

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

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|---------|------------------|---------------------|----------------------------|
| 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, *$SU(3)_C \times SU(2)_L \times U(1)_Y \times U(1)_X$ 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

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|------|---------------------|---|-------------------|
| 2022 | Talk | Joint Mathematics Meeting 2022 | Seattle, USA |
| 2021 | Talk | Octonions and Standard model , Perimeter Institute (II) | Waterloo, Canada |
| 2021 | Talk | Octonions and Standard model , Perimeter Institute (I) | Waterloo, Canada |
| 2021 | Talk | Humboldt-Universität zu Berlin, KMPB day | Berlin, Germany |
| 2021 | Talk | Women at the intersection of math/physics , Perimeter | Waterloo, Canada |
| 2021 | Talk | 16th Marcel Grossmann Meeting | Rome, Italy |
| 2019 | Talk | Iris Adlershof Symposium, Humboldt University | Berlin, Germany |
| 2018 | Plenary Talk | 14th Annual VCES conference | 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 |

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| 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 (won the Giulio Racah Diploma) | 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 (won best talk award) | Tartu, Estonia |
| 2014 | Talk | Frontiers of Fundamental Physics Conference | Marseille, France |
| 2014 | Talk | 52nd International School of Subnuclear Physics (won the Eugene P. Wigner Diploma) | 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, this trip was the prize for winning the TRIUMF competition, below. | Lk Louise, Canada |
| 2002 | Talk | TRIUMF Annual Research Student Competition (won the competition) | Vancouver, Canada |

Selected seminars

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|------|------|--|--------------------|
| 2022 | Talk | Prof. Denjoe O'Connor's group, DIAS | 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

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

International online seminar series (creator)

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

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| Speakers | 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) |

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

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| Students | 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 | AIMS Women in Science , 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 |

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| Leadership / Community | First aid certified | 12 August, 2022 |
| | Referee for | <i>Journal of Mathematical Physics (JMP)</i> |
| | Referee for | <i>Journal of High Energy Physics (JHEP)</i> |
| | Referee for | <i>Nuclear Physics B</i> |
| Referee for | <i>Physics Letters B</i> | |

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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

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| 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 |