
Education

Massachusetts Institute of Technology, Cambridge, Massachusetts, USA, 2004–2011

Ph.D., Physics, 25 January 2011.

Thesis advisor: Edmund Bertschinger. Thesis Committee: Alan Guth, Paul Schechter.

University of Maryland, College Park, Maryland, USA 1999–2003

B.S., Physics, High Honors and magna cum laude

B.S., Astronomy, High Honors and magna cum laude

Centre International d'Études Françaises, Université de Bourgogne, Dijon, France, January–May 2002

Diplome d'Études Langue Française, deuxième degré, mention Très Bien

Research Experience

Postdoctoral scholar, Caltech December 2017–present.

Theoretical Astrophysics (TAPIR). Supervisor: Phil Hopkins

NSF Astronomy and Astrophysics Postdoctoral Fellow 2014–2017.

Proposal 1400989, “Weighing and measuring the Milky Way and other galaxies.”

Sponsors: Phil Hopkins (Caltech), Kathryn Johnston (Columbia), David Hogg (NYU).

Postdoctoral researcher, Kapteyn Astronomical Institute 2011–2014. Supervisor: Amina Helmi.

Ph.D. Thesis research, MIT 2004–2011. Supervisor: Edmund Bertschinger.

Thesis title: “Understanding dark matter halos with tidal caustics.”

Undergraduate Honors Thesis Research, University of Maryland 2003.

Supervisor: Derek Richardson. Thesis title: “Towards a dynamical model of Amalthea.”

Professional Highlights

FSWG Chair, WFIRST Astrometry Working Group. Led development of white paper on science cases and considerations for astrometry with the WFIRST Wide-Field Imager.

Chair, Gaia Challenge working group on tidal streams in 2015 (Barcelona) and 2016 (NORDITA). Constructed mock Gaia catalogs of accreted stellar halos for tests of various potential-determination methods.

Co-I on $\gtrsim 200\text{M}$ node-hours of allocations on Blue Waters, Stampede, and Pleiades computing systems.

Member of the **WFIRST Infrared Nearby Galaxy Survey Science Investigation Team** (PIs: B. Williams, J. Dalcanton). Generating mock observations of nearby galaxy halos from simulations.

Member of the **Carnegie-Caltech Outer Halo RR Lyr Project**, using Keck and Magellan to obtain radial velocities for RR Lyr discovered by PanSTARRS.

Supervised research projects with seven students in total: 4 undergraduate, 1 master's, 2 graduate; resulting in 3 published papers & 2 in prep/under review.

Referee for *MNRAS*, *ApJ*, *A&A*, *PASA*; **Proposal reviewer** for NSF, HST.

Assistant Director for Physical Sciences, Columbia University Bridge to the Ph.D. Program in the Natural Sciences, April 2015–June 2017. Advised eight post-baccalaureate students from underrepresented groups bound for graduate school in physical-sciences disciplines. bit.ly/cubridge.

Steering Committee, Caltech Women in Physics, Math, and Astronomy (WiPMA). Planned events program for the inaugural 2016–2017 academic year; group now reaches >150 members of the Caltech community. pma.caltech.edu/content/women-pma-wipma.

Awards

NSF Astronomy and Astrophysics Postdoctoral Fellowship 2014–2017

Henry Kendall Teaching Award MIT Physics Department, 2010

Whiteman Graduate Fellowship MIT Physics Department, 2004–2006

References

References from whom letters were requested are marked with *.

***Kathryn Johnston**

(faculty sponsor for NSF AAPF)
Professor of Astronomy, Columbia University
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***Amina Helmi**

(postdoc supervisor 2011–2014)
Full Professor, Kapteyn Astronomical Institute
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***David Hogg**

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Professor of Physics and Data Science
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David Spergel

Director, Center for Computational Astrophysics
Flatiron Institute
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***Philip Hopkins**

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***Marcel Agüeros**

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Evan Kirby

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Juna Kollmeier

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Recent and Upcoming Conferences

Dynamics of the Milky Way System in the Era of Gaia

Aspen Center for Physics, 27 Aug–14 Sept 2018 (Organizer)

COSPAR 42nd Assembly Pasadena, 14–22 July 2018 (Solicited talk)

Shedding Light on the Dark Universe with Extremely Large Telescopes Trieste, 2–6 July 2018 (Invited talk)

Gaia Sprint New York, 4–8 June 2018

49th Division on Dynamical Astronomy Meeting San Jose, CA 15–19 April 2018 (Invited talk)

The 21st Century H-R Diagram STScI Spring Symposium, 23–26 April 2018 (Invited talk)

Shedding Light on the Dark Universe with Extremely Large Telescopes UCLA, 2–6 April 2018 (Invited talk)

Science with Precision Astrometry STScI, 13–15 March 2018 (Invited talk)

Has Sterile Neutrino Dark Matter Been Detected? Lorentz Center, 5–9 Feb 2018 (Invited talk)

Searching for Dwarf Companions of the Milky Way and Beyond in the LSST Era

NOAO, Tucson, AZ 11–13 Oct 2017 (Invitation-only workshop)

Shedding Light on the Dark Universe with Extremely Large Telescopes

Lanzhou, China, 30 Aug–2 Sept 2017 (Invited talk)

Gaia Sprint Heidelberg, 17–21 July 2017

Astronomy in the 2020s: Synergies with WFIRST STScI, 26–28 June 2017

On the Origin and Evolution of Baryonic Halos Galapagos, Ecuador, 13–17 March 2017 (contributed talk)

Detecting the Unexpected STScI, 27 Feb–2 Mar 2017 (Data and methods bazaar)

The Galactic Renaissance Caltech, 1–3 Feb 2017 (opening talk)

Dark Matter Distribution in the Era of Gaia NORDITA, 10–21 Oct 2016 (SOC for Gaia Challenge)

Dark Matter on the Smallest Scales Lorentz Center, Leiden, Netherlands, 4–8 April 2016

Community Astrophysics with WFIRST Pasadena, CA, 29 Feb–2 Mar 2016

Stellar Streams in the Local Universe Ringberg Castle, Tegernsee, Germany, 20–24 Jul 2015

Local Group Astrostatistics University of Michigan, Ann Arbor, MI, 1–4 Jun 2015

Grants

- \$394k** “Modeling Galactic Archaeology of the Milky Way.” NASA Astrophysics Theory Program, 17-ATP17-0069, awarded 19 December 2017. PIs: A. Wetzel, **R. Sanderson**. Co-Is: S. Loebman, S. Garrison-Kimmel.
- \$116k** “Understanding the physics of gas stripping and star-formation quenching of the satellite dwarf galaxies in the Local Group.” HST Cycle 25 proposal AR-15057, awarded 26 June 2017. PI: A. Wetzel. Co-Is: **R. Sanderson**, S. Loebman, S. Garrison-Kimmel, C. Hummels.
- \$267k** “Weighing and measuring the Milky Way and other galaxies.” NSF Astronomy & Astrophysics Fellowship Program AST-1400989, awarded 17 July 2014. PI: **R. Sanderson**.

Computing Allocations

- 160m CPU-hours** “Probing New Physics in Galaxy Formation at Ultra-High Resolution.” Blue Waters Proposal NSF-1713353, awarded 27 April 2017. PI: P. Hopkins. Co-Is: E. Quataert, D. Kereš, J. Bullock, C. Faucher-Giguère, A. Wetzel, C. Hummels, N. Murray, **R. Sanderson**, M. Boylan-Kolchin.
- 11k CPU-hours** “Can we detect the edge of the Milky Way?” Blue Waters education allocation, awarded 19 April 2017. PI: **R. Sanderson**
- 18m CPU-hours** “FIRE: Dark Matter and Galaxy Formation with Unprecedented Physics & Resolution.” NASA Advanced Supercomputing (Pleiades), allocation SMD-16-7592, 11/2016-09/2017. PI: P. Hopkins; Co-Is: J. Kim, S. Garrison-Kimmel, A. Wetzel, C. Hayward, P. Torrey, C. Hummels, A. Lamberts, A. Medling, **R. Sanderson**.
- 2.5m CPU-hours** “Simulating the WFIRST Nearby Galaxy Survey.” NASA Advanced Supercomputing (Pleiades), allocation SMD-16-7474, 11/2016-09/2017. PI: B. Williams Co-Is: J. Bullock, C. Wheeler, K. Johnston, **R. Sanderson**, L. Sales, T. Kelley.
- 77k CPU-hours** “Simulating the WFIRST Nearby Galaxy Survey.” NASA Advanced Supercomputing (Pleiades), allocation SMD-16-6937, 05/2016-10/2016. PI: B. Williams Co-Is: J. Bullock, C. Wheeler, K. Johnston, **R. Sanderson**, L. Sales.

Observing Allocations

- 2 nights** “Mapping the Outer Halo of the Milky Way with RR Lyrae.” NOAO DECam, 2018A-0215, awarded 15 December 2017. PI: J. Carlin; Co-Is: R. Munoz, G. Medina, K. Vivas, **R. Sanderson**, B. Willman.
- 4 nights** “The Caltech/Carnegie Survey of the Outer Halo of the Milky Way.” Keck ESI, 2018A-C281, awarded 1 December 2017. PI: J. Cohen; Co-Is: B. Sesar, N. Hernitschek, S. Shethman, I. Thompson, J. Simon, J. Kollmeier, N. Blogorodnova, **R. Sanderson**, J. Crane.
- 10 hours** “Mapping the Gravitational Force in NGC 3923 using MUSE.” ESO Programme 099.B-0471, awarded 24 December 2016 (UT4 pressure factor 8.3). PI: T. Puzia; Co-Is: B.W. Miller, **R.E. Sanderson**, S. McGaugh, C. Mihos.

Outreach Products

- Galactic Cannibalism** interview for the Spark Dialog podcast (2016) (sparkdialog.com/galactic-cannibalism)
- Why Stars Shine** interactive multimedia lesson developed for sixth-grade science students at Jonas Clarke Middle School, Lexington, MA, 2006–2007; presented in March 2017 at the Caltech Astro Stargazing and Lecture Series (tinyurl.com/whystarsshine) and in May 2018 at the Linda Vista Library in Pasadena.
- Voiceovers for YouTube videos** about current astrophysics research:
- ▶ Introductions to six short films on planet formation and protoplanetary disks: youtube.com/channel/UCbpJQukyO7U1MMdi-36Y5Gg (2013).
 - ▶ “The Sticky Geometry of the Cosmic Web,” youtube.com/watch?v=wl12X2zczql. Presented at the [peer-reviewed] Symposium on Computational Geometry (2012).

Teaching Experience

Caltech Guest lecturer for graduate course in cosmology (Spring 2017): large-scale structure tests of dark matter & dark energy.

Columbia University Introduction to astrophysics (Spring 2015): Sophomore-level course for majors. Lectured two classes on interacting galaxies and the Gaia satellite.

University of Groningen Dynamics of Galaxies (Spring 2014): Masters-level course based on Binney & Tremaine; taught four problem-solving sessions & two computer labs.

Graduate Student Teaching Certificate, MIT Teaching and Learning Laboratory Awarded May 2010.

One-year program including lectures, readings, and teaching assessment. Full description at <http://web.mit.edu/tll/programs-services/ta-certificate/index-ta-certificate.html>.

Teaching Assistant, MIT Department of Physics 2006–2009

8.01: Introduction to Mechanics.

First-semester physics course taught in research-based Technology-Enabled Active Learning (TEAL) format, emphasizing problem-solving, group work, and interactive demonstrations. Managed classroom operation; supervised 3 undergraduate TAs; provided in-class assistance to students during group problem-solving and labs and during weekend problem-solving sessions; lectured one class.

8.282/8.284: Undergraduate survey courses in astrophysics (introductory/advanced). Gave two one-hour lectures on cosmology. Ran a nighttime observing session with 8" telescopes.

8.902: Graduate course in extragalactic astrophysics.

8.224: Exploring Black Holes: General Relativity and Astrophysics. Gave introductory lecture; reviewed new sections of the course textbook for a new edition.

8.287: Observational Techniques of Optical Astronomy. Conducted weekly observing sessions at Wallace Astrophysical Observatory.

Teaching Assistant, UMCP Department of Astronomy 2001–2003

ASTR100 (all spring and fall semesters except Spring 2002): Introduction to Astronomy. Taught weekly 1-hour discussion section.

ASTR101 (Summer 2003): Introduction to Astronomy Laboratory. Conducted two 2-hour laboratories weekly for a 6-week course.

Undergraduate Teaching Assistant, UMCP Department of Physics Spring 2001

PHYS170: Introduction to Mechanics for Physics Majors. Concurrent with a course for undergraduate teaching assistants through the Center for Teaching Excellence.