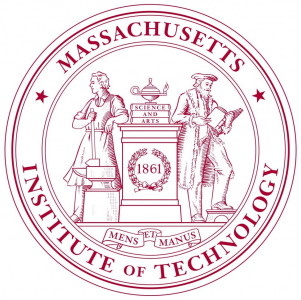

Rebecca K. Leane

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Research Interests

Dark Matter Phenomenology, Particle Astrophysics and Cosmology, Collider Physics, Physics Beyond the Standard Model

Academic Appointments

Massachusetts Institute of Technology 2017–Present
MIT Center for Theoretical Physics
Postdoctoral Research Associate

MIT Kavli Institute for Astrophysics and Space Research
Affiliate Postdoctoral Scholar

Education

University of Melbourne 2013–2017
Centre of Excellence for Particle Physics at the Terascale (CoEPP)
Ph.D. in Theoretical Particle Physics
Thesis Title: Phenomenology of Particle Dark Matter
Thesis Advisor: A/Prof. Nicole Bell

University of Cambridge 2012–2013
Department of Applied Mathematics and Theoretical Physics (DAMTP)
Master of Advanced Study in Mathematics (Part III of the Mathematical Tripos)
Essay Advisor: Prof. Ben Allanach

Monash University 2008–2011
Bachelor of Science Advanced with Honours
Majors: Physics and Mathematics. High Distinction.
Thesis Advisor: A/Prof. Csaba Balazs

Funded Grants

NASA Fermi Guest Investigator Program, Cycle 12, $70,000 USD 2019–2020
Grant No. 80NSSC19K1515, Slatyer and **Leane**

Prizes, Awards & Scholarships

Chancellor's Prize for Excellence in the PhD Thesis, U. Melbourne	2018
Dean's Award for Excellence in Graduate Research, U. Melbourne	2018
Best PhD Completion Seminar, Physics Dept., U. Melbourne	2017
Royal Society of Victoria Young Scientist Research Prize	2016
Science Abroad Travelling Scholarship	2016
Best Geoff Opat Seminar Series Talk, Physics Dept., U. Melbourne	2015
Laby Foundation Early Career Researcher Travel Scholarship	2015
Australian Postgraduate Award (APA)	2012–2016
Monash Jubilee Honours Scholarship	2011
J. L. William Honours Scholarship	2011

Publications

inSPIRE profile and arXiv publication list
Asterisk indicates alphabetical order list.

14. J. Acevedo, J. Bramante, **R. K. Leane***, N. Raj, "Cooking Pasta with Dark Matter: Kinetic and Annihilation Heating of Neutron Star Crusts", Submitted to JCAP, MIT-CTP/5152, [arXiv:1911.06334 [hep-ph]].

13. **R. K. Leane** and T. R. Slatyer, "Dark Matter Strikes Back at the Galactic Center", Phys. Rev. Lett. 123 (2019) 241101, MIT-CTP/5104, [arXiv:1904.08430 [astro-ph.HE]]. *Selected as PRL Editor's Suggestion*

12. M. Un Nisa, J. F. Beacom, S. Y. BenZvi, **R. K. Leane**, T. Linden, K. C.Y. Ng, A. H.G. Peter, B. Zhou, " The Sun at GeV-TeV Energies: A New Laboratory for Astroparticle Physics", Astro2020 Science White Paper (2019) [arXiv:1903.06349 [astro-ph.HE]].

11. HAWC Collaboration and J.F. Beacom, **R. K. Leane***, T. Linden, K. C.Y. Ng, A. Peter, B. Zhou, "Constraints on Spin-Dependent Dark Matter Scattering with Long-Lived Mediators from TeV Observations of the Sun with HAWC", Phys. Rev. D 98 (2018), 123012, MIT-CTP/5038, [arXiv:1808.05624 [hep-ph]].

10. HAWC Collaboration and J.F. Beacom, **R. K. Leane***, T. Linden, K. C.Y. Ng, A. Peter, B. Zhou, "First HAWC Observations of the Sun Constrain Steady TeV Gamma-Ray Emission", Phys. Rev. D 98 (2018), 123011, MIT-CTP/5037, [arXiv:1808.05620 [astro-ph.HE]].

9. **R. K. Leane**, T. R. Slatyer, J. F. Beacom, K. C.Y. Ng, "GeV-Scale Thermal WIMPs: Not Even Slightly Dead", MIT-CTP/5020, Phys. Rev. D98 (2018), 023016 [arXiv:1805.10305 [hep-ph]].

8. N. F. Bell, Y. Cai, J. B. Dent, **R. K. Leane***, T. J. Weiler, "Enhancing Dark Matter Annihilation Rates with Dark Bremsstrahlung", Phys. Rev. D96 (2017), 023011 [arXiv:1705.01105 [hep-ph]].

7. **R. K. Leane**, K. C.Y. Ng, J. F. Beacom, "Powerful Solar Signatures of Long-Lived Dark Mediators", Phys. Rev. D95 (2017), 123016 [arXiv:1703.04629 [astro-ph.HE]].

6. N. F. Bell, Y. Cai, **R. K. Leane***, "Impact of Mass Generation for Spin-1 Mediator Simplified Models", JCAP 01 (2017) 039 [arXiv:1610.03063 [hep-ph]].

5. N. F. Bell, Y. Cai, **R. K. Leane***, "Dark Forces in the Sky: Signals from Z' and the Dark Higgs", JCAP 08 (2016) 001 [arXiv:1605.09382 [hep-ph]].

4. N. F. Bell, Y. Cai, **R. K. Leane***, "Mono-W Dark Matter Signals at the LHC: Simplified Model Analysis", JCAP 01 (2016) 051 [arXiv:1512.00476 [hep-ph]].

3. N. F. Bell, Y. Cai, J. B. Dent, **R. K. Leane***, T. J. Weiler, "Dark matter at the LHC: Effective field theories and gauge invariance", Phys. Rev. D92, 053008 (2015) [arXiv:1503.07874 [hep-ph]].

2. N. F. Bell, Y. Cai, **R. K. Leane***, A. D. Medina, "Leptophilic dark matter with Z' interactions", Phys. Rev. D 90, 035027 (2014) [arXiv:1407.3001 [hep-ph]].

1. G. Brooijmans et al (incl **R. K. Leane***), "Les Houches 2011: Physics at TeV Colliders New Physics Working Group Report", FERMILAB-CONF-12-924-T (2012) [arXiv:1203.1488 [hep-ph]]. (*Note:* Contribution 1, "DLHA: Dark Matter Les Houches Agreement", is heavily based on my bachelor thesis.)

Teaching

Guest Lecturer for MIT graduate level course *8.811: Particle Physics II* 2017
Lecture Title: "Dark Matter Model Building"
ATLAS International Masterclass Tutor, U. Melbourne 2015
Physics Teaching Assistant (Tutorials, Grading, Office Hours), U. Melbourne 2014
Physics Teaching Assistant (Lab Demonstrator, Grading), U. Melbourne 2012
Physics Teaching Assistant (Lab Demonstrator, Grading), Monash U. 2011
High School Senior Tutoring, Physics and Mathematics 2008–2010

Outreach & Press

Interview, *The Boston Globe Newspaper*, MIT scientists find dark matter could be cause of mysterious energy at the center of our galaxy 2019
Interview, *MIT News*, Is there dark matter at the center of the Milky Way? 2019
Press Piece, *APS Physics*, New Hope for Milky-Way Dark Matter 2019
Interview, *Gizmodo*, The Future of Particle Physics Is Bright, Bleak, and Magical 2019
Interview, *Quanta Magazine*, Dark Matter Gets a Reprieve in New Analysis 2019
Interview, *Kavli Foundation*, Dark Matter is Back 2019
Interview, *Science Magazine*, Physicists Revive Hunt for Dark Matter in the Heart of the Milky Way 2019
Interview, *Popular Mechanics*, Filling the Void: What is Dark Matter? 2019
Open House Talk, MIT Center for Theoretical Physics, Cambridge MA, USA 2018
Young Scientist Research Prize Talk, Royal Society of Victoria, Australia 2016

Key Scientific Researcher on International Science Documentary Series 2014–2015
"Uranium: Twisting the Dragon's Tail"
Worked with Emmy Award winning producer Sonya Pemberton and writer Wain Fimeri part time over 12 months. Had a major role in explaining science content and developing the script for the series. Aired in the United States, Australia, Germany, France, Middle East, Norway and Sweden. The series has been nominated for and won numerous science communication and film awards.

Public Talk, Strathcona Girls' School, Australia 2014
Panel Member, National Science Week: Kids Ask Questions, Australia 2013
Panel Member, National Science Week: Ask a Scientist, Australia 2013
Public Talk, Monash University Open Day Seminar Series, Australia 2011
Physics Demonstrator, Monash University Open Day, Australia 2011

Seminars & Conference Talks

"Indirect Detection of Dark Matter in the Galaxy" (Upcoming)
Invited Overview Talk, 3rd World Summit on EDSU, Guadeloupe, France — Mar 2020

Upcoming
Invited Talk, Aspen Winter Conf. on Particle Physics, Aspen CO, USA — Mar 2020
Invited Seminar, U. Mass Amherst, Amherst MA, USA — Dec 2019

"The Hunt for Dark Matter: Hints and New Searches"
Invited Seminar, Boston University, Boston MA, USA — Nov 2019
Invited Seminar, SLAC, Menlo Park CA, USA — Oct 2019

"Interplay of Collider and Indirect Searches for Dark Matter"
Invited Plenary Talk, DM@LHC 2019, Seattle WA, USA — Aug 2019

"Dark Matter Strikes Back at the Galactic Center"
Invited Seminar, Texas A&M University, College Station TX, USA — Oct 2019
Invited Seminar, MIT Center for Theoretical Physics, Cambridge MA, USA — Sep 2019
Invited Seminar, Perimeter Institute, Waterloo ON, Canada — Jun 2019
Invited Talk, Aspen Center for Physics, Aspen CO, USA — Jun 2019
Invited Seminar, KICP, University of Chicago, Chicago IL, USA — Apr 2019
Invited Seminar, Brown University, Providence RI, USA — Apr 2019
Invited Seminar, Fermilab, Batavia IL, USA — Mar 2019
Invited Seminar, Brandeis University, Boston MA, USA — Mar 2019
Invited Seminar, Princeton University, Princeton NJ, USA — Feb 2019
Invited Talk, TRIUMF Dark Matter Workshop, Vancouver BC, Canada — Feb 2019

"A Tour of the Universe: The Hunt for Dark Matter"
Invited Colloquium, University of Melbourne, Melbourne VIC, Australia — Dec 2018

"Tricking Non-Poissonian Template Fitting: DM Hiding at the Galactic Center?"
Parallel Talk, DESY Theory Workshop, Hamburg, Germany — Sep 2018
Seminar, University of Melbourne, Melbourne VIC, Australia — Sep 2018

"Point Sources at the Galactic Center"
Parallel Talk, IDM 2018, Providence RI, USA — Jul 2018

"GeV-Mass Thermal WIMPs: Not Even Slightly Dead"
Parallel Talk, IDM 2018, Providence RI, USA — Jul 2018
Invited Parallel Talk, PASCOS 2018, Cleveland OH, USA — Jun 2018
Parallel Talk, Pheno 2018 Symposium, Pittsburgh PA, USA — May 2018
Invited Seminar, California Institute of Technology, Pasadena CA, USA — Apr 2018
Invited Seminar, Lawrence Berkeley National Laboratory, Berkeley CA, USA — Apr 2018
Invited Seminar, Michigan Center for Theoretical Physics, Ann Arbor MI, USA — Apr 2018
Invited Seminar, Dartmouth University, Hanover NH, USA — Apr 2018
Seminar, University of Melbourne, Melbourne VIC, Australia — Jan 2018

"Novel Signatures of Dark Matter in the Sky"
Invited Seminar, MIT Center for Theoretical Physics, Cambridge MA, USA — Sep 2017

"Phenomenology of Particle Dark Matter"
PhD Completion Seminar, University of Melbourne, Melb VIC, Australia — Mar 2017

"Dark Matter Theory and New Searches"
Invited Talk, CAASTRO-CoEPP Joint Workshop, Melb VIC, Australia — Jan 2017

"Novel Signatures of Dark Matter in the Sky"
Invited Talk, TRIUMF, Vancouver BC, Canada (remote) — Dec 2016

Seminars & Conference Talks (Cont'd)

"Impact of Mass Generation for Simplified Dark Matter Models"
Invited Talk, ATLAS Astroparticle Forum Plenary Meeting, CERN (remote) Nov 2016

"Unitarity and Gauge Invariance in Dark Matter Models"
Invited Talk, CETUP Dark Matter Workshop, Deadwood SD, USA Jul 2016
Invited Seminar, University of Cincinnati, Cincinnati OH, USA May 2016

"Dark Forces in the Sky: Signals from Z' and the Dark Higgs"
Invited Seminar, CCAPP, Ohio State University, Columbus OH, USA Jun 2016
Invited Seminar, UC Riverside, Riverside CA, USA May 2016
Invited Seminar, UC Irvine, Irvine CA, USA May 2016
Parallel Talk, Pheno 2016 Symposium, Pittsburgh PA, USA May 2016
Invited Seminar, University of Melbourne, Melbourne VIC, Australia Apr 2016

"Dark Matter at the LHC"
Invited Seminar, SLAC, Menlo Park CA, USA Oct 2015
Invited Seminar, CCAPP, Ohio State University, Columbus OH, USA Oct 2015
Invited Seminar, Fermilab, Batavia IL, USA Sep 2015
Invited Seminar, Vanderbilt University, Nashville TN, USA Sep 2015

"Dark Matter at the LHC: EFTs, Gauge Invariance and the Mono-W"
Invited Seminar, University of Melbourne, Melbourne VIC, Australia Aug 2015

"Dark Matter at the LHC: EFTs and Gauge Invariance"
Parallel Talk, SUSY2015, Lake Tahoe CA, USA Aug 2015
Seminar, Geoff Opat Seminar Series, U. Melbourne, Melb VIC, Australia May 2015

"Leptophilic Dark Matter with Z' Interactions"
Parallel Talk, CoSPA2014, Auckland, New Zealand Dec 2014
Contributed Talk, RESCEU APCosPA Summer School, Matsumoto, Japan Jul 2014

"Dark Matter and the Universe"
Invited Seminar, St Edmund's Academic Talks Series, U. Cambridge, UK Jun 2013

Student Projects Co-Advised

Gregory Ridgway, MIT Graduate Student 2019–Present
Project: Kilonovae as a Probe of New Physics, *in progress*

Field Rogers, MIT Graduate Student 2019–Present
Project: Cosmic Ray Propagation Models and the AMS positron flux, *in progress*

Service

Convener, Dark Matter Session, TeV Particle Astrophysics (TeVPA) Conference 2019
Particle Theory Seminar Organizer, MIT Center for Theoretical Physics 2018–Present
MIT Heising-Simons Physics Research Fellowship Peer Review Committee 2018

Technical Skills

Programming Languages:
C/C++, Python, Bash/zsh, HTML/CSS, Mathematica (all working proficiency level)

Packages & Frameworks:
FeynRules, MadGraph, Pythia, ROOT, MadAnalysis, Fastjet, Delphes, MultiNest, MicrOMEGAs, Pppc4dmid, Dragon, FeynArts, FeynCalc, Ti*k*Z, Minuit, Matplotlib

Other:
Linux OS, LaTeX

Cambridge MA, December 11, 2019