

Marion I. Dierickx

Center for Astrophysics | Harvard & Smithsonian

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Appointments

2020- Research Associate, Harvard University

2017-20 Postdoctoral Fellow, Harvard University (PI: John Kovac)

Research Interests

Experimental cosmology: early-Universe astrophysics with the Cosmic Microwave Background (CMB).

Millimeter-wave instrumentation: polar operations, field deployment, optics.

Education

2017 Ph.D. in Astrophysics, Harvard University
Secondary Field in Computational Science and Engineering
Dissertation: *Simulations of Local Group Galactic Interactions*
Advisor: Abraham Loeb

2014 S.M. in Astrophysics, Harvard University

2012 B.A. in Astrophysics, *Summa Cum Laude* with Highest Honors, Harvard University
Thesis: *Constraining Local Group Dark Matter Using M33's Past Orbit*
Advisor: Abraham Loeb

Awards and Honors

2024 Selected for the 2025 Arctic Circle residency program

2022 Reached Phase 3 of European Space Agency Astronaut selection (amongst final 400 candidates out of initial pool of 22,500)

2014-19 Four-time recipient of the Derek Bok Center Certificate of Distinction in Teaching

2013-14 John P. and Carol J. Merrill Graduate Fellowship

2012 Leo Goldberg Prize
Thomas T. Hoopes Prize
Phi Beta Kappa

2010 Weissman International Internship Program Fellow

Collaborations

2021- **CMB-S4**: Next-generation ground-based CMB experiment

Level 3 Scientist for Integration & Commissioning of Small Aperture Telescopes at South Pole site.

Level 3 Scientist for Integration & Testing of Small-Aperture Telescopes in North America.

- Oversee and plan integration, testing and commissioning activities for the Small-Aperture Telescopes planned at the South Pole by the CMB-S4 project.

- Manage associated schedule, risks, costs, funding and agency reviews (NSF and DOE).

2017- **BICEP/Keck Collaboration:** Degree-scale CMB polarization from the South Pole

Observatory Operations lead.

Senior Personnel on NSF award *MSIP: Innovation to Achieve the Full Science Reach of the BICEP Array Stage 3 CMB Polarization Experiment*

- Hire, train and oversee on-site winter-over scientists for the BICEP telescopes at the South Pole.
- Plan and coordinate deployments to Antarctica across 8+ research institutions, government agencies and contractors.
- Year-round management and frontline support for observations, maintenance and upgrade activities in the field.

Professional Service

- 2024 NASA APRA-SAT23 Program (Reviewer)
- 2023 *Parity Violation from Home* conference (SOC)
BICEP/Keck collaboration meeting (SOC)
NSF USAP COVID-19 Subcommittee (Member)
- 2022 DOE Office of Science Graduate Student Research (Reviewer)
NSF IceCube Upgrade Re-baseline (Reviewer)
- 2020-22 Harvard & Smithsonian Center for Astrophysics Seminar (Organizer)
- 2017 Harvard CMB-S4 Workshop (LOC)
- 2015-19 Breakthrough Starshot initiative Theory Advisory Group (Member)
- 2014-16 Harvard Astronomy Department Committee on Academic Studies (Student Representative)

Advising and Mentorship

- 2023 Grant Meiners (undergraduate, Harvard) – Senior thesis reader
- 2020- Miranda Eiben (graduate, Harvard) – Optical instrumentation for BICEP Array
- 2021 Destiny Santalucia (undergraduate, Rensselaer Polytechnic) - BICEP Array instrumentation
- 2018-19 Emilia Morgan (undergraduate, Harvey Mudd) - Optical instrumentation for BICEP Array
- 2017-19 Liam Corrigan (undergraduate, Harvard) – Advisor for thesis entitled *Development of a Microwave Scatterometer and Investigation of Optical Properties of BICEP3 Materials*, awarded Thomas T. Hoopes Prize.
- 2014-16 Eliot House Sophomore Advising Coordinator (Harvard)

Teaching

- 2015-20 Freshman Seminar 21G – *First Stars and Life in the Cosmos* Teaching Fellow. Responsible for 50% of in-class curriculum and 100% of course assignments. Four-time teaching award recipient, with student evaluation scores 4.5/5 (2015), 4.7/5 (2016), 4.6/5 (2017), 4.4/5 (2018), 5/5 (2019).
- 2014 Astronomy 16 – *Stellar and Planetary Astrophysics* Teaching Fellow. Teaching award recipient, with student evaluation score of 4.7/5.

Selected Outreach

- 2021 *What is an impactful career in 2021?* Panelist, INSEAD Business School, France (Mar. 15)
- 2020 Skype a Scientist Q&A session for 4th grade students (Apr. 11)
To the Moon and Beyond: A New Space Race? Panelist, Harvard Project for Asian Relations, Cambridge, MA (Feb. 15)
- 2019 *Going Interstellar* Harvard-MIT Belgian Society, MIT (Mar. 12)
- 2018 *BICEP curls, Inflating the Universe, and more* South Pole Station (Dec. 16)
Galactic Collisions in the Local Group Cape Cod Astronomical Society (Aug. 2)
CMB Cosmology from the South Pole with BICEP/Keck Harvard Summer School (Jul. 23)
- 2017 Cosmology lab tour video for Astronomy 10 course at Long Island University (Mar.16)
- 2015 Judge, National Collegiate Research Conference, Harvard University (Jan. 24)
- 2014 Panelist, Scientista Foundation Symposium, MIT (Apr. 5)

Selected Talks

(*: invited)

- 2023 * *Searching for B-mode Polarization of the CMB with the BICEP/Keck Experiments at the South Pole* - Colloquium, Department of Astronomy and Steward Observatory, U. of Arizona (Oct. 19)
BICEP/Keck: Constraining Primordial Gravitational Waves with CMB Polarization Observations from the South Pole - SCAR Astronomy and Astrophysics from Antarctica, Norway (Sep. 20)
- 2022 *New Developments in Cosmic Microwave Background Experiments at the South Pole* - Scientific Committee on Antarctic Research meeting (remote, Aug. 9)
Primordial Gravitational Waves: Highlights from Current and Future CMB Polarization Experiments - Astrophysics in the Next Decade, Martha's Vineyard, MA (Jun. 6)
- 2021 *BICEP/Keck: Constraining Primordial Gravitational Waves with CMB Polarization Observations from the South Pole* - US Scientific Committee on Antarctic Research meeting (remote, Jul. 15)
- 2020 * *Searching for B-mode Polarization of the CMB with the BICEP/Keck Experiments at the South Pole* - Astronomy Colloquium, University of Florida (remote, Nov.12)
* *Constraining the Primordial Gravitational Wave Signal with BICEP/Keck Observations of CMB Polarization from the South Pole* - Receiver Lab Lunch Talk, SAO (remote, Jul. 1)
* *CMB-S4 Cold Optics: Laminated Epoxy AR-Coatings for BICEP Array Alumina Optics* – CMB-S4 Collaboration meeting (remote, Apr. 1)
* *Constraining the Primordial Gravitational Wave Signal with BICEP/Keck Observations of CMB Polarization from the South Pole* - Astrophysics, Gravitation and Cosmology Seminar, University of Illinois at Urbana-Champaign (Mar. 11)
- 2019 * *Alumina Optics for CMB-S4: Fabrication and AR-Coating Experience from BICEP/Keck* - CMB-S4 Collaboration meeting, UC San Diego (Oct.18)
BICEP/Keck: Constraining Primordial Gravitational Waves with CMB Polarization Observations from the South Pole - COSMO'19, RWTH Aachen University, Germany (Sep. 4)

BICEP/Keck: Constraining Primordial Gravitational Waves with CMB Polarization Observations from the South Pole - 2019 Meeting of the Division of Particles and Fields of the American Physical Society, Boston, MA (Aug. 31)

BICEP/Keck: Constraining Primordial Gravitational Waves with CMB Polarization Observations from the South Pole - Cosmology on Safari, Hlulhuwe, South Africa (Mar. 4)

2018 * *BICEP/Keck: Constraining Primordial Gravitational Waves with CMB Polarization Observations from the South Pole* - Rencontres de Blois, France (Jun. 6)

* *BICEP/Keck: Constraining Primordial Gravitational Waves with CMB Polarization Observations from the South Pole* - APC Laboratory Colloquium, Paris, France (Jun. 1)

2016 * *The Sun as a Gravitational Lens* - Breakthrough Discuss, Stanford, CA (Apr. 16)

2015 *Modeling the Infall of the Sagittarius dSph and its Consequences on Milky Way Evolution* - 2015 Santa Cruz Galaxy Workshop, University of California Santa Cruz (Aug. 20)

Selected Publications and Proceedings

Total: 40, total citations: 2021, h-index: 17

[ArXiv](#) – [ADS](#) – [Google Scholar](#) – [ORCID](#) (0000-0002-3519-8593)

2023 **M. Dierickx** et al. (83 authors), *Plastic Laminate Antireflective Coatings for Millimeter-Wave Optics in BICEP Array*, Journal of Low Temperature Physics, vol. 211, pp. 366-375, June 2023.

2021 BICEP/Keck Collaboration: P. A. R. Ade, ... **M. Dierickx** et al. (91 authors), *BICEP/Keck XIII: Improved Constraints on Primordial Gravitational Waves using Planck, WMAP, and BICEP/Keck Observations through the 2018 Observing Season*, Physical Review Letters, vol. 127, p. 151301, Oct. 2021.

2020 A. Nadolski, ... **M. Dierickx** et al., *Broadband, Millimeter-Wave Antireflection Coatings for Large-Format, Cryogenic Aluminum Oxide Optics*, Applied Optics, vol. 59, p. 3285, Apr. 2020.

2018 BICEP2 Collaboration, Keck Array Collaboration: P. A. R. Ade, ... **M. Dierickx** et al., *Constraints on Primordial Gravitational Waves Using Planck, WMAP, and New BICEP2/Keck Observations through the 2015 Season*, Physical Review Letters, vol. 121, p. 221301, Nov. 2018.

D. Barkats, **M. Dierickx** et al. (78 authors), *Ultra-thin Large-Aperture Vacuum Windows for Millimeter Wavelength Receivers*, Proceedings of the SPIE, vol. 10708, p. 107082K, July 2018.

2017 **M. Dierickx** and A. Loeb, *An Upper Limit on the Milky Way Mass from the Orbit of the Sagittarius Dwarf Satellite*, The Astrophysical Journal, vol. 847, p. 42, Sept. 2017.

B. Sesar, N. Hernitschek, **M. Dierickx**, M. A. Fardal and H.-W. Rix, *The > 100 kpc Distant Spur of the Sagittarius Stream and the Outer Virgo Overdensity, as Seen in PS1 RR Lyrae Stars*, The Astrophysical Journal Letters, vol. 844, L4, July 2017.

M. Dierickx and A. Loeb, *Predicted Extension of the Sagittarius Stream to the Milky Way Virial Radius*, The Astrophysical Journal, vol. 836, p. 92, Feb. 2017.

2014 **M. Dierickx**, L. Blecha and A. Loeb, *Signature of the M31-M32 Galactic Collision*, The Astrophysical Journal Letters, vol. 788, L38, June 2014.

White Papers

- 2022 **M. Dierickx** et al. (9 authors), [CfA 2022 Decadal Survey White Paper: Astronomy and Physics with Next-Generation Cosmological Surveys](#)
- M. Dierickx** et al. (7 authors), [CfA 2022 Decadal Survey White Paper: CfA Remote Observatory Operations Center](#)
- P. Grimes, J. Kovac, S. Paine, **M. Dierickx**, B. Schmitt, A. Stark, L. Zeng, [CfA 2022 Decadal Survey White Paper: Cosmic Microwave Background - Stage 4 \(CMB-S4\) at the CfA](#)
- P. Grimes, J. Kovac, **M. Dierickx**, S. Paine, B. Schmitt, A. Stark, L. Zeng, [CfA 2022 Decadal Survey White Paper: Cosmic Microwave Background Instrumentation at the CfA](#)
- G. Keating *et al.* (13 authors, incl. **M. Dierickx**), [CfA 2022 Decadal Survey White Paper: Line Intensity Mapping with the Greenland Telescope](#)
- 2021 CMB-S4 Collaboration (incl. **M. Dierickx**), *Snowmass 2021 CMB-S4 White Paper*, [arXiv:2203.08024](#)