# DR. REBECCA K. LEANE

MIT Center for Theoretical Physics
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| RESEARCH INTERESTS | Dark Matter Phenomenology, Particle Astrophysics and Cosmology, Collider Physics, Physics Beyond the Standard Model | |
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| **ACADEMIC APPOINTMENTS** | **Massachusetts Institute of Technology** *MIT Center for Theoretical Physics* Postdoctoral Research Associate | 2017–Present |
| **EDUCATION** | **University of Melbourne** *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 | 2013–2017 |
| | **University of Cambridge** *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 | 2012–2013 |
| | **Monash University** Bachelor of Science Advanced with Honours Majors: Physics and Mathematics. High Distinction. Thesis Advisor: A/Prof. Csaba Balazs | 2008–2011 |
| **VISITING POSITIONS** | **Center for Cosmology and AstroParticle Physics (CCAPP)** Ohio State University Collaborating with Prof. John Beacom | Apr–Jun 2016 |
| | **Vanderbilt University** School of Physics and Astronomy Collaborating with Prof. Tom Weiler | Sep–Oct 2015 |
| **PRIZES, AWARDS & SCHOLARSHIPS** | 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 |

*"Point Sources at the Galactic Center"*
Parallel Talk, IDM 2018, Providence RI, USA (*Upcoming*)                    Jul 2018

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

*"Novel Signatures of Dark Matter in the Sky"*
Invited Talk, MIT Center for Theoretical Physics, Cambridge MA, USA        Sept 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

*"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 Talk, University of Cincinnati, Cincinnati OH, USA                May 2016

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

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

*"Dark Matter at the LHC: EFTs, Gauge Invariance and the Mono-W"*
Invited Talk, 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
Talk, 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 Talk, St Edmund's Academic Talks Series, Univ. of Cambridge, UK   Jun 2013

PUBLICATIONS    INSPIRE profile and ARXIV publication list

1. **R. K. Leane**, T. R. Slatyer, J. F. Beacom, K. C.Y. Ng, "GeV-Scale Thermal WIMPs: Not Even Slightly Dead", Submitted to PRD [arXiv:1805.10305 [hep-ph]].

2. 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) no.2, 023011 [arXiv:1705.01105 [hep-ph]].

3. **R. K. Leane**, K. C.Y. Ng, J. F. Beacom, "Powerful Solar Signatures of Long-Lived Dark Mediators", Phys. Rev. D95 (2017) no.12, 123016 [arXiv:1703.04629 [astro-ph.HE]].

4. 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]].

6. 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]].

7. 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, no.5 053008 (2015) [arXiv:1503.07874 [hep-ph]].

8. N. F. Bell, Y. Cai, **R. K. Leane**∗, A. D. Medina, "Leptophilic dark matter with $Z'$ interactions", Phys. Rev. D 90, no.3, 035027 (2014) [arXiv:1407.3001 [hep-ph]].

9. 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.)

∗Author list is alphabetical, as per convention in theoretical particle physics.


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

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| OUTREACH | **Key Scientific Researcher on International Science Documentary Series** | 2014–2015 |

OUTREACH  **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 several science communication and film awards.

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| Open House Talk, MIT Center for Theoretical Physics, Cambridge MA, USA | 2018 |
| Young Scientist Research Prize Talk, Royal Society of Victoria, Australia | 2016 |
| 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 |

SERVICE
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| Particle Theory Seminar Organizer, MIT Center for Theoretical Physics | 2018–Present |
| MIT Heising-Simons Physics Research Fellowship Peer Review Committee | 2018 |

TECHNICAL SKILLS

**Languages:**
C/C++, Python, Bash, HTML/CSS, Mathematica

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

**Other:**
Linux OS, LaTeX

*Cambridge MA, June 18, 2018*