

# N. Furey - CV

**Citizenship** Canadian      **Languages** English, basic French, basic Spanish

**Education** PhD in theoretical physics, Perimeter Institute, U. of Waterloo, Dec 2015  
Part III Mathematics, Cambridge University, UK (Master's) 2006  
Honours B.Sc. in Mathematics and Physics, Simon Fraser University, 2005

## Research Fellowships accepted

2020 Freigeist Fellowship, VolkswagenStiftung for Humboldt-Universität Berlin  
2019 AIMS African Institute of Mathematical Sciences Fellowship, Cape Town  
2015 Walter Grant Scott Fellowship in Physics, Trinity Hall, Cambridge University  
2015 Canadian NSERC postdoctoral fellowship, held at Cambridge University

## Research Experience

2016-19	Research Fellow	Cambridge	Algebraic particle physics
2015	PhD Student	Perimeter Institute	Algebraic particle physics
2006	Research Project	Cambridge	Machian causal sets
2004	Honours Thesis	Simon Fraser U.	Modified gravity

(Medical issues caused numerous interruptions, beginning 2004. Doctor's letter available.)

- Publications**
- N. Furey, M.J. Hughes, *Division algebraic symmetry breaking*, Phys. Lett. B, **831** (2022)
  - N. Furey, M.J. Hughes, *One generation of standard model Weyl representations as a single copy of RCHO*, Phys. Lett. B, **827** (2022)
  - C. Furey, *Three generations, two unbroken gauge symmetries, and one eight-dimensional algebra*, Phys. Lett. B, **785** (2018) p.84-89  
*See addendum, arXiv version*
  - C. Furey,  *$SU(3)_C \times SU(2)_L \times U(1)_Y (x U(1)_X)$  as a symmetry of division algebraic ladder operators*, Eur. Phys. J. C, **78** 5 (2018) 375
  - C. Furey, *A demonstration that electroweak theory could violate parity automatically (leptonic case)*, Int.J.Mod.Phys.A, (2018)
  - C. Furey, *Standard model physics from an algebra?*, PhD thesis, University of Waterloo, [arXiv:1611.09182]
  - C. Furey, *Charge quantization from a number operator*, Phys. Lett. B, **742** (2015), pp. 195–199
  - C. Furey, *Generations: Three prints, in colour*, JHEP **10** (2014) 046 [arXiv:1405.4601 hep-th]
  - C. Furey, *Towards a unified theory of ideals*, Phys. Rev. D **86** (2012) 025024, [arXiv:1002.1497 hep-th]
  - Furey, DeBenedictis, *Wormhole throats in  $R^m$  gravity*, Class. Quantum Grav. **22** (2005) 313–322, [arXiv:gr-qc/0410088]

## Conference talks

2023	<b>Plenary Talk</b>	Lie Theory and its Applications in physics	Varna, Bulgaria
2023	<b>Lecture</b>	International Conference on Clifford algebras	Holon, Israel
2023	Talk	International Conference on Clifford algebras	Holon, Israel
2023	Talk	Octonions, Standard model, Unification 2023	Oxford, Pune online
2022	<b>Invited Talk</b>	New Trends in Quaternions and Octonions	Covilhã, Portugal
2022	Talk	Joint Mathematics Meeting 2022	Seattle, USA
2021	Talk	<a href="#">Octonions and Standard model</a> , Perimeter Institute (II)	Waterloo, Canada
2021	Talk	<a href="#">Octonions and Standard model</a> , Perimeter Institute (I)	Waterloo, Canada
2021	Talk	Humboldt-Universität zu Berlin, KMPB day	Berlin, Germany
2021	Talk	<a href="#">Women at the intersection of math/physics</a> , Perimeter	Waterloo, Canada
2021	Talk	16th Marcel Grossmann Meeting	Rome, Italy
2019	Talk	Iris Adlershof Symposium, Humboldt University	Berlin, Germany

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2018	<b>Plenary Talk</b>	<a href="#">14th Annual VCES conference</a>	Vienna, Austria
2018	Talk	15th Marcel Grossmann Meeting	Rome, Italy
2017	Talk	Bangkok Workshop on Discrete Geometry	Bangkok, Thailand
2017	Talk	6th Bangkok Workshop on High Energy Theory	Bangkok, Thailand
2016	Talk	2016 Advances in Quantum Gravity conference	Hawaii, USA
2016	Talk	Algebraic Geometry and Math-Physics Conference	Tromso, Norway
2016	Talk	54th International School of Subnuclear Physics <b>(won the Giulio Racah Diploma)</b>	Erice, Italy
2015	Talk	2015 Advances in Quantum Gravity conference	Los Angeles, USA
2014	Talk	10th International Conference on Clifford Algebras and their Applications in Mathematical Physics <b>(won best talk award)</b>	Tartu, Estonia
2014	Talk	Frontiers of Fundamental Physics Conference	Marseille, France
2014	Talk	52nd International School of Subnuclear Physics <b>(won the Eugene P. Wigner Diploma)</b>	Erice, Italy
2014	Talk	Theory Canada 9 Conference	Waterloo, Canada
2007	Talk	Current challenges for causal set quantum gravity	Waterloo, Canada
2007	Talk	Graduate Student Conference, Perimeter Inst.	Waterloo, Canada
2003	Talk	40th Western Regional Nuclear and Particle Physics Conference, <b>this trip was the prize for winning the TRIUMF competition, below.</b>	Lk Louise, Canada
2002	Talk	TRIUMF Annual Research Student Competition <b>(won the competition)</b>	Vancouver, Canada

## Selected seminars

2023	Talk	QFT and strings group, Humboldt-Universität	Berlin, Germany
2022	Talk	Prof. Denjoe O'Connor's group, <a href="#">DIAS</a>	Dublin, Ireland
2021	Talk	Prof. José Figueroa-O'Farrill's group, U of Edinburgh	Edinburgh, UK
2020	Talk	Prof. Jan Plefka's group, Humboldt-Universität	Berlin, Germany
2020	Talk	Nikhef National Institute for Subatomic Physics	Amsterdam, NL
2020	Talk	Prof. A.S. Tahvildar-Zadeh's group, Rutgers University	New Brunswick, US
2019	Talk	Prof. Dirk Kreimer's group, Humboldt-Universität	Berlin, Germany
2019	Talk	Prof. K-H Rehren's group, University of Göttingen	Göttingen, Germany
2019	Talk	Prof. Dieter Lust's group, LMU	Munich, Germany
2018	Talk	Perimeter Institute for Theoretical Physics	Waterloo, Canada
2018	Talk	Prof. S. Majid's group, Queen Mary University	London, UK
2017	Talk	Prof B. Coecke's group, Oxford University	Oxford, UK
2017	Talk	Quantum fields and strings group, DAMTP	Cambridge, UK
2017	Talk	Prof. M. Sakamoto's group, Kobe University	Kobe, Japan
2017	Talk	Prof. N. Maekawa's group, Nagoya University	Nagoya, Japan
2017	Talk	Prof. K. Yoshida's group, Kyoto University	Kyoto, Japan
2017	Talk	Center for Theoretical Physics of the Universe, IBS	Daejeon, S. Korea
2017	Talk	Prof. H.L. Yu's group, Academia Sinica	Taipei, Taiwan
2017	Talk	National Tsing Hua University	Hsinchu, Taiwan
2017	Talk	Prof M.C. Tan's group, National U. of Singapore	Singapore
2016	Talk	Prof. A. Lasenby's group, Cavendish Laboratory	Cambridge, UK
2016	Talk	Prof. Ed Copeland's group, University of Nottingham	Nottingham, UK
2016	Talk	Mathematical physics group, DAMTP	Cambridge, UK
2016	Talk	Particle Theory group, University of Sussex	Brighton, UK
2015	Talk	Prof. John Barrett's group, University of Nottingham	Nottingham, UK
2014	Talk	Prof. Pierre Ramond's group, University of Florida	Florida, USA
2014	Talk	Prof. Jorge Pullin's group, Louisiana State University	Louisiana, USA
2014	Talk	Centre de Physique Theorique	Marseille, France
2014	Talk	Quantum gravity research group, Perimeter Inst.	Waterloo, Canada
2014	Talk	Dept Mathematics, University of Waterloo (x2)	Waterloo, Canada
2014	Talk	Dept Physics, University of Waterloo (x2)	Waterloo, Canada
2013	Talk	For department of theoretical physics INFN	Naples, Italy

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## Colloquia

2019	<b>Colloquium</b>	Dept Physics, University of British Columbia	Vancouver, Canada
2019	<b>Colloquium</b>	Dept Physics, Simon Fraser University	Vancouver, Canada
2018	<b>Colloquium</b>	Department of Mathematics, Rutgers	New Brunswick, US
2017	<b>Colloquium</b>	School of Mathematics, Trinity College	Dublin, Ireland

## International online seminar series (creator)

2021-2022 [Algebra, Particles, and Quantum Theory](#)

<b>Speakers</b>	Lucien Hardy (Perimeter Institute)	Anna Pachol (Queen Mary)
	A. Shadi Tahvildar-Zadeh (Rutgers)	Howard Barnum
	Shahn Majid (Queen Mary)	Peter Woit (Columbia)
	Andreas Trautner (Max Planck)	Jorge Zanelli (CECS)
	Corinne Manogue (Oregon State)	Tevian Dray (Oregon State)
	Markus Müller (IQOQI)	Sean Carroll (Caltech)

2022-2023 [Algebra, Particles, and Quantum Theory](#)

<b>Speakers</b>	Denjoe O'Connor (DIAS)	Shogo Tanimura (Nagoya)
	John Baez (U.C. Riverside)	Aiyalam Balachandran (Syracuse)
	L Glaser (Vienna)	John Huerta (Lisbon)
	Kasia Rejzner (York)	Lev Vaidman (Tel Aviv)
	John Baez (U.C. Riverside)	Roger Penrose (Oxford)

**New Scientist article:** [Octonions: The strange maths that could unite the laws of nature](#), by M. Brooks

**Our work featured, front cover of New Scientist**

**Quanta article:** [The Peculiar Math that could Underlie the Laws of Nature](#), by N. Wolchover  
**Second most-read article in Quanta Magazine for that year**

**Wired article:** [10 Women in Science and Tech who should be Household Names](#), by E. Dreyfuss

**Video series:** [Division algebras and the standard model](#)

Channel now at > 9,000 subscribers

<b>Students</b>	2022	Talk	Women in Physics series, Humboldt-Universität zu Berlin
	2021	Mentor	Perimeter Institute, Women in mathematical physics
	2020	Mentor	for several AIMS graduate students, South Africa (ongoing) proofreading of CVs and emails, mock interviews, moral support
	2019	Panel Speaker	<a href="#">AIMS Women in Science</a> , Cape Town, South Africa
	2019	Lecture	for AIMS students, Cape Town, South Africa
	2019	Supervised research project	for Part III grad student, Cambridge
	2019	Talk	for Women in Maths, Murray Edwards College, Cambridge
	2019	Lecture	for TRIUMF physics students, UBC, Vancouver, Canada
	2018	Informally mentoring	a small number of graduate students
	2017	Panel Speaker	Trinity Hall Women in Science, Cambridge
	2017	Trinity Hall Outreach:	for students in less advantaged districts
	2016	Interviewed students	for entrance into the Math Tripos, Cambridge
	2016	Talk	Natural Sciences Society, Trinity Hall, Cambridge
	2016	Talk	Natural sciences first-years Trinity Hall, Cambridge

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**Outreach**      2022    Essay    [Assoc. of Women Mathematicians](#), Interviewee of B. Cannon  
2019    Film     Consulting for [educational video](#) on division algebras, Seeker  
2019    Podcast Quanta Magazine, Octonions and particle physics  
2017    Talk     British Science Association, SciBar public talk, Cambridge

**Leadership**      Scientific advisor for the OSMU 2023 conference  
**/ Community**    First aid certified, 12 August, 2022  
Referee for *Journal of Mathematical Physics (JMP)*  
Referee for *Journal of High Energy Physics (JHEP)*  
Referee for *Nuclear Physics B*  
Referee for *Physics Letters B*  
Referee for *European Physical Journal C*  
Referee for *Int. J. Mod. Phys. A*  
Referee for *Advances in Applied Clifford Algebras*, Springer  
Referee for *Commentationes Mathematicae Universitatis Carolinae*, Prague  
2018 (Offered) Guest Editor in Chief, *Adv. in Applied Clifford Algebras*  
2016-9 Member of governing body, Trinity Hall Cambridge  
Member of Perimeter Institute's Environmental Committee

**Funding**            2020-2026      VW Freigeist Fellowship, Humboldt University, Berlin  
2019-2023      Royal Commission 1851 Fellowship (offered), U. Edinburgh  
2019-2022      Rutgers University postdoctoral fellowship (offered)  
2019-2020      AIMS African Institute of Mathematical Sciences  
Fellowship, Cape Town  
2016-2019      Walter Grant Scott Fellowship in Physics, Cambridge  
2016-2018      NSERC Postdoctoral Fellowship, Cambridge  
2016-2018      Newton International Fellowship (offered) Imperial College  
2015              PhD Completion award, Dept Physics, U. of Waterloo  
2014-2015      NSERC grant (through supervisor)  
2012-2014      John Templeton Foundation (through supervisor)  
2006-2010      NSERC Alexander Graham Bell PGS-D and CGS-D awards  
2006-2010      President's Graduate Scholarships, U. of Waterloo  
2009              NSERC Michael Smith Foreign Study Supplement, M.I.T.  
2005              Rudi Haering Award in Physics, Simon Fraser University