

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 – **Flatiron Research Fellow**
Aug 2018 Center for Computational Astrophysics (CCA), Flatiron Institute
Sep 2016 – **Associate Research Scholar**
Aug 2017 Department of Astrophysical Sciences, Princeton University
Sep 2013 – **Postdoctoral Research Associate**
Aug 2016 Department of Astrophysical Sciences, Princeton University
Oct 2011 – **CITA National Fellow**
Aug 2013 Department of Physics and Astronomy, University of Western Ontario, Canada
Mar 2011 – **BK21 Postdoctoral Research Fellow**
Aug 2011 Department of Physics and Astronomy, Seoul National University, Korea

Education

Mar 2005– **Ph. D in Astronomy**, Advisor: Prof. Woong-Tae Kim
Feb 2011 Department of Physics and Astronomy, Seoul National University, Korea
Mar 2001– **B. S in Astronomy**
Feb 2005 Department of Physics and Astronomy, Seoul National University, Korea

Teaching Experience

2019 – *present* **Lachlan Lancaster**, Graduate student at Princeton University
Globular Cluster Formation in Giant Molecular Clouds – Ph. D. thesis project (with Jeong-Gyu Kim and Eve Ostriker)
2019 – 2020 **Ryan Golant**, Undergraduate student at Princeton University
Effect of early feedback in regulating star formation rates – Summer research, Senior thesis (with Eve Ostriker)
2018 – 2019 **Erin Kado-Fong**, Graduate student at Princeton University
Diffuse ionized gas in star-forming galactic disks – Semester project (with Jeong-Gyu Kim and Eve Ostriker)
2018 – 2019 **Aditi Vijayan**, Graduate student at the Indian Institute of Science
Kinematics and dynamics of multiphase outflows – Summer research via [Kavli Summer Program in Astrophysics](#) (with Lucia Armillotta, Eve Ostriker, Miao Li)

2018 – 2019	Kareem El-Badry , Graduate student at the UC Berkeley <i>Evolution of supernovae-driven superbubbles with conduction and cooling</i> – Summer research via Kavli Summer Program in Astrophysics (with Eve Ostriker)
2018	Mohammad Refat , Undergraduate student at the CUNY <i>Metallicity fluctuations in TIGRESS</i> – Summer research via AstroCom NYC
2018 – 2019	Erin Flowers , Graduate student at Princeton University <i>Turbulence driving and outflows by clustered Supernovae</i> – Semester project (with Eve Ostriker)
2017 – <i>present</i>	Woorak Choi , Graduate student at Yonsei University <i>Ram pressure stripping in resolved multiphase ISM simulations</i> – Ph.D thesis project (with Aeree Chung)
2014 – 2015	Roberta Raileanu , Undergraduate student at Princeton University <i>Superbubbles in the multiphase ISM and the loading of galactic winds</i> – 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 <i>Solar System Astronomy and Lab.</i> , <i>Astronomical Observation & Lab. I & II</i> , <i>Astronomy and Lab.</i> , <i>Introduction to Astrophysics I & II</i> , <i>Stars and Stellar Systems</i> , <i>Man & the Universe</i> . Designing and leading the Lab classes. Teaching programming languages and analysis tools including Fortran, C, and IDL.

Grants

2020	PI , Chandra Theory Grant; \$85,000
2018–2021	Co-I , NASA TCAN (PI: Julian Borrill); \$1,398,099

Observing Proposals

2019	Co-I , VLA Extra Large proposal (PI: Adam Leroy), submitted
2019	Co-I , VLA Regular proposal (PI: Woorak Choi), 7.4 hours, rank B

Computing Time Allocations

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 Service

2020 –	HI Working Group Member , GASKAP high spectral resolution survey of the HI and OH lines in the Milky Way and Magellanic Systems
2019 –	Working Group Member , SPICA Nearby Galaxies member of the SPICA science case development team for “Diffuse gas in galaxies”
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 (Simulating Multiscale Astrophysics to Understand Galaxies) collaboration**
 leading the working group for “Resolved ISM, Star formation, and Stellar feedback” in the international collaboration funded by the Simons Foundation
- 2017 – 2019 **Working Group Member, PICO collaboration**
 contributing galactic foreground modeling for a probe-class mission concept study funded by NASA entitled “Probe of Inflation and Cosmic Origins”
- 2020 **Reviewer, NASA FINESST**
- 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 **Invited Review, Cosmic turbulence and magnetic fields: physics of baryonic matter across time and scales**, Cargèse, 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

- 2020 **Colloquium**, University of Georgia, Athens, GA – remote talk
- 2020 **Colloquium**, University of Waterloo, Waterloo, ON, Canada
- 2019 **Colloquium**, University of Maryland, College Park, MD
- 2019 **Colloquium**, Australia National University, Canberra, Australia
- 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 **Invited Talk, CMB-S4 Workshop**, UChicago, via Zoom
- 2020 **Invited Talk**, Midwest Magnetic Field Meeting 2020, Madison, WI – cancelled due to COVID-19
- 2020 **Invited Talk, Cosmological Analyses Featuring Galactic Foreground Emission**, Lattes, France – cancelled due to COVID-19

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, Cargèse, 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, Suwon, Korea
 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

References

- **Eve Ostriker** – eco@astro.princeton.edu, +1-609-258-7240
Professor, Department of Astrophysical Sciences, Princeton University
- **James Stone** – jmstone@ias.edu (ddunbar@ias.edu for letter request), +1-609-734-8054
Professor, School of Natural Sciences, Institute for Advanced Study
- **Rachel Somerville** – rsomerville@flatironinstitute.org, +1-848-445-8964
Group Leader, 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
- **Raphael Flauger** – flauger@physics.ucsd.edu, +1-858-534-7504
Professor, Department of Physics, University of California, San Diego
- **Snezana Stanimirović** – sstanimi@astro.wisc.edu, +1-608-890-1458
Professor, Department of Astronomy, University of Wisconsin-Madison

Bibliography (ADS, Google Scholar)

Name: student mentored by me

Metrics (as of 2021-01-14) — refereed: 30 — first author: 15

citations: 1053 (879 as the first author) — h-index: 16 (11 as the first author)

Refereed Publications

30. Pandya, V. *et al.* (incl. **CGK**; 11/13), *First Results from SMAUG: The Need for Preventative Stellar Feedback and Improved Baryon Cycling in Semianalytic Models of Galaxy Formation*, ApJ, **905**, 4, 2020 (arXiv:2006.16317) [6 citations]
29. Koo, Bon-Chul; **Kim, Chang-Goo**; Park, Sangwook; Ostriker, Eve C., *Radiative Supernova Remnants and Supernova Feedback*, ApJ, **905**, 35, 2020 (arXiv:2011.06322)
28. **Kim, Chang-Goo**; Ostriker, Eve C.; Fielding, Drummond B.; Smith, Matthew C. *et al.*, *A Framework for Multiphase Galactic Wind Launching Using TIGRESS*, ApJ, **903**, 2020 (arXiv:2010.09090)
27. Gong, Munan; Ostriker, Eve C.; **Kim, Chang-Goo**; Kim, Jeong-Gyu, *The Environmental Dependence of the X_{CO} Conversion Factor*, ApJ, **903**, 142, 2020 (arXiv:2009.14631) [3 citations]
26. Fielding, D. B. *et al.* (incl. **CGK**; 7/15), *First Results from SMAUG: Uncovering the Origin of the Multiphase Circumgalactic Medium with a Comparative Analysis of Idealized and Cosmological Simulations*, ApJ, **903**, 32, 2020 (arXiv:2006.16316) [8 citations]
25. **Kim, Chang-Goo**; Ostriker, Eve C.; Somerville, Rachel S.; Bryan, Greg L. *et al.*, *First Results from SMAUG: Characterization of Multiphase Galactic Outflows from a Suite of Local Star-forming Galactic Disk Simulations*, ApJ, **900**, 61, 2020 (arXiv:2006.16315) [11 citations]
24. Seon, Kwang-il; **Kim, Chang-Goo**, *$\text{Ly}\alpha$ Radiative Transfer: Monte Carlo Simulation of the Wouthuysen-Field Effect*, ApJS, **250**, 9, 2020 (arXiv:2005.00238) [4 citations]
23. Murray, Claire E.; Peek, J. E. G.; **Kim, Chang-Goo**, *Extracting the Cold Neutral Medium from H I Emission with Deep Learning: Implications for Galactic Foregrounds at High Latitude*, ApJ, **899**, 15, 2020 (arXiv:2006.16490) [5 citations]
22. Mao, S. Alwin; Ostriker, Eve C.; **Kim, Chang-Goo**, *Cloud Properties and Correlations with Star Formation in Self-consistent Simulations of the Multiphase ISM*, ApJ, **898**, 52, 2020 (arXiv:1911.05078) [7 citations]
21. Kim, Woong-Tae; **Kim, Chang-Goo**; Ostriker, Eve C., *Local Simulations of Spiral Galaxies with the TIGRESS Framework. I. Star Formation and Arm Spurs/Feathers*, ApJ, **898**, 35, 2020 (arXiv:2006.05614) [6 citations]
20. Kado-Fong, Erin; Kim, Jeong-Gyu; Ostriker, Eve C.; **Kim, Chang-Goo**, *Diffuse Ionized Gas in Simulations of Multiphase, Star-forming Galactic Disks*, ApJ, **897**, 143, 2020 (arXiv:2006.06697) [2 citations]
19. Vijayan, Aditi; **Kim, Chang-Goo**; Armillotta, Lucia; Ostriker, Eve C. *et al.*, *Kinematics and Dynamics of Multiphase Outflows in Simulations of the Star-forming Galactic Interstellar Medium*, ApJ, **894**, 12, 2020 (arXiv:1911.07872) [8 citations]

18. El-Badry, Kareem; Ostriker, Eve C.; **Kim, Chang-Goo**; Quataert, Eliot *et al.*, *Evolution of supernovae-driven superbubbles with conduction and cooling*, MNRAS, **490**, 1961, 2019 (arXiv:1902.09547) [20 citations]
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) [11 citations]
16. Murray, C. E. *et al.* (incl. **CGK**; 7/7), *The 21-SPONGE H I Absorption Line Survey. I. The Temperature of Galactic H I*, ApJS, **238**, 14, 2018 (arXiv:1806.06065) [29 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) [28 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) [76 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) [68 citations]
12. Murray, Claire E.; Stanimirović, Snežana; **Kim, Chang-Goo**; Ostriker, Eve C. *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) [16 citations]
11. Safraneck-Shrader, Chalence; Krumholz, Mark R.; **Kim, Chang-Goo**; Ostriker, Eve C. *et al.*, *Chemistry and radiative shielding in star-forming galactic discs*, MNRAS, **465**, 885, 2017 (arXiv:1605.07618) [27 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) [67 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) [58 citations]
8. **Kim, Chang-Goo**; Ostriker, Eve C., *Momentum Injection by Supernovae in the Interstellar Medium*, ApJ, **802**, 99, 2015 (arXiv:1410.1537) [201 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) [37 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) [134 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](#)) [[107 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](#)) [[17 citations](#)]
2. **Kim, Chang-Goo**; Kim, Woong-Tae; Ostriker, Eve C., *Galactic Spiral Shocks with Thermal Instability*, ApJ, **681**, 1148, 2008 ([arXiv:0804.0139](#)) [[47 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](#)) [[41 citations](#)]

Papers under Review

1. Motwani, Bhawna; Genel, Shy; Bryan, Greg L.; **Kim, Chang-Goo et al.**, *First results from SMAUG: Insights into star formation conditions from spatially-resolved ISM properties in TNG50*, 2020 ([arXiv:2006.16314](#)) [[5 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, 2015, *Highlights of Astronomy*, 16:609–610, *Numerical modeling of multiphase, turbulent galactic disks with star formation feedback*.