

# Bo-Eun Choi

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Department of Astronomy, University of Washington Box 351580 Seattle, WA 98195-1580

## Education

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*PhD Student*, Astronomy Sep 2021 - present  
**University of Washington**, Seattle, USA

*MSc*, Astronomy and Space Science Feb 2021  
**Sejong University**, Seoul, Korea

*BSc*, Astronomy and Space Science | Physics, *Cum Laude* Feb 2019  
**Sejong University**, Seoul, Korea

## Research Interest

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### Cosmic Baryon Cycle & Chemical Evolution

I am interested in detailed physical processes within the cosmic baryon cycle, how pristine gas is accreted into galaxies and fuel star formation, and how feedback processes efficiently redistribute baryons and enrich metals in gas. I use spectroscopy to trace metals and gas flows along the cycle.

### Massive Stars: Powerful Feedback Drivers

Massive stars drive strong radiative, kinematic, and chemical feedback, having a huge impact on the host galaxy, but our understanding of their evolution is limited. I am interested in deciphering their evolutionary history from their observable properties.

Keywords: **CGM, Stellar Feedback, Stellar Evolution, Spectroscopy, Radiative Transfer**

## Publications

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### [ADS/ arXiv](#)

- **Choi, B.-E.**, Werk, J. K., Tchernyshyov, K., et al. 2024, *ApJ*, 976, 222  
*Metallicity Mapping of the Ionized Diffuse Gas at the Milky Way Disk–Halo Interface*
- **Choi, B.-E.** & Lee, H.-W. 2020, *ApJL*, 903, L39  
*Discovery of Raman-scattered He II  $\lambda 6545$  in the Planetary Nebulae NGC 6886 and NGC 6881*
- **Choi, B.-E.**, Chang, S.-J., Lee, H.-G. & Lee, H.-W. 2020, *ApJ*, 889, 2  
*Line Formation of Raman-scattered He II  $\lambda 4851$  in an Expanding Spherical H I Shell in Young Planetary Nebulae*
- Angeloni, R., ..., **Choi, B.-E.**, et al. 2019, *AJ*, 157, 156  
*RAMSES II - RAMan Search for Extragalactic Symbiotic Stars: Project Concept, Commissioning, and Early Results from the Science Verification Phase*

## Research Experience

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*Graduate Research Assistant*, University of Washington, USA

Sep 2021 - present

- **Probing the Milky Way's Gaseous Halo** (Advisor: Prof. Jessica K. Werk)  
Metallicity study of the ionized diffuse gas at the Milky Way disk-halo interface using HST UV archival data with a precise ionization correction using CLOUDY.
- **Red and Luminous Massive Stars** (Advisor: Emily M. Levesque)  
Using high-resolution spectral data, chemical abundance, variability, and stellar atmosphere modeling study of evolved massive stars to search for Thorne-Żytkow object candidates.

*Post-master Researcher*, UNIST, South Korea  
(Advisor: Prof. Maurice van Putten)

Mar - Jul 2021

- **Orbital Stability of Circumbinary Planets**  
Developing a 3-body simulation code for testing orbital stability of prograding and retrograding circumbinary planets.

*Graduate Research Assistant*, Sejong University, South Korea  
(Advisor: Prof. Hee-Won Lee)

Mar 2019 - Feb 2021

- **Decoding Mass-loss in Evolved Stars using Raman He II**
  - Line formation study of Raman-scattered He II, applying radiative transfer simulation for Rayleigh and Raman scattering in neutral hydrogen region.
  - Spectroscopic survey of Raman He II features in young planetary nebulae.

*Undergraduate Research Assistant*, Sejong University, South Korea  
(Advisor: Prof. Hee-Won Lee)

Sep 2018 - Feb 2019

- Evaluating quantum mechanical effect on the line profile of DLAs.
- Monte Carlo simulation of the emission line formation in an accretion disk around Schwarzschild black hole

## Successful Observing Proposals

- **Building a Spectroscopic Tool for TZO Search (P.I.)**
  - 3.75 hours with **GHOST - 8.1 m Gemini-South** Telescope (2023B FT)
  - 8 half-nights with **ARCES - 3.5 m ARC** Telescope (2022Q3, 2023Q2)
- **\*Spectroscopic Survey for Raman He II Features in Young Planetary Nebulae**
  - 4.8 hours with **GRACES - 8.1 m Gemini-North** Telescope (2019A, 2020B)
  - 19 nights with **BOES - 1.8 m BOAO** Telescope (2019A, 2020A&B)
  - 8.5 nights with **MRES - 2.4 m Thai National Telescope** (Cycle7, 8)
- **\*Spectropolarimetry Monitoring of Raman-Scattered O VI Features in S-type Symbiotic Stars**
  - 3 nights with **BOES - 1.8 m BOAO** Telescope (2019B)

\* *Co-I of the proposals, but the primary observer*

## Awards & Grants

Jacobsen Fund (\$350), Astronomy Department, UW	Jul 2023
Outstanding TA Award, Astronomy Department, UW	Sep 2022
Jacobsen Fund (\$1,700), Astronomy Department, UW	Apr 2022
Outstanding Research Award, Graduate School, Sejong University	Feb 2021
Outstanding Presentation Award, Korean Physical Society	Oct 2019

## Conferences & Talks

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<b>XXXV Canary Islands Winter School of Astrophysics</b> — Baryonic Cycle Across Space and Time	Oct 2024
<b>MIAPbP - “Some Like It Hot”: A Journey from the Hot IGrM to the Multiphase CGM</b>	Apr 2024
<b>ESO CGM Group Seminar Talk</b>	Apr 2024
<b>New Views on Feedback &amp; the Baryon Cycle in Galaxies</b> Talk: The Metallicity Mapping of the Ionized Diffuse Gas at the Milky Way Disk-halo Interface	Jul 2023
<b>Seminar Talk at the RSAA of Australian National University</b>	Jul 2023
<b>241st AAS meeting</b> Talk: The Metallicity Mapping of the Ionized Diffuse Gas at the Milky Way Disk-halo Interface	Jan 2023
<b>2022 XXXI IAUGA</b> Poster: Spectral Features and Variability of the Thorne-Zytkow Object Candidates in the SMC	Aug 2022
<b>102nd Korean Astronomical Society Meeting</b> Talk: Discovery of Raman-scattered He II $\lambda 6545$ in Planetary Nebulae NGC 6886 and NGC 6881 from BOES Spectroscopy Poster: Activity of Korean Young Astronomers’ Meeting in 2019-2020 Season (co-author)	Oct 2020
<b>2019 XVI Latin American Regional IAU Meeting</b> Poster: A Study of Line Formation of Raman-Scattered He II $\lambda 4851$ in Young Planetary Nebulae	Nov 2019
<b>96th Korean Physical Society Meeting</b> A New Grid-Based Radiative Transfer Simulation for Raman Scattering of He II with Atomic Hydrogen	Oct 2019
<b>8th KGMT Summer School: Exoplanet</b>	Jul 2019
<b>2019 APCTP-NIMS-KISTI-UNIST-KASI Summer School</b> — Numerical Relativity and Gravitational Waves	Jul 2019
<b>100th Korean Astronomical Society Meeting</b> Poster: A New Grid-based Monte Carlo Code for Raman Scattered He II : Preliminary Results	Apr 2019
<b>2019 Korea Young Astronomers’ Meeting Workshop</b> Poster: The Emission Line Formation in an Accretion Disk of Schwarzschild Black Hole	Feb 2019
<b>7th KGMT Summer School</b>	Jul 2017
<b>SOAO Winter School: Long-slit Spectroscopy</b>	Feb 2017

## Teaching Experience

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<i>UW Astronomy Pre-MAP Mentor</i> Jimmy Fowler (2022), Annabelle Lin (2024), Anaïs Martin (2022), Pranathi Ramesh (2022)	Fall 2022 & 2024
<i>UW Graduate Mentor</i> Abbas Jaffery, now Application Engineer at Radiant Vision Systems	Sep 2022 - Jun 2023
<i>Teaching Assistant, University of Washington, USA</i> - Introduction to Astronomical Data Analysis (ASTR 480) - ASTR 101	2021-2022 Spring 2022 Fall 2021, Winter 2022
<i>Teaching Assistant, Sejong University</i> - Introduction to Astronomical Spectroscopy (300 level)	2018-2020 Fall 2018 & 2020

- Astrophysics (300 level)
- General Physics 2 (100 level)

Spring 2019 & 2020  
Fall 2019

## Outreach

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Astronomy on Tap - Seattle, Flyer Designer	2023 - present
2021 Staff IAUGA Session of Busan Science Festival	Apr 2019
Volunteer Instructor at the Observatory of Seoul	2014-2016
Sejong University Starry Night Festival Staff	2014-2016

## Professional Services

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UW TAC of Apache Point Observatory ARC 3.5 m	2023 - present
Organizing committee of Korean Young Astronomers' Meeting	2020
LOC member of the 1st Korean Lyman Alpha Workshop	Jan 2019
Student staff of Korean Astronomical Society Meeting	Apr 2017

## Technical Skills

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Highly experienced: Python, Fortran, IRAF,  $\LaTeX$   
Moderately experienced: MATLAB, MPI  
Basic knowledge of: CASA (Common Astronomy Software Applications)  
Operating Systems : Linux, Mac