 11th Pacific Rim Conference on Stellar Astrophysics, Hong Kong
  Poster : Formation of Broad Balmer Wings in Symbiotic Stars
- XXIX IAU General Assembly, Hawaii

- 2015 Korean Astronomical Society Fall Meeting
  Poster : Raman Scattering Wings of Hydrogen in AGN
- 2015 Korean Astronomical Society Spring Meeting
  Poster : Balmer Wing Formation in Active Galactic Nuclei(AGN)

2014

- 2014 Korean Astronomical Society Fall Meeting
  Poster : H alpha - H beta Foramtion in Optically Thick Media
- The 4th KGMT(Great Magellan Telescope) Summer School

References

Prof. Hee-Won Lee (Academic Advisor)
Department of Physics and Astronomy, Sejong University
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