



# DR. 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	<b>Massachusetts Institute of Technology</b> <i>MIT Center for Theoretical Physics</i> Postdoctoral Research Associate	2017–Present
EDUCATION	<b>University of Melbourne</b> <i>Centre of Excellence for Particle Physics at the Terascale (CoEPP)</i> Ph.D. in Theoretical Particle Physics Thesis Title: Phenomenology of Particle Dark Matter Thesis Advisor: A/Prof. Nicole Bell	2013–2017
	<b>University of Cambridge</b> <i>Department of Applied Mathematics and Theoretical Physics (DAMTP)</i> Master of Advanced Study in Mathematics (Part III of the Mathematical Tripos) Essay Advisor: Prof. Ben Allanach	2012–2013
	<b>Monash University</b> Bachelor of Science Advanced with Honours Majors: Physics and Mathematics. High Distinction. Thesis Advisor: A/Prof. Csaba Balazs	2008–2011
VISITING POSITIONS	<b>Center for Cosmology and AstroParticle Physics (CCAPP)</b> Ohio State University Collaborating with Prof. John Beacom	Apr–Jun 2016
	<b>Vanderbilt University</b> School of Physics and Astronomy Collaborating with Prof. Tom Weiler	Sep–Oct 2015
PRIZES, AWARDS & SCHOLARSHIPS	Best PhD Completion Seminar, School of Physics, U. Melbourne Royal Society of Victoria Young Scientist Research Prize Science Abroad Travelling Scholarship Best Geoff Opat Seminar Series Talk, School of Physics, U. Melbourne Laby Foundation Early Career Researcher Travel Scholarship Australian Postgraduate Award (APA) Monash Jubilee Honours Scholarship J. L. William Honours Scholarship	2017 2016 2016 2015 2015 2012–2016 2011 2011

SEMINARS &  
CONFERENCE  
TALKS

*Upcoming*

Invited (Parallel) Talk, PASCOS 2018, Cleveland OH, USA	Jun 2018
<i>"GeV-Mass Thermal WIMPs: Not Even Slightly Dead"</i>	
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
<i>"Novel Signatures of Dark Matter in the Sky"</i>	
Invited Talk, MIT Center for Theoretical Physics, Cambridge MA, USA	Sept 2017
<i>"Phenomenology of Particle Dark Matter"</i>	
PhD Completion Seminar, University of Melbourne, Melb VIC, Australia	Mar 2017
<i>"Dark Matter Theory and New Searches"</i>	
Invited Talk, CAASTRO-CoEPP Joint Workshop, Melb VIC, Australia	Jan 2017
<i>"Novel Signatures of Dark Matter in the Sky"</i>	
Invited Talk, TRIUMF, Vancouver BC, Canada (remote)	Dec 2016
<i>"Impact of Mass Generation for Simplified Dark Matter Models"</i>	
Invited Talk, ATLAS Astroparticle Forum Plenary Meeting, CERN (remote)	Nov 2016
<i>"Unitarity and Gauge Invariance in Dark Matter Models"</i>	
Invited Talk, CETUP Dark Matter Workshop, Deadwood SD, USA	Jul 2016
Invited Talk, University of Cincinnati, Cincinnati OH, USA	May 2016
<i>"Dark Forces in the Sky: Signals from <math>Z'</math> and the Dark Higgs"</i>	
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
<i>"Dark Matter at the LHC"</i>	
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
<i>"Dark Matter at the LHC: EFTs, Gauge Invariance and the Mono-<math>W</math>"</i>	
Invited Talk, University of Melbourne, Melbourne VIC, Australia	Aug 2015
<i>"Dark Matter at the LHC: EFTs and Gauge Invariance"</i>	
Parallel Talk, SUSY2015, Lake Tahoe CA, USA	Aug 2015
Talk, Geoff Opat Seminar Series, U. Melbourne, Melb VIC, Australia	May 2015
<i>"Leptophilic Dark Matter with <math>Z'</math> Interactions"</i>	
Parallel Talk, CoSPA2014, Auckland, New Zealand	Dec 2014
Contributed Talk, RESCEU APCosPA Summer School, Matsumoto, Japan	Jul 2014
<i>"Dark Matter and the Universe"</i>	
Invited Talk, St Edmund's Academic Talks Series, Univ. of Cambridge, UK	Jun 2013

## PUBLICATIONS

INSPIRE profile and ARXiv publication list

1. 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]].
2. **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]].
3. 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]].
4. 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]].
5. 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]].
6. 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]].
7. 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]].
8. 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.

## 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.

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

TEACHING	Guest Lecturer for MIT graduate level course <i>8.811: Particle Physics II</i>	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

TECHNICAL  
SKILLS

**Languages:**

C/C++, Python, Bash, Mathematica

**Packages & Frameworks:**

FeynRules, MadGraph, Pythia, ROOT, MadAnalysis, Fastjet, Delphes,  
MicrOMEGAS, PPC4DMID, DRAGON, FeynArts, FeynCalc, TikZ, Minuit, Matplotlib

**Other:**

Linux OS, L<sup>A</sup>T<sub>E</sub>X