

Curriculum Vitae
Shea C. Garrison-Kimmel

Einstein Postdoctoral Fellow
Theoretical Astrophysics Including Relativity
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Professional Appointments

- Einstein Fellow, California Institute of Technology *August 2015 - present*

Education

- Ph.D. in Physics and Astronomy, University of California, Irvine *Awarded June 2015*
- M.S. in Physics and Astronomy, University of California, Irvine *Awarded Dec 2010*
- B.S. in Physics and Astronomy, concentration in Computer Science, Haverford College *Awarded May 2009*

Fellowships and Awards

- Einstein Postdoctoral Fellowship, NASA *Awarded July 2015*
- Chancellor's Club Dissertation Fellowship, University of California, Irvine *Awarded Dec 2014*
- Price Prize, Ohio State University *Awarded July 2014*
- Chancellor's Fellowship, University of California, Irvine *Awarded Feb 2009*
- Summer Research Fellowship, University of California, Irvine *Awarded Feb 2009*

Research Interests

Galaxy formation and theoretical cosmology, such as:

- Placing the Milky Way in its proper cosmological context as a member of the Local Group
- Numerical simulations of structure formation on both large and small scales
- Constraining the behavior of dark matter by comparing with local galactic properties
- The impact of environment on dwarf galaxy evolution
- The formation and evolution of the smallest galaxies in the Universe
- Comparing theoretical predictions with observational data to constrain baryonic processes

Professional Service

- Created and organized inaugural GalFRESCA workshop *Summer 2016*
- Co-organized second annual GalFRESCA workshop *Summer 2017*
- Twice served on NASA Astrophysics Theory Program grant review panel

Teaching and Mentoring

Teaching experience

- University of California, Irvine, Teaching Assistant *Sept 2009 - June 2010 and March 2014 - June 2014*
- California State Summer School for Mathematics and Science, Teaching Assistant *July 2010, 2011, and 2012*
- Haverford College, Physics Clinic Tutor *Feb 2007 - May 2009*

Mentoring Experience

- Mentored Jaspreet Lally, then a rising junior at University of California, Irvine, on how to run and analyze simulations of dwarf galaxies in isolation with a time varying potential to search for core formation, resulting in an authorship on Garrison-Kimmel et al., 2013. Jaspreet successfully graduated the following year.
- Mentored Kyle Lee, then a sophomore at Chapman University, on how to set up, simulate, and analyze cosmological simulations, resulting in an authorship on Garrison-Kimmel et al., 2014 and helping to secure his current position in a Ph.D. program at Stony Brook University.
- Mentored Emma Bardwell, then a rising sophomore at Case Western University, on a project exploring the relationship between halo mass and galaxy stellar mass, and the impact of scatter in that relation, resulting in an authorship on Garrison-Kimmel et al., 2016.
- Mentored Kris Burke, then a senior at University of California, Irvine, on simulating the cosmological evolution of galaxies with a central potential to explore the impact of the Milky Way disk on the substructure population with minimal CPU cost, resulting in an authorship on a paper in preparation. Kris has since continued into a M.Sc. program at Texas A&M.
- Aided Astrid Lamberts in mentoring the summer research of Kaliden Drango, then an entering undergraduate at Caltech who built the initial machinery for applying binary population synthesis models to the FIRE simulations to make gravitational wave predictions.

References

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Peer-Reviewed Publications

First Author Publications

- [1] **S. Garrison-Kimmel**, A. Wetzel, J. Bullock, P. Hopkins, M. Boylan-Kolchin, C.-A. Faucher-Giguère, D. Kereš, E. Quataert, R. Sanderson *et al.*, “Not so lumpy after all: modelling the depletion of dark matter subhaloes by Milky Way-like galaxies.” *MNRAS* **471**, 1709–1727 (2017).
- [2] **S. Garrison-Kimmel**, J. Bullock, M. Boylan-Kolchin, and E. Bardwell, “Organized chaos: scatter in the relation between stellar mass and halo mass in small galaxies.” *MNRAS* **464**, 3108–3120 (2017).
- [3] **S. Garrison-Kimmel**, S. Horiuchi, K. Abazajian, J. Bullock, and M. Kaplinghat, “Running with BICEP2: implications for small-scale problems in CDM.” *MNRAS* **444**, 961–970 (2014).
- [4] **S. Garrison-Kimmel**, M. Boylan-Kolchin, J. Bullock, and E. Kirby, “Too big to fail in the Local Group.” *MNRAS* **444**, 222–236 (2014).
- [5] **S. Garrison-Kimmel**, M. Boylan-Kolchin, J. Bullock, and K. Lee, “ELVIS: Exploring the Local Volume in Simulations.” *MNRAS* **438**, 2578–2596 (2014).
- [6] **S. Garrison-Kimmel**, M. Rocha, M. Boylan-Kolchin, J. Bullock, and J. Lally, “Can feedback solve the too-big-to-fail problem?.” *MNRAS* **433**, 3539–3546 (2013).

Nth Author Publications

- [1] K. El-Badry, E. Quataert, A. Wetzel, P. Hopkins, D. Weisz, T. Chan, A. Fitts, M. Boylan-Kolchin, D. Kereš *et al.*, “Gas kinematics, morphology and angular momentum in the FIRE simulations.” *MNRAS* **473**, 1930–1955 (2018).
- [2] J.-h. Kim, X. Ma, M. Grudić, P. Hopkins, C. Hayward, A. Wetzel, C.-A. Faucher-Giguère, D. Kereš, **S. Garrison-Kimmel** *et al.*, “Formation of globular cluster candidates in merging proto-galaxies at high redshift: a view from the FIRE cosmological simulations.” *MNRAS* **474**, 4232–4244 (2018).
- [3] S. Fillingham, M. Cooper, A. Pace, M. Boylan-Kolchin, J. Bullock, **S. Garrison-Kimmel**, and C. Wheeler, “Under pressure: quenching star formation in low-mass satellite galaxies via stripping.” *MNRAS* **463**, 1916–1928 (2016).
- [4] A. Lamberts, **S. Garrison-Kimmel**, D. Clausen, and P. Hopkins, “When and where did GW150914 form?.” *MNRAS* **463**, L31–L35 (2016).
- [5] S. Horiuchi, B. Bozek, K. Abazajian, M. Boylan-Kolchin, J. Bullock, **S. Garrison-Kimmel**, and J. Onorbe, “Properties of resonantly produced sterile neutrino dark matter subhaloes.” *MNRAS* **456**, 4346–4353 (2016).
- [6] B. Bozek, M. Boylan-Kolchin, S. Horiuchi, **S. Garrison-Kimmel**, K. Abazajian, and J. Bullock, “Resonant sterile neutrino dark matter in the local and high-z Universe.” *MNRAS* **459**, 1489–1504 (2016).
- [7] A. Deason, A. Wetzel, **S. Garrison-Kimmel**, and V. Belokurov, “Satellites of LMC-mass dwarfs: close friendships ruined by Milky Way mass haloes.” *MNRAS* **453**, 3568–3574 (2015).
- [8] C. Wheeler, J. Oñorbe, J. Bullock, M. Boylan-Kolchin, O. Elbert, **S. Garrison-Kimmel**, P. Hopkins, and D. Kereš, “Sweating the small stuff: simulating dwarf galaxies, ultra-faint dwarf galaxies, and their own tiny satellites.” *MNRAS* **453**, 1305–1316 (2015).
- [9] S. Fillingham, M. Cooper, C. Wheeler, **S. Garrison-Kimmel**, M. Boylan-Kolchin, and J. Bullock, “Taking care of business in a flash: constraining the time-scale for low-mass satellite quenching with ELVIS.” *MNRAS* **454**, 2039–2049 (2015).
- [10] A. Wetzel, A. Deason, and **S. Garrison-Kimmel**, “Satellite Dwarf Galaxies in a Hierarchical Universe: Infall Histories, Group Preprocessing, and Reionization.” *ApJ* **807**, 49 (2015).

- [11] O. Elbert, J. Bullock, **S. Garrison-Kimmel**, M. Rocha, J. Oñorbe, and A. Peter, “Core formation in dwarf haloes with self-interacting dark matter: no fine-tuning necessary.” *MNRAS* **453**, 29–37 (2015).
- [12] A. Deason, A. Wetzel, and **S. Garrison-Kimmel**, “Satellite Dwarf Galaxies in a Hierarchical Universe: The Prevalence of Dwarf-Dwarf Major Mergers.” *ApJ* **794**, 115 (2014).
- [13] M.-Y. Wang, A. Peter, L. Strigari, A. Zentner, B. Arant, **S. Garrison-Kimmel**, and M. Rocha, “Cosmological simulations of decaying dark matter: implications for small-scale structure of dark matter haloes.” *MNRAS* **445**, 614–629 (2014).
- [14] M. Boylan-Kolchin, J. Bullock, and **S. Garrison-Kimmel**, “Near-field limits on the role of faint galaxies in cosmic reionization.” *MNRAS* **443**, L44–L48 (2014).
- [15] C. Brook, A. Di Cintio, A. Knebe, S. Gottlöber, Y. Hoffman, G. Yepes, and **S. Garrison-Kimmel**, “The Stellar-to-halo Mass Relation for Local Group Galaxies.” *ApJ* **784**, L14 (2014).
- [16] S. Horiuchi, P. Humphrey, J. Oñorbe, K. Abazajian, M. Kaplinghat, and **S. Garrison-Kimmel**, “Sterile neutrino dark matter bounds from galaxies of the Local Group.” *Phys. Rev. D* **89**, 025017 (2014).
- [17] J. Oñorbe, **S. Garrison-Kimmel**, A. Maller, J. Bullock, M. Rocha, and O. Hahn, “How to zoom: bias, contamination and Lagrange volumes in multimass cosmological simulations.” *MNRAS* **437**, 1894–1908 (2014).
- [18] B. Yniguez, **S. Garrison-Kimmel**, M. Boylan-Kolchin, and J. Bullock, “On the stark difference in satellite distributions around the Milky Way and Andromeda.” *MNRAS* **439**, 73–82 (2014).
- [19] M. Rocha, A. Peter, J. Bullock, M. Kaplinghat, **S. Garrison-Kimmel**, J. Oñorbe, and L. Moustakas, “Cosmological simulations with self-interacting dark matter - I. Constant-density cores and substructure.” *MNRAS* **430**, 81–104 (2013).

Papers Under Review

First Author Publications

- [1] **S. Garrison-Kimmel**, P. Hopkins, A. Wetzel, K. El-Badry, R. Sanderson, J. Bullock, X. Ma, F. van de Voort, Z. Hafen *et al.*, “The origin of the diverse morphologies and kinematics of Milky Way-mass galaxies in the FIRE-2 simulations.” *ArXiv e-prints* (2017).

Nth Author Publications

- [1] A. Lamberts, **S. Garrison-Kimmel**, P. Hopkins, E. Quataert, J. Bullock, C.-A. Faucher-Giguère, A. Wetzel, D. Keres, K. Drango *et al.*, “Predicting the binary black hole population of the Milky Way with cosmological simulation.” *ArXiv e-prints* (2018).
- [2] R. Sanderson, **S. Garrison-Kimmel**, A. Wetzel, T. Keung Chan, P. Hopkins, D. Kereš, I. Escala, C.-A. Faucher-Giguère, and X. Ma, “Reconciling observed and simulated stellar halo masses.” *ArXiv e-prints* (2017).
- [3] E. Nadler, Y.-Y. Mao, R. Wechsler, **S. Garrison-Kimmel**, and A. Wetzel, “Modeling the Impact of Baryons on Subhalo Populations with Machine Learning.” *ArXiv e-prints* (2017).
- [4] T. Chan, D. Kereš, A. Wetzel, P. Hopkins, C.-A. Faucher-Giguère, K. El-Badry, **S. Garrison-Kimmel**, and M. Boylan-Kolchin, “The origin of ultra diffuse galaxies: stellar feedback and quenching.” *ArXiv e-prints* (2017).
- [5] X. Ma, P. Hopkins, M. Boylan-Kolchin, C.-A. Faucher-Giguère, E. Quataert, R. Feldmann, **S. Garrison-Kimmel**, C. Hayward, D. Kereš *et al.*, “Simulating galaxies in the reionization era with FIRE-2: morphologies and sizes.” *ArXiv e-prints* (2017).
- [6] X. Ma, P. Hopkins, **S. Garrison-Kimmel**, C.-A. Faucher-Giguère, E. Quataert, M. Boylan-Kolchin, C. Hayward, R. Feldmann, and D. Kereš, “Simulating galaxies in the reionization era with FIRE-2: galaxy scaling relations, stellar mass functions, and luminosity functions.” *ArXiv e-prints* (2017).

- [7] P. Hopkins, A. Wetzel, D. Keres, C.-A. Faucher-Giguere, E. Quataert, M. Boylan-Kolchin, N. Murray, C. Hayward, **S. Garrison-Kimmel** *et al.*, “FIRE-2 Simulations: Physics versus Numerics in Galaxy Formation.” *ArXiv e-prints* (2017).
- [8] O. Elbert, J. Bullock, M. Kaplinghat, **S. Garrison-Kimmel**, A. Graus, and M. Rocha, “A Testable Conspiracy: Simulating Baryonic Effects on Self-Interacting Dark Matter Halos.” *ArXiv e-prints* (2016).

Conference Proceedings

Nth Author Publications

- [1] B. Bozek, M. Boylan-Kolchin, S. Horiuchi, **S. Garrison-Kimmel**, K. Abazajian, and J. Bullock, “Decaying sterile neutrino dark matter in the Local Group” in American Astronomical Society Meeting Abstracts (2017)
- [2] M. Rocha, A. Peter, J. Bullock, M. Kaplinghat, **S. Garrison-Kimmel**, J. Onorbe, and L. Moustakas, “Cosmological simulations with self-interacting dark matter” in Probes of Dark Matter on Galaxy Scales (2013)
- [3] A. Pancoast, **S. Garrison-Kimmel**, and P. Love, “Gaps and Tails: The restricted N-body problem in colliding galaxies and the asteroid belt” in APS March Meeting Abstracts (2009)

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