

Curriculum Vitae
Shea C. Garrison-Kimmel

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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. S. Bullock, P. F. Hopkins, M. Boylan-Kolchin, C.-A. Faucher-Giguère, D. Kereš, E. Quataert, R. E. 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. S. 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. N. Abazajian, J. S. 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. S. Bullock, and E. N. Kirby, “Too big to fail in the Local Group.” *MNRAS* **444**, 222–236 (2014).
- [5] **S. Garrison-Kimmel**, M. Boylan-Kolchin, J. S. 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. S. Bullock, and J. Lally, “Can feedback solve the too-big-to-fail problem?” *MNRAS* **433**, 3539–3546 (2013).

Nth Author Publications

- [1] E. O. Nadler, Y.-Y. Mao, R. H. Wechsler, **S. Garrison-Kimmel**, and A. Wetzel, “Modeling the Impact of Baryons on Subhalo Populations with Machine Learning.” *ApJ* **859**, 129 (2018).
- [2] X. Ma, P. F. Hopkins, M. Boylan-Kolchin, C.-A. Faucher-Giguère, E. Quataert, R. Feldmann, **S. Garrison-Kimmel**, C. C. Hayward, D. Kereš *et al.*, “Simulating galaxies in the reionization era with FIRE-2: morphologies and sizes.” *MNRAS* **477**, 219–229 (2018).
- [3] 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.” *MNRAS* **478**, 906–925 (2018).
- [4] S. P. Fillingham, M. C. Cooper, M. Boylan-Kolchin, J. S. Bullock, **S. Garrison-Kimmel**, and C. Wheeler, “Environmental quenching of low-mass field galaxies.” *MNRAS* **477**, 4491–4498 (2018).
- [5] J.-h. Kim, X. Ma, M. Y. Grudić, P. F. Hopkins, C. 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).
- [6] O. D. Elbert, J. S. Bullock, M. Kaplinghat, **S. Garrison-Kimmel**, A. S. Graus, and M. Rocha, “A Testable Conspiracy: Simulating Baryonic Effects on Self-interacting Dark Matter Halos.” *ApJ* **853**, 109 (2018).
- [7] K. El-Badry, E. Quataert, A. Wetzel, P. F. Hopkins, D. R. 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).
- [8] S. P. Fillingham, M. C. Cooper, A. B. Pace, M. Boylan-Kolchin, J. S. Bullock, **S. Garrison-Kimmel**, and C. Wheeler, “Under pressure: quenching star formation in low-mass satellite galaxies via stripping.” *MNRAS* **463**, 1916–1928 (2016).
- [9] A. Lamberts, **S. Garrison-Kimmel**, D. Clausen, and P. Hopkins, “When and where did GW150914 form?” *MNRAS* **463**, L31–L35 (2016).
- [10] B. Bozek, M. Boylan-Kolchin, S. Horiuchi, **S. Garrison-Kimmel**, K. Abazajian, and J. S. Bullock, “Resonant sterile neutrino dark matter in the local and high-*z* Universe.” *MNRAS* **459**, 1489–1504 (2016).

- [11] S. Horiuchi, B. Bozek, K. N. Abazajian, M. Boylan-Kolchin, J. S. Bullock, **S. Garrison-Kimmel**, and J. Onorbe, “Properties of resonantly produced sterile neutrino dark matter subhaloes.” *MNRAS* **456**, 4346–4353 (2016).
- [12] S. P. Fillingham, M. C. Cooper, C. Wheeler, **S. Garrison-Kimmel**, M. Boylan-Kolchin, and J. S. Bullock, “Taking care of business in a flash: constraining the time-scale for low-mass satellite quenching with ELVIS.” *MNRAS* **454**, 2039–2049 (2015).
- [13] 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).
- [14] C. Wheeler, J. Oñorbe, J. S. Bullock, M. Boylan-Kolchin, O. D. Elbert, **S. Garrison-Kimmel**, P. F. Hopkins, and D. Keres, “Sweating the small stuff: simulating dwarf galaxies, ultra-faint dwarf galaxies, and their own tiny satellites.” *MNRAS* **453**, 1305–1316 (2015).
- [15] A. R. Wetzel, A. J. Deason, and **S. Garrison-Kimmel**, “Satellite Dwarf Galaxies in a Hierarchical Universe: Infall Histories, Group Preprocessing, and Reionization.” *ApJ* **807**, 49 (2015).
- [16] O. D. Elbert, J. S. Bullock, **S. Garrison-Kimmel**, M. Rocha, J. Oñorbe, and A. H. Peter, “Core formation in dwarf haloes with self-interacting dark matter: no fine-tuning necessary.” *MNRAS* **453**, 29–37 (2015).
- [17] M.-Y. Wang, A. H. Peter, L. E. Strigari, A. R. 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).
- [18] 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).
- [19] 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).
- [20] S. Horiuchi, P. J. Humphrey, J. Oñorbe, K. N. Abazajian, M. Kaplinghat, and **S. Garrison-Kimmel**, “Sterile neutrino dark matter bounds from galaxies of the Local Group.” *Phys. Rev. D* **89**, 025017 (2014).
- [21] 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).
- [22] B. Yniguez, **S. Garrison-Kimmel**, M. Boylan-Kolchin, and J. S. Bullock, “On the stark difference in satellite distributions around the Milky Way and Andromeda.” *MNRAS* **439**, 73–82 (2014).
- [23] J. Oñorbe, **S. Garrison-Kimmel**, A. H. Maller, J. S. Bullock, M. Rocha, and O. Hahn, “How to zoom: bias, contamination and Lagrange volumes in multimass cosmological simulations.” *MNRAS* **437**, 1894–1908 (2014).
- [24] M. Rocha, A. H. Peter, J. S. Bullock, M. Kaplinghat, **S. Garrison-Kimmel**, J. Oñorbe, and L. A. 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. F. Hopkins, A. Wetzel, J. S. Bullock, M. Boylan-Kolchin, D. Keres, C.-A. Faucher-Giguere, K. El-Badry, A. Lamberts *et al.*, “The Local Group on FIRE: Dwarf galaxy populations across a suite of hydrodynamic simulations.” *ArXiv e-prints* arXiv:1806.04143 (2018).
- [2] **S. Garrison-Kimmel**, P. F. Hopkins, A. Wetzel, K. El-Badry, R. E. Sanderson, J. S. 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* arXiv:1712.03966 (2017).

Nth Author Publications

- [1] M. Rodriguez Wimberly, M. Cooper, S. Fillingham, M. Boylan-Kolchin, J. Bullock, and **S. Garrison-Kimmel**, “The Suppression of Star Formation on the Smallest Scales: What Role Does Environment Play?.” *ArXiv e-prints* arXiv:1806.07891 (2018).
- [2] K. El-Badry, J. Bland-Hawthorn, A. Wetzel, E. Quataert, D. R. Weisz, M. Boylan-Kolchin, P. F. Hopkins, C.-A. Faucher-Giguère, D. Kereš *et al.*, “Where are the most ancient stars in the Milky Way?.” *ArXiv e-prints* arXiv:1804.00659 (2018).
- [3] B. Bozek, A. Fitts, M. Boylan-Kolchin, **S. Garrison-Kimmel**, K. Abazajian, J. S. Bullock, D. Keres, C.-A. Faucher-Giguere, A. Wetzel *et al.*, “Warm FIRE: Simulating Galaxy Formation with Resonant Sterile Neutrino Dark Matter.” *ArXiv e-prints* arXiv:1803.05424 (2018).
- [4] 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 simulations.” *ArXiv e-prints* arXiv:1801.03099 (2018).
- [5] R. E. Sanderson, **S. Garrison-Kimmel**, A. Wetzel, T. Keung Chan, P. F. Hopkins, D. Kereš, I. Escala, C.-A. Faucher-Giguère, and X. Ma, “Reconciling observed and simulated stellar halo masses.” *ArXiv e-prints* arXiv:1712.05808 (2017).
- [6] P. F. Hopkins, A. Wetzel, D. Keres, C.-A. Faucher-Giguere, E. Quataert, M. Boylan-Kolchin, N. Murray, C. C. Hayward, **S. Garrison-Kimmel** *et al.*, “FIRE-2 Simulations: Physics versus Numerics in Galaxy Formation.” *ArXiv e-prints* arXiv:1702.06148 (2017).

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, AAS Meeting #229, id.418.06 (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, AAS Topical Conference Series Vol. 1. Proceedings of the conference held 14-19 July 2013 in Monterey, CA. Bulletin of the American Astronomical Society, Vol. 45, #7, #302.03 (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 American Physical Society, 2009 APS March Meeting, March 16-20, 2009, abstract id. K1.007 (2009)