Curriculum Vitae

Chang-Goo Kim (cgkim@astro.princeton.edu)

Department of Astrophysical Sciences
Princeton University
4 Ivy Lane, Princeton
NJ 08544, USA

+1-609-933-1180
http://changgoo.github.io
ORCID: 0000-0003-2896-3725
cgkim@astro.princeton.edu

Current Position

Sep 2018 – **Associate Research Scholar**
Department of Astrophysical Sciences, Princeton University

Employment

Sep 2017 – Aug 2018 **Flatiron Research Fellow**
Center for Computational Astrophysics (CCA), Flatiron Institute

Sep 2016 – Aug 2017 **Associate Research Scholar**
Department of Astrophysical Sciences, Princeton University

Sep 2013 – Aug 2016 **Postdoctoral Research Associate**
Department of Astrophysical Sciences, Princeton University

Oct 2011 – Aug 2013 **CITA National Fellow**
Department of Physics and Astronomy, University of Western Ontario, Canada

Mar 2011 – Aug 2011 **BK21 Postdoctoral Research Fellow**
Department of Physics and Astronomy, Seoul National University, Korea

Education

Mar 2005– Feb 2011 **Ph. D in Astronomy,** Advisor: Prof. Woong-Tae Kim
Department of Physics and Astronomy, Seoul National University, Korea

Mar 2001– Feb 2005 **B. S in Astronomy**
Department of Physics and Astronomy, Seoul National University, Korea

Teaching Experience

2019 – *present* **Ryan Golant,** Undergraduate student at Princeton University
Effect of Early Feedback in TIGRESS – Summer research (with Eve Ostriker)

2018 – *present* **Erin Kado-Fong,** Graduate student at Princeton University
Diffuse Ionized Gas in TIGRESS – Semester project (with Jeong-Gyu Kim and Eve Ostriker)

2018 **Aditi Vijayan,** Graduate student at the Indian Institute of Science
Kinematics and Dynamics of Outflows in TIGRESS – Summer research via Kavli Summer Program in Astrophysics (with Eve Ostriker, Lucia Armillotta, Miao Li)

2018 **Kareem El-Badry,** Graduate student at the UC Berkeley
Evolution of supernovae-driven superbubbles with conduction and cooling – Summer research via Kavli Summer Program in Astrophysics (with Eve Ostriker)

2018 **Mohammad Refat,** Undergraduate student at the CUNY
Metallicity Fluctuations in TIGRESS – Summer research via AstroCom NYC (with Yuan-Sen Ting)

2018 – *present* **Erin Flowers,** Graduate student at Princeton University
Turbulence driving and Outflows by Clustered Supernovae – Semester project (with Eve Ostriker)

2017 – *present* **Woorak Choi,** Graduate student at Yonsei University
Ram Pressure Stripping in TIGRESS Ph.D thesis project (with Aeree Chung)

2014 – 2015 **Roberta Raileanu,** Undergraduate student at Princeton University
Superbubbles in the Multiphase ISM – Junior Thesis and Summer research (with Eve Ostriker)

2005 – 2010 **Teaching Assistant,** Seoul National University
Grading problem sets and leading problem-solving sessions for courses including *Solar System Astronomy and Lab., Astronomical Observation & Lab. I & II, Astronomy and Lab., Introduction to Astrophysics I & II, Stars and Stellar Systems, Man & the Universe.*
Designing and leading the Lab classes.
Teaching programming languages and analysis tools including Fortran, C, and IDL.

Grants

2020–2022 **PI**, NASA ATP (submitted); $409,071
2020 **PI**, Chandra Theory Grant (selected); $85,000
2018–2021 **Co-I**, NASA TCAN (PI: Julian Borrill); $1,398,099

Computing Time Allocations

2020–2022 **33M CPU hrs (1.2M SBUs), PI**, NASA Pleiades (submitted)
2019 **60M CPU hrs, Co-I**, ASCR Leadership Computing Challenge (submitted; PI: Alex Lazarian)
2018–2021 **80M CPU hrs, Co-I**, NERSC, (PI: Julian Borrill)
2016–2019 **22M CPU hrs (800k SBUs), Co-I**, NASA Pleiades, (PI: Eve Ostriker)

Professional Activities and Services

2018 – 2021 **Subnet Leader,** NASA Theoretical and Computational Astrophysics Networks
leading the MHD simulation subnet in the multi-institutional collaboration funded by NASA entitled "Modeling Polarized Galactic Foregrounds for CMB Missions"

2017 – 2022 **Working Group Leader,** SMAUG collaboration
leading the working group for "Resolved ISM, Star formation, and Stellar feedback" in the international collaboration funded by the Simons Foundation

2017 – 2019 **Member,** PICO collaboration
contributing galactic foreground modeling for a probe-class mission concept study funded by NASA entitled "Probe of Inflation and Cosmic Origins"

2017 **Review Panelist**, NSF AAG Program

2016 – 2017 **Organizer**, Star Formation/ISM Rendezvous Seminars at Princeton University

2012 – **Referee**, ApJ, ApJL, MNRAS

Invited Reviews

2019 (planned) **Invited Review**, Cosmic turbulence and magnetic fields: physics of baryonic matter across time and scales, Cargése, France

2019 **Invited Review**, Linking galaxies from the Epoch of initial star-formation to today, Sydney, Australia

2016 **Invited Review**, How Galaxies Form Stars, Stockholm, Sweden

Invited Colloquia

2019 **Colloquium**, University of Maryland, College Park, MD
2019 **Colloquium**, Australia National University, Canberra, Austrailia
2018 **Colloquium**, Yonsei University, Seoul, Korea
2018 **Colloquium**, Korea Astronomy and Space Science Institute, Daejeon, Korea
2017 **Colloquium**, Osaka University, Osaka, Japan
2017 **Colloquium**, University of California, Santa Barbara, CA
2016 **Colloquium**, Shanghai Jiao Tong University, Shanghai, China
2016 **Colloquium**, Korea Astronomy and Space Science Institute, Daejeon, Korea
2016 **Colloquium**, Seoul National University, Seoul, Korea
2014 **Colloquium**, Korea Astronomy and Space Science Institute, Daejeon, Korea
2014 **Colloquium**, Seoul National University, Seoul, Korea
2014 **Colloquium**, Korea Institute for Advanced Study, Seoul, Korea
2011 **Colloquium**, National Institute for Mathematical Sciences, Daejeon, Korea
2011 **Colloquium**, Yonsei University, Seoul, Korea

Conference/Workshop/Seminar

2020 (planned) **Invited Talk**, Cosmological Analyses Featuring Galactic Foreground Emission, Lattes, France
2019 (planned) **Invited Talk**, The self-organized star formation process, Orsay, France
2019 **Contributed Talk**, Feedback and its Role in Galaxy Formation, Spetses, Greece
2019 **Poster**, Linking the Milky Way and Nearby Galaxies, Helsinki, Finland
2019 **Invited Talk**, Multi-phase Gas Workshop, CCA, New York, NY
2019 **Invited Talk**, Athena++ Workshop 2019, UNLV, Las Vegas, NV
2018 **Contributed Talk**, THINKSHOP15, Potsdam, Germany
2018 **Invited Talk**, The Milky Way in the age of Gaia, Orsay, France
2018 **Invited Talk**, Kavli Summer Program in Astrophysics, CCA, New York, NY

2018 **Invited Talk**, MPPC Workshop, Princeton, NJ
2018 **Invited Talk**, CMB Foreground Workshop at CCA, New York, NY
2018 **Invited Talk**, Computational Galaxy Formation at Ringberg Castle, Germany
2017 **Invited Talk**, CMB Foreground Workshop at UCSD, San Diego, CA
2017 **Invited Talk**, The ISM beyond 3D, Orsay, France
2017 **Invited Talk**, Astrophysics Seminar, UCSB, Santa Barbara, CA
2016 **Invited Talk**, 7th East-Asia Numerical Astrophysics Meeting, Beijing, China
2016 **Invited Talk**, Computational Galaxy Formation at Ringberg Castle, Germany
2015 **Contributed Talk**, Magnetic Fields in the Universe V, Cargése, France
2015 **Contributed Talk**, IAU Symposium #315, Honolulu, HI
2015 **Invited Talk**, IAS Informal Seminar, IAS, Princeton, NJ
2014 **Invited Talk**, 6th East-Asia Numerical Astrophysics Meeting, Beijing, China
2014 **Invited Talk**, KITP Program – Gravity's Loyal Opposition, Santa Barbara, CA
2013 **Invited Talk**, CITA National Fellow Meeting, Toronto, Canada
2013 **Contributed Talk**, KAS Spring Meeting, Daecheon, Korea
2012 **Invited Talk**, IAU General Assembly – SpS12, Beijing, China
2012 **Contributed Talk**, AAS Meeting #221, Long Beach, CA

Bibliography (ADS, Google Scholar)

Name: student primary mentored by me

refereed: 17 — first author: 13 — citations: 671 — h-index: 13 (*2019-08-06*)

Refereed Publications

17. **Kim, Chang-Goo**; Choi, Steve K.; Flauger, Raphael, *Dust Polarization Maps from TIGRESS: E/B Power Asymmetry and TE Correlation*, ApJ, **880**, 106, 2019 (arXiv:1901.07079) [3 citations]

16. Murray, C. E. *et al.* (incl. **CGK**), *The 21-SPONGE H I Absorption Line Survey. I. The Temperature of Galactic H I*, ApJS, **238**, 14, 2018 (arXiv:1806.06065) [12 citations]

15. Gong, Munan; Ostriker, Eve C.; **Kim, Chang-Goo**, *The X_{CO} Conversion Factor from Galactic Multiphase ISM Simulations*, ApJ, **858**, 16, 2018 (arXiv:1803.09822) [9 citations]

14. **Kim, Chang-Goo**; Ostriker, Eve C., *Numerical Simulations of Multiphase Winds and Fountains from Star-forming Galactic Disks. I. Solar Neighborhood TIGRESS Model*, ApJ, **853**, 173, 2018 (arXiv:1801.03952) [29 citations]

13. **Kim, Chang-Goo**; Ostriker, Eve C., *Three-phase Interstellar Medium in Galaxies Resolving Evolution with Star Formation and Supernova Feedback (TIGRESS): Algorithms, Fiducial Model, and Convergence*, ApJ, **846**, 133, 2017 (arXiv:1612.03918) [38 citations]

12. Murray, Claire E.; Stanimirović, Snežana; **Kim, Chang-Goo** *et al.*, *Recovering Interstellar Gas Properties with Hi Spectral Lines: A Comparison between Synthetic Spectra and 21-SPONGE*, ApJ, **837**, 55, 2017 (arXiv:1612.02017) [9 citations]

11. Safranek-Shrader, Chalence; Krumholz, Mark R.; **Kim, Chang-Goo** *et al.*, *Chemistry and radiative shielding in star-forming galactic discs*, MNRAS, **465**, 885, 2017 (arXiv:1605.07618) [18 citations]

10. **Kim, Chang-Goo**; Ostriker, Eve C.; Raileanu, Roberta, *Superbubbles in the Multiphase ISM and the Loading of Galactic Winds*, ApJ, **834**, 25, 2017 (arXiv:1610.03092) [38 citations]

9. **Kim, Chang-Goo**; Ostriker, Eve C., *Vertical Equilibrium, Energetics, and Star Formation Rates in Magnetized Galactic Disks Regulated by Momentum Feedback from Supernovae*, ApJ, **815**, 67, 2015 (arXiv:1511.00010) [41 citations]

8. **Kim, Chang-Goo**; Ostriker, Eve C., *Momentum Injection by Supernovae in the Interstellar Medium*, ApJ, **802**, 99, 2015 (arXiv:1410.1537) [139 citations]

7. **Kim, Chang-Goo**; Ostriker, Eve C.; Kim, Woong-Tae, *Three-dimensional Hydrodynamic Simulations of Multiphase Galactic Disks with Star Formation Feedback. II. Synthetic H I 21 cm Line Observations*, ApJ, **786**, 64, 2014 (arXiv:1403.5566) [30 citations]

6. **Kim, Chang-Goo**; Basu, Shantanu, *Long-term Evolution of Decaying Magnetohydrodynamic Turbulence in the Multiphase Interstellar Medium*, ApJ, **778**, 88, 2013 (arXiv:1309.4996) [4 citations]

5. **Kim, Chang-Goo**; Ostriker, Eve C.; Kim, Woong-Tae, *Three-dimensional Hydrodynamic Simulations of Multiphase Galactic Disks with Star Formation Feedback. I. Regulation of Star Formation Rates*, ApJ, **776**, 1, 2013 (arXiv:1308.3231) [111 citations]

4. **Kim, Chang-Goo**; Kim, Woong-Tae; Ostriker, Eve C., *Regulation of Star Formation Rates in Multiphase Galactic Disks: Numerical Tests of the Thermal/Dynamical Equilibrium Model*, ApJ, **743**, 25, 2011 (arXiv:1109.0028) [91 citations]

3. **Kim, Chang-Goo**; Kim, Woong-Tae; Ostriker, Eve C., *Galactic Spiral Shocks with Thermal Instability in Vertically Stratified Galactic Disks*, ApJ, **720**, 1454, 2010 (arXiv:1006.4691) [16 citations]

2. **Kim, Chang-Goo**; Kim, Woong-Tae; Ostriker, Eve C., *Galactic Spiral Shocks with Thermal Instability*, ApJ, **681**, 1148, 2008 (arXiv:0804.0139) [43 citations]

1. **Kim, Chang-Goo**; Kim, Woong-Tae; Ostriker, Eve C., *Interstellar Turbulence Driving by Galactic Spiral Shocks*, ApJ, **649**, 2006 (arXiv:astro-ph/0608161) [38 citations]

Preprints

1. El-Badry, Kareem; Ostriker, Eve C.; **Kim, Chang-Goo** *et al.*, *Evolution of supernovae-driven superbubbles with conduction and cooling*, 2019 (arXiv:1902.09547) [2 citations]

Refereed Conference Proceedings

2. **Chang-Goo Kim** and E. C. Ostriker, 2016, In P. Jablonka, P. André, and F. van der Tak, editors, *From Interstellar Clouds to Star-Forming Galaxies: Universal Processes?*, volume 315 of *IAU Symposium*, pages 38–41, *Feedback Regulated Turbulence, Magnetic Fields, and Star Formation Rates in Galactic Disks.*

1. **Chang-Goo Kim**, E. C. Ostriker, and W.-T. Kim, March 2015, Highlights of Astronomy, 16:609–610, March 2015, *Numerical modeling of multiphase, turbulent galactic disks with star formation feedback.*

Papers in Preparation

- **Chang-Goo Kim**, Eve Ostriker, and the SMAUG collaboration *Numerical Simulations of Multiphase Winds and Fountains from Star-Forming Galactic Disks: II. Milky Way TIGRESS Models*
- Woorak Choi, **Chang-Goo Kim**, and Aeree Chung, *Resolved Numerical Simulations of the Multiphase, Turbulence, Magnetized ISM Interacting with ICM Ram Pressure*
- Kwang-Il Seon and **Chang-Goo Kim**, *Lyman-alpha Radiation Transfer: I. the Wouthuysen-Field Effect*
- Bon-Chul Koo, **Chang-Goo Kim**, and Sangwook Park, *Radiative Supernova Remnants and Supernova Feedback*
- Aditi Vijayan, Lucia Armillotta, **Chang-Goo Kim**, Eve C. Ostriker, and Miao Li, *Kinematics and Dynamics of Multiphase Outflows in the solar neighborhood TIGRESS model*

References

Main References

- **Woong-Tae Kim** – wkim@astro.snu.ac.kr, +82-2-880-6769
  Professor, Department of Physics and Astronomy, Seoul National University
- **Eve Ostriker** – eco@astro.princeton.edu, +1-609-258-7240
  Professor, Department of Astrophysical Sciences, Princeton University
- **James Stone** – jmstone@ias.edu, +1-609-734-8054
  Professor, School of Natural Sciences, Institute for Advanced Study
  Emeritus Professor, Department of Astrophysical Sciences, Princeton University
- **Snezana Stanimirović** – sstanimi@astro.wisc.edu, +1-608-890-1458
  Professor, Department of Astronomy, University of Wisconsin-Madison
- **Rachel Somerville** – rsomerville@flatironinstitute.org, +1-848-445-8964
  Group Leader, Center for Computational Astrophysics, Flatiron Institute
  Distinguished Professor (on leave), Department of Physics and Astronomy, Rutgers University

Additional References (available upon request)

- **Amiel Sternberg** – amiel@astro.tau.ac.il, 03-6407590
  Professor, Department of Astronomy, Tel Aviv University
  Senior Research Scientist, Center for Computational Astrophysics, Flatiron Institute
- **Greg Bryan** – gbryan@astro.columbia.edu, +1-212-854-6837
  Group Leader, Center for Computational Astrophysics, Flatiron Institute
  Professor, Department of Astronomy, Columbia University
- **David Spergel** – dspergel@flatironinstitute.org, +1-609-258-3589
  Director, Center for Computational Astrophysics, Flatiron Institute
  Emeritus Professor, Department of Astrophysical Sciences, Princeton University