

Scott Melville

Research Fellow, Emmanuel College
University of Cambridge

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Employment

University of Cambridge, UK	<u>UKRI Stephen Hawking Fellow</u>	from 2021
University of Cambridge, UK	Postdoctoral Research Fellow (Emmanuel College)	since 2018

Education and Training

Imperial College London, UK	Ph.D., Physics (advisor: Prof. C. de Rham)	2016 - 2018
Harvard University, US	Research placement (<u>High Energy Theory Group</u>)	2015 - 2016
University of Oxford, UK	M.Phys., Physics (ranked top in cohort)	2011 - 2015

Funding Awarded

Scholarships

Imperial College London, UK	<u>President's Scholarship</u>	2016 - 2018
Harvard University, US	<u>Michael von Clemm Fellowship</u>	2015 - 2016
University of Oxford, UK	The Queen's College Styring Scholarship	2012 - 2015

Visiting Fellowships

<u>YITP, Kyoto JP</u>	Long-term Visitor (collaborator: Prof. S. Mukohyama)	Jul - Aug 2018
<u>Australian National University, AU</u>	Visiting Scholar (collaborator: Prof. D. Ridout)	Nov '14 - Jan '15
<u>Wolfgang Pauli Institute, AT</u>	Predocctoral Scholar (collaborator: Prof. A. Schekochihin)	Mar - Jun 2014
<u>Okinawa Inst. of Sci. & Tech., JP</u>	Research Intern, Quantum (collaborator: Prof. T. Busch)	Jun - Aug 2013
<u>Helsinki Institute of Physics, FI</u>	Research Intern, Cosmology (collaborator: Dr. R. Lerner)	Jun - Sep 2012

Travel Grants

<u>IoP Research Student Grant</u>	to attend "The Universe as a Quantum Lab", Paris FR	Sep 2018
<u>Universe MDPI Travel Award</u>	to attend PASCOS18, Cleveland US	Jun 2018

Honours and Prizes

<u>IoP Thesis Prize</u>	"for excellence in research / communication skills"	2020
<u>Award for Best Poster</u>	at <u>Gravity@Prague School</u> (sponsor: CEICO)	2018
<u>Award for Best Talk</u>	at <u>BritGrav18 Conference</u> (sponsor: CQG)	2018
<u>B.P. Prize</u>	for MPhys project in Theoretical Physics (Oxford)	2015
<u>Scott Prize</u>	best performance in Oxford's MPhys examination	2015
<u>J.A. Scott Prize</u>	"outstanding performance by Queen's College candidate"	2015
<u>Winton Capital Prize</u>	best performance in Oxford's degree examination	2013
<u>IoP Award for Physics</u>	best performance in national examination (Scotland)	2011

Supervision

Lewis Croney (undergraduate)	Summer research project	Jun - Aug 2020
Calvin Chen (Masters student)	Research project for Part III examination	2019 - 2020
Ward Haddadin (PhD student)	Informal supervision & mentoring (with advisor Prof. B.Gripaios)	since 2019
Tanguy Grall (PhD student)	Informal supervision & mentoring (with advisor Prof. E.Pajer)	since 2018

Professional Memberships

Committee Member	<u>Institute of Physics Gravitational Physics Group</u>	since 2018
Governing Body Member	Emmanuel College, Cambridge UK	since 2018
AFHEA	Associate Fellow of the <u>Higher Education Academy</u>	since 2017
M.Inst.P.	Member of the Institute of Physics	since 2012

Services to the Academic Community

Admissions Panel	interviewing candidates for Cambridge undergraduate program	2019
Journal Referee	for JCAP, JHEP and EJP-C	since 2018
Organising Committees	for three international conferences (see Conferences section)	2018, '19, '20
Seminar Organiser (Imperial)	used <u>Research Community Fund</u> to establish PhD seminar series	2017 - 2018

Publications

15 peer-reviewed articles, 543 citations, h -index = 12 (Google Scholar, July 2020)

InSpires Profile: [S.Melville.1](#)

Recently submitted

- [17] T. Grall, **S. Melville** “Inflation in Motion: Unitarity Constraints in Effective Field Theories with Broken Lorentz Symmetry,” arXiv:2005.02366 [gr-qc]
- [16] A.-C. Davis, **S. Melville** “Novel Screening with Two Bodies: Summing the ladder in disformal scalar-tensor theories,” arXiv:1910.08831 [gr-qc]

Published / Accepted for Publication

- [15] **S. Melville**, D. Roest, D. Stefanyszyn “UV Constraints on Massive Spinning Particles: Lessons from the gravitino,” *JHEP* 02(2020)185
- [14] **S. Melville**, J. Noller “Positivity in the Sky: Constraining dark energy and modified gravity from the UV,” *Phys.Rev.D* 101 (2020) 2, 021502
- [13] B. Allanach, J. Davighi, **S. Melville** “An Anomaly-free Atlas: charting the space of flavor-dependent gauged extensions of the Standard Model,” *JHEP* 02(2019)082
- [12]* C. de Rham, **S. Melville** “Gravitational Rainbows: LIGO and dark energy at its cutoff,” *Phys.Rev.Lett.* 121 (2018) 22, 221101
- [11] C. de Rham, **S. Melville**, A. Tolley, S. Zhou “Positivity bounds for massive spin-1 and spin-2 fields,” *JHEP* 03(2019)182
- [10] C. de Rham, **S. Melville**, A. Tolley “Improved positivity bounds and massive gravity,” *JHEP* 04(2018)083
- [9] C. de Rham, **S. Melville**, A. Tolley, S.-Y. Zhou “UV Complete Me: Positivity bounds for particles with spin,” *JHEP* 03(2018)011
- [8] C. de Rham, **S. Melville**, “Unitary null energy condition violation in P(X) cosmologies,” *Phys.Rev.D* 95 (2017) 12, 123523
- [7] C. de Rham, **S. Melville**, A. Tolley, S.-Y. Zhou “Massive Galileon positivity bounds,” *JHEP* 09(2017)072
- [6] C. de Rham, **S. Melville**, A. Tolley, S.-Y. Zhou “Positivity bounds for scalar theories,” *Phys.Rev.D* 96 (2017) 8, 081702
- [5] **S. Melville**, A.A. Schekochihin, M. W. Kunz “Pressure-anisotropy-driven microturbulence and magnetic-field evolution in a shearing collisionless plasma,” *Mon.Not.Roy.Astron.Soc.* 459(2016)3 2701
- [4] **S. Melville**, J. Noller, “Generalised matter couplings in massive bigravity,” *JHEP* 01(2016)094
- [3] J. Noller, **S. Melville**, “The coupling to matter in Massive, Bi and Multi Gravity,” *JCAP* 01(2015)003
- [2] R. Lerner, **S. Melville**, “Quantifying the ‘naturalness’ of the curvaton model,” *JCAP* 07(2014)026
- [1] C.M. Chandrashekar, **S. Melville**, Th. Busch, “Single photons in an imperfect array of beam-splitters: interplay between percolation, backscattering and transient localization,” *J. Phys. B: At. Mol. Opt. Phys.* 47 (2014) 085502

Book Chapters

S. Melville and twelve other contributors

Chapter 12 in “Effective Field Theory in Particle Physics & Cosmology: Lecture Notes of the Les Houches Summer School Vol. 108,” Oxford University Press, ISBN 978-0-19-885574-3 [arXiv: 2005.08573]

* According to Web of Science, citations to this “hot paper” were in the top 0.1% of papers in Physics (Jan/Feb 2020).

Research Dissemination

27 talks (8 invited), 15 research seminars and an active record of public engagement

<i>Seminars / Colloquia</i>		
15.	<i>GR seminar</i>	University of Cambridge, UK (online) 05 Jun 2020
14.	<i>Theory seminar</i>	SISSA, Trieste IT (postponed) Mar 2020
13.	<i>Particle Theory seminar</i>	University of Nottingham, UK 06 Mar 2020
12.	<i>ICG seminar</i>	University of Portsmouth, UK 26 Feb 2020
11.	<i>Cosmology seminar</i>	University of Amsterdam, NL 18 Nov 2019
10.	<i>Cosmology seminar</i>	University of Cambridge, UK 04 Jun 2019
9.	<i>VSI seminar</i>	University of Groningen, NL 11 Apr 2019
8.	<i>HEP-Pheno joint seminar</i>	University of Cambridge, UK 14 Feb 2019
7.	<i>APEC seminar</i>	Kavli IPMU, Tokyo, JP 22 Aug 2018
6.	<i>Quantum gravity seminar</i>	Okinawa Insti. of Science and Technology, JP 14 Aug 2018
5.	<i>Theory seminar</i>	Yukawa Inst. for Theoretical Physics, Kyoto JP 19 Jul 2018
4.	<i>Theory HEP seminar</i>	McGill University, Montreal, CA 20 Oct 2017
3.	<i>Cosmology seminar</i>	Imperial College, London, UK 19 Sep 2016
2.	<i>Theory seminar</i>	Case Western Reserve University, US 03 Dec 2015
1.	<i>Cosmology seminar</i>	Helsinki Institute of Physics, FI 27 Sep 2012
<i>Conferences / Workshops / Schools</i>		
	Invited participant	<i>Beyond BSM</i> , Monte Verità CH (postponed) Aug 2020
	Organising committee	<i>Cosmology 2020: rise of field theory</i> , Cambridge UK (postponed) Jun 2020
8.	Invited talk	<i>Quantum Gravity Meets Dark Energy</i> , DK (online) 22-24 Jun 2020
	Invited participant	<i>GGI Workshop on Gravitational Inspirals</i> , Florence IT (postponed) Jun 2020
7.	Invited talk / convener	<i>GOLD Workshop</i> , Saclay FR (postponed) 25-29 May 2020
	Parallel talk	<i>TEXAS Symposium (Relativistic Astrophysics)</i> , Portsmouth UK 16-20 Dec 2019
6.	Invited talk & review	<i>Pascal Astroparticle Symposium</i> , Saclay FR 14-25 Oct 2019
5.	Invited lectures (3)	<i>l'Agape Summer School</i> , Mezevrac FR 29Jun-2Jul 2019
	Parallel talk	<i>GR22/Amaldi13</i> , Valencia ES 07-12 Jul 2019
	Parallel talk	<i>PASCOS XXV</i> , Manchester UK 01-05 Jul 2019
	Invited participant	<i>24th Itzykson Workshop on Effective Field Theory</i> , Saclay FR 05-07 Jun 2019
	Organising committee	<i>Workshop for Anne-Christine Davis</i> , Cambridge UK 01 May 2019
	Contributed talk	<i>BritGrav 2019</i> , Durham UK 15-16 Apr 2019
	Contributed talk	<i>IoP HEPP/APP Annual Meeting</i> , London UK 08-10 Apr 2019
4.	Invited review	<i>SCGSC 2019</i> , Munich DE 01-03 Apr 2019
	Parallel talk	<i>COSMO18</i> , Daejeon KR 27-31 Aug 2018
	Contributed talk	<i>Korea-Japan Workshop on Dark Energy</i> , Daejeon KR 06-10 Aug 2018
	Parallel talk	<i>PASCOS XXIV</i> , Cleveland US 04-08 Jun 2018
	Contributed talk	<i>UKCosmo Meeting</i> , Swansea UK 23-24 May 2018
	Contributed talk	<i>Collabor8.2</i> , Lancaster UK 14-15 May 2018
	Contributed talk	<i>BritGrav 2018</i> , Portsmouth UK 18-19 Apr 2018
	Contributed talk	<i>IoP APP/HEP Annual Meeting</i> , Bristol UK 26-28 Mar 2018
	Organising committee	<i>SCGSC 2018</i> , Paris FR 14-16 Mar 2018
3.	Invited talk	<i>ETH-ITS Workshop on Effective Field Theory</i> , Zurich CH 05-07 Mar 2018
2.	Invited review	<i>RCSU Student Conference</i> , London UK 31 Jan 2018
	Contributed talk	<i>UKCosmo Meeting</i> , London UK 18 Sep 2017
	Parallel talk	<i>COSMO-17</i> , Paris FR 28 Aug-1 Sep '17
	Contributed talk	<i>PONT 2017</i> , Avignon FR 24-28 Apr 2017
	Contributed talk	<i>UKQFT-VI</i> , London UK 14 Mar 2017
	Contributed talk	<i>SCGSC 2017</i> , Paris FR 15-17 Feb 2017
	Contributed talk	<i>YTF 9</i> , Durham UK 11-12 Jan 2017
1.	Invited talk	<i>Workshop on Plasma Kinetics</i> , W. Pauli Institute, Vienna AT 24Mar-4Apr '14

Contributed talk	<i>Plasma Theory Group Meeting, Oxford UK</i>	06 Feb 2014
Public Engagement		
Public talks (4)	Developed & performed at the IoP's <u>Festival of Physics</u>	27-28 Oct 2018
Peer support	Member of <u>Cambridge Presenter Network</u>	since 2018
TV documentary	Presented experiment for Discovery's "Mythical Beasts"	17 Sep 2018
Blog post	for researchers in other fields of physics (CQG+)	30 May 2018
Science festival	Organised the Theory Group stall at the <u>Imperial Festival</u>	28-29 Apr 2018
Public talk	Performed science comedy routine at <u>BrightClub (Imperial)</u>	28 Apr 2018
" <u>FameLab</u> " UK finalist	Finalist in nationwide science communication competition	25 Apr 2018
Science Explainer	Volunteer at the <u>London Science Museum</u>	2018
Blog post	for the general public in "Science in the News" (Harvard)	07 July 2016
Public talk	The Queen's College Symposium (Oxford)	12 May 2015
"3MT" presenter	Audience favourite at 3-minute-thesis competition (ANU)	15 Jan 2015
University outreach		
Presentation	to undergraduates at " <u>Research in the UK</u> " event (Cambridge)	08 Nov 2018
Presentation	to sixth form students (<u>Hutchesons Grammar School</u>)	27 Mar 2018
University ambassador	Led tours and visited schools as " <u>President Ambassador</u> " (Imperial)	2017 – 2018
"I'm a Scientist" finalist	Finalist in "I'm a Scientist, Get Me Out of Here" school competition	Nov 2017
STEM ambassador	Visited schools as <u>STEM Ambassador</u> (for West of Scotland)	2013 – 2014
Teaching and Course Development		
Resources Developed		
LaTeX	Designed new LaTeX course for Graduate School (Imperial)	2018
Higher Physics (Year 10-12)	Developed learning materials for <u>SQA Physics</u>	2010
Courses Taught		
Cosmological Field Theories Cosmology (Imperial)	3 lectures given at l'Agape Summer School Problem set lectures and marking	Summer 2019 2017 – 2018
Quantum Field Theory (Imperial)	Problem set lectures and marking	2016 – 2017
Unification (Imperial)	Problem set lectures and marking	2016 – 2017
Teaching Accolades		
AFHEA	"recognition of commitment to outstanding teaching"	since 2017
SACA Nominated	Nominated for Student Academic Choice Award (Imperial)	2017
Professional Development		
Admissions Workshop	on accurate & fair assessment by interview (Cambridge)	Nov 2019
Engagement Training (3)	producing online engagement resources (with <u>Neil Monteiro</u>) using comedy to communicate science (with <u>Steve Cross</u>) science communication masterclass (with <u>Matthew Tosh</u>)	May 2018 Apr 2018 Apr 2018
Research Impact Workshops	on communicating & improving impact (Imperial)	2017 – 2018
Plagiarism Online Course	on recognising & preventing plagiarism (Imperial)	Oct 2016
Online Presence Workshop	on maintaining a visible & effective online profile (Harvard)	Apr 2016
Other Positions of Responsibility		
Parlour Secretary	administering finances of Emmanuel parlour (Cambridge)	since 2019
Hall Selection Panel	interviewing for hall senior & subwarden positions (Imperial)	2017, '18
Subwarden (Imperial)	pastoral care & discipline in undergraduate residence halls	2016 – 2018