

# **CURRICULUM VITAE**

## **A. BIOGRAPHICAL INFORMATION**

### **1. PERSONAL**

- **Name:** David Curtin
- **University Address:** MP1113, Department of Physics, 60 St. George Street, University of Toronto, Toronto, Ontario M5S 1A7, Canada
- **Office Phone:** +1 416-978-4784
- **Email:** dcurtin@physics.utoronto.ca
- **Website:** curtin.physics.utoronto.ca

### **2. DEGREES**

- **Ph.D.:** May 2011  
Cornell University, Ithaca, New York  
Thesis Title: "Model Building and Collider Physics Above the Weak Scale"  
Advisor: Csaba Csaki
- **Bachelor of Science: First Class Honours, Nov 2005**  
University of Melbourne, Melbourne, Australia  
Thesis Title: "Fermion confinement in brane world models with SO(10) unification"  
Advisor: Raymond Volkas
- **Bachelor of Science (Advanced Stream) with High Distinction: Nov, 2004**  
University of Sydney, Sydney, Australia  
Majors: Physics and Pure Mathematics

### **3. EMPLOYMENT**

- **University of Toronto, Toronto, Ontario, Canada**  
Assistant Professor, Department of Physics: Jan 2018 - present  
*On parental leave Sep - Dec 2022*
- **Maryland Center for Fundamental Physics, University of Maryland, College Park, MD, USA**  
Postdoctoral Research Associate: Aug 2014 - Dec 2017
- **C.N. Yang Institute for Theoretical Physics, Stony Brook University, New York, USA**

Postdoctoral Research Associate: Aug 2011 - Aug 2014

- Cornell University, Ithaca, New York, USA  
Graduate Research and Teaching Assistant, Department of Physics: Aug 2006 - Mar 2011

#### 4. **HONOURS**

- 2022 McLean Senior Fellow
- 2021 Alfred P. Sloan Research Fellow in Physics
- Appointed Canada Research Chair in Theoretical Particle Physics, 2018-2023
- Stony Brook University Postdoctoral Achievement Award in Theoretical Physics for 2013
- John and David Boochever Prize Fellowship in Fundamental Theoretical Physics for 2010-11
- Laby Medal for Outstanding Honours Thesis, 2005
- Prestigious Honours Scholarship, 2005
- Melbourne Honours Scholarship, 2005
- Placed on Deans List of Excellence in Academic Performance , Admitted to University of Sydney Talented Students Program to conduct extracurricular research, 2004
- Science Foundation for Physics Scholarship No II, 2003
- Science Foundation for Physics Scholarship No I, 2002

#### 5. **PROFESSIONAL AFFILIATIONS AND ACTIVITIES**

- **MATHUSLA** (MAssive Timing Hodoscope for Ultra-Stable neutral pArticles) experimental collaboration: co-founder and member, 2016 - ongoing  
<http://mathusla.web.cern.ch>
- **Large Hadron Collider Long Lived Particles Working Group**, CERN, Geneva: 2016 - ongoing.
- **Higgs Cross Section Working Group**, CERN, Geneva: 2014 - ongoing.

### B. **ACADEMIC HISTORY**

#### 6. i. **RESEARCH ENDEAVOURS**

Theoretical Particle Physics, Cosmology:

Higgs physics; theories and detection of long-lived BSM particles; early universe cosmology, electroweak baryogenesis, gravitational waves; the hierarchy problem, neutral naturalness, composite higgs theories, supersymmetric theories; collider phenomenology; future proton and muon colliders; dark complexity, dark matter models, direct

detection, implications for stellar astrophysics, N-body simulations with interaction dark matter.

ii. **RESEARCH AWARDS** (grants, contracts, fellowships)

2022 McLean Award  
Jul 2022 - 2027  
125k CAD over 5 years

NSERC Subatomic Physics Discovery Grant  
“The MATHUSLA Experiment”  
PI: Steven Robertson (McGill)  
Co-PIs: David Curtin (U of T), Miriam Diamond (U of T), Heather Russell (McGill)  
April 1, 2022 - Mar 31, 2024  
250k CAD total over 2 years.

2021 Alfred P. Sloan Research Fellow in Physics  
Sep 2021 - 2023  
75k USD over 2 years

2019 Ontario Early Researcher Award  
April 2021 - 2026 (onset delayed by COVID pandemic)  
100k CAD over 5 years

Canada Research Chair for Theoretical Particle Physics  
CRC Tier 2, 2018 - 2023  
250k CAD of personal research & cluster research funds over 5 years

NSERC Subatomic Physics Individual Discovery Grant  
“New Approaches to Beyond Standard Model Searches with Colliders and Cosmology”  
April 1, 2018 - Mar 31, 2023  
250k CAD total over 5 years.

C. **SCHOLARLY AND PROFESSIONAL WORK**

7. **Metrics (retrieved 28 Feb 2022)**

h-index = 40, citations = 11252 total (iNSPIRE HEP)  
iNSPIRE HEP profile: <https://inspirehep.net/authors/1024481>

h-index = 37, citations = 9039 (Google Scholar)  
Google Scholar profile: [https://scholar.google.com/citations?user=c\\_ZchXUAAAAJ](https://scholar.google.com/citations?user=c_ZchXUAAAAJ)

ORCID: 0000-0003-0263-6195, <https://orcid.org/0000-0003-0263-6195>

The database of record in high energy physics is iNSPIRE HEP. Google scholar and even more so other databases do not include several of my contributions.

On the below papers/reports, I am a main author unless otherwise indicated. A star \* indicates papers/white papers/reports where I was asked by editors for specific contributions. Two stars \*\* indicates white papers or proceedings that I was asked to sign as a supporter due to my involvement/impact in the corresponding subfield/community.

On iNSPIRE, my h-index and citations including only papers where I am a main author (also including white papers I contributed to) {also including white papers I signed} is 29, 4641 (34, 7904) {40,11210}. This excludes arXiv preprints submitted for publication.

## 8. Refereed publications

*Note that authors are ordered alphabetically on high energy theory papers.*

*Numbered R# for reference.*

- R51: Simulating glueball production in  $N_f=0$  QCD  
David Curtin, Caleb Gemell, Christopher B. Verhaaren  
e-Print: 2202.12899 [hep-ph]  
Phys.Rev.D 106 (2022) 7, 075015
- R50: Systematically testing singlet models for  $(g-2)_\mu$   
Rodolfo Capdevilla, David Curtin, Yonatan Kahn and Illinois U., Urbana),  
Gordan Krnjaic  
e-Print: 2112.08377 [hep-ph]  
JHEP 04 (2022), 129
- R49: How to search for mirror stars with Gaia  
Aaron Howe, Jack Setford, David Curtin, Christopher D. Matzner  
e-Print: 2112.05766 [hep-ph]  
JHEP 07 (2022), 059
- R48: Resurrecting the fraternal twin WIMP miracle  
David Curtin, Shayne Gryba, Dan Hooper, Jakub Scholtz, Jack Setford  
e-Print: 2106.12578 [hep-ph]  
Phys.Rev.D 105 (2022) 3, 035033
- R47: Mirror neutron stars  
Maurício Hippert, Jack Setford, Hung Tan, David Curtin, Jacquelyn  
Noronha-Hostler et al.  
e-Print: 2103.01965 [astro-ph.HE]  
Phys.Rev.D 106 (2022) 3, 035025
- R46: No-lose theorem for discovering the new physics of  $(g-2)_\mu$  at muon colliders  
Rodolfo Capdevilla, David Curtin, Yonatan Kahn, Gordan Krnjaic  
e-Print: 2101.10334 [hep-ph]  
Phys.Rev.D 105 (2022) 1, 015028

- R45: Using LSST Microlensing to Constrain Dark Compact Objects in Spherical and Disk Configurations  
Harrison Winch, Jack Setford, Jo Bovy, David Curtin  
e-Print: 2012.07136 [astro-ph.GA]  
Astrophys.J. 933 (2022) 2, 177, Astrophys.J. 933 (2022), 177
- R44: Unsupervised hadronic SUEP at the LHC  
Jared Barron, David Curtin, Gregor Kasieczka, Tilman Plehn, Aris Spourdalakis  
e-Print: 2107.12379 [hep-ph]  
JHEP 12 (2021), 129
- R43: Direct detection of mirror matter in Twin Higgs models  
Zackaria Chacko, David Curtin, Michael Geller, Yuhsin Tsai  
e-Print: 2104.02074 [hep-ph]  
JHEP 11 (2021), 198
- R42: Twin Higgs portal dark matter  
David Curtin, Shayne Gryba  
e-Print: 2101.11019 [hep-ph]  
JHEP 08 (2021), 009
- R41: Direct Detection of Atomic Dark Matter in White Dwarfs  
David Curtin, Jack Setford  
e-Print: 2010.00601 [hep-ph]  
JHEP 03 (2021), 166
- R40: Discovering the physics of  $(g-2)\mu$  at future muon colliders  
Rodolfo Capdevilla, David Curtin, Yonatan Kahn, Gordan Krnjaic  
e-Print: 2006.16277 [hep-ph]  
Phys.Rev.D 103 (2021) 7, 075028
- R39: The MATHUSLA test stand  
Maf Alidra, Cristiano Alpigiani, Austin Ball, Paolo Camarri, Roberto Cardarelli et al.  
e-Print: 2005.02018 [physics.ins-det]  
Nucl.Instrum.Meth.A 985 (2021), 164661
- R38: On the Origin of Long-Lived Particles  
Jared Barron, David Curtin  
e-Print: 2007.05538 [hep-ph]  
JHEP 12 (2020), 061
- R37: How To Discover Mirror Stars  
David Curtin, Jack Setford  
e-Print: 1909.04071 [hep-ph]  
Phys.Lett.B 804 (2020), 135391
- R36: Signatures of Mirror Stars  
David Curtin, Jack Setford  
e-Print: 1909.04072 [hep-ph]  
JHEP 03 (2020), 041

- R35: Searching for long-lived particles beyond the Standard Model at the Large Hadron Collider  
Juliette Alimena, James Beacham, Martino Borsato, Yangyang Cheng, Xabier Cid Vidal et al.  
e-Print: 1903.04497 [hep-ex]  
J.Phys.G 47 (2020) 9, 090501
- R34: \* Physics Beyond Colliders at CERN: Beyond the Standard Model Working Group Report  
J. Beacham, C. Burrage, D. Curtin, A. De Roeck, J. Evans et al.  
e-Print: 1901.09966 [hep-ex]  
J.Phys.G 47 (2020) 1, 010501
- R33: Closing the light gluino gap with electron-proton colliders  
David Curtin, Kaustubh Deshpande, Oliver Fischer, Jose Zurita  
e-Print: 1812.01568 [hep-ph]  
Phys.Rev.D 99 (2019) 5, 055011
- R32: Long-Lived Particles at the Energy Frontier: The MATHUSLA Physics Case  
David Curtin, Marco Drewes, Matthew McCullough, Patrick Meade, Rabindra N. Mohapatra et al.  
e-Print: 1806.07396 [hep-ph]  
Rept.Prog.Phys. 82 (2019) 11, 116201
- R31: Dynamical Dark Matter, MATHUSLA, and the Lifetime Frontier  
David Curtin, Keith R. Dienes, Brooks Thomas  
e-Print: 1809.11021 [hep-ph]  
Phys.Rev.D 98 (2018) 11, 115005
- R30: Cosmological Signatures of a Mirror Twin Higgs  
Zackaria Chacko, David Curtin, Michael Geller, Yuhsin Tsai  
e-Print: 1803.03263 [hep-ph]  
JHEP 09 (2018), 163
- R29: New Physics Opportunities for Long-Lived Particles at Electron-Proton Colliders  
David Curtin, Kaustubh Deshpande, Oliver Fischer, José Zurita  
e-Print: 1712.07135 [hep-ph]  
JHEP 07 (2018), 024
- R28: Analysis of Long Lived Particle Decays with the MATHUSLA Detector  
David Curtin, Michael E. Peskin  
e-Print: 1705.06327 [hep-ph]  
Phys.Rev.D 97 (2018) 1, 015006
- R27: Thermal Resummation and Phase Transitions  
David Curtin, Patrick Meade, Harikrishnan Ramani  
e-Print: 1612.00466 [hep-ph]  
Eur.Phys.J.C 78 (2018) 9, 787
- R26: Flashes of Hidden Worlds at Colliders  
David Curtin, Raman Sundrum  
e-Print: 1702.02524 [hep-ph]  
Physics Today, June 2017, page 46

- R25: New Detectors to Explore the Lifetime Frontier  
John Paul Chou, David Curtin, H.J. Lubatti  
e-Print: 1606.06298 [hep-ph]  
Phys.Lett.B 767 (2017), 29-36
- R24: Data-driven Model-independent Searches for Long-lived Particles at the LHC  
Andrea Coccaro, David Curtin, H.J. Lubatti, Heather Russell, Jessie Shelton  
e-Print: 1605.02742 [hep-ph]  
Phys.Rev.D 94 (2016) 11, 113003
- R23: Quirky Explanations for the Diphoton Excess  
David Curtin, Christopher B. Verhaaren  
e-Print: 1512.05753 [hep-ph]  
Phys.Rev.D 93 (2016) 5, 055011
- R22: A Quirky Probe of Neutral Naturalness  
Zackaria Chacko, David Curtin, Christopher B. Verhaaren  
e-Print: 1512.05782 [hep-ph]  
Phys.Rev.D 94 (2016) 1, 011504
- R21: Towards a No-Lose Theorem for Naturalness  
David Curtin, Prashant Saraswat  
e-Print: 1509.04284 [hep-ph]  
Phys.Rev.D 93 (2016) 5, 055044
- R20: A facility to Search for Hidden Particles at the CERN SPS: the SHiP physics case  
Sergey Alekhin, Wolfgang Altmannshofer, Takehiko Asaka, Brian Batell, Fedor Bezrukov et al.  
e-Print: 1504.04855 [hep-ph]  
Rept.Prog.Phys. 79 (2016) 12, 124201
- R19: Discovering Uncolored Naturalness in Exotic Higgs Decays  
David Curtin, Christopher B. Verhaaren  
e-Print: 1506.06141 [hep-ph]  
JHEP 12 (2015), 072
- R18: Uncovering light scalars with exotic Higgs decays to  $b\bar{b}\mu\mu$   
David Curtin, Rouven Essig, Yi-Ming Zhong  
e-Print: 1412.4779 [hep-ph]  
JHEP 06 (2015), 025
- R17: Illuminating Dark Photons with High-Energy Colliders  
David Curtin, Rouven Essig, Stefania Gori, Jessie Shelton  
e-Print: 1412.0018 [hep-ph]  
JHEP 02 (2015), 157
- R16: Testing Electroweak Baryogenesis with Future Colliders  
David Curtin, Patrick Meade, Chiu-Tien Yu  
e-Print: 1409.0005 [hep-ph]  
JHEP 11 (2014), 127

- R15: Natural SUSY in Plain Sight  
David Curtin, Patrick Meade, Pin-Ju Tien  
e-Print: 1406.0848 [hep-ph]  
Phys.Rev.D 90 (2014) 11, 115012
- R14: The Double-Dark Portal  
David Curtin, Yuhsin Tsai  
e-Print: 1405.1034 [hep-ph]  
JHEP 11 (2014), 136
- R13: Exotic decays of the 125 GeV Higgs boson  
David Curtin, Rouven Essig, Stefania Gori, Prerit Jaiswal, Andrey Katz et al.  
e-Print: 1312.4992 [hep-ph]  
Phys.Rev.D 90 (2014) 7, 075004
- R12: Direct Detection with Dark Mediators  
David Curtin, Ze'ev Surujon, Yuhsin Tsai  
e-Print: 1312.2618 [hep-ph]  
Phys.Lett.B 738 (2014), 477-482
- R11: Measuring the  $t$ th coupling from same-sign dilepton +  $2b$  measurements  
David Curtin, Jamison Galloway, Jay G. Wacker  
e-Print: 1306.5695 [hep-ph]  
Phys.Rev.D 88 (2013) 9, 093006
- R10: Casting Light on BSM Physics with SM Standard Candles  
David Curtin, Prerit Jaiswal, Patrick Meade, Pin-Ju Tien  
e-Print: 1304.7011 [hep-ph]  
JHEP 08 (2013), 068
- R9: Boosted Multijet Resonances and New Color-Flow Variables  
David Curtin, Rouven Essig, Brian Shuve  
e-Print: 1210.5523 [hep-ph]  
Phys.Rev.D 88 (2013), 034019
- R8: Charginos Hiding In Plain Sight  
David Curtin, Prerit Jaiswal, Patrick Meade  
e-Print: 1206.6888 [hep-ph]  
Phys.Rev.D 87 (2013) 3, 031701
- R7: Excluding Electroweak Baryogenesis in the MSSM  
David Curtin, Prerit Jaiswal, Patrick Meade  
e-Print: 1203.2932 [hep-ph]  
JHEP 08 (2012), 005
- R6: Spontaneous R-symmetry Breaking with Multiple Pseudomoduli  
David Curtin, Zohar Komargodski, David Shih, Yuhsin Tsai  
e-Print: 1202.5331 [hep-th]  
Phys.Rev.D 85 (2012), 125031
- R5: Mixing It Up With MT2: Unbiased Mass Measurements at Hadron Colliders  
David Curtin  
e-Print: 1112.1095 [hep-ph]  
Phys.Rev.D 85 (2012), 075004



- R4: Supersymmetry Breaking Triggered by Monopoles  
Csaba Csaki, David Curtin, Vikram Rentala, Yuri Shirman, John Terning  
e-Print: 1108.4415 [hep-th]  
Phys.Rev.D 85 (2012), 045014
- R3: Singlet-Stabilized Minimal Gauge Mediation  
David Curtin, Yuhsin Tsai  
e-Print: 1011.2766 [hep-th]  
Phys.Rev.D 83 (2011), 075005
- R2: SUSY-Yukawa Sum Rule at the LHC  
Monika Blanke, David Curtin, Maxim Perelstein  
e-Print: 1004.5350 [hep-ph]  
Phys.Rev.D 82 (2010), 035020
- R1: A Flavor Protection for Warped Higgsless Models  
Csaba Csaki, David Curtin  
e-Print: 0904.2137 [hep-ph]  
Phys.Rev.D 80 (2009), 015027

## 9. CERN Yellow Reports

*These are reports for communicating work done at CERN when journal publication is not appropriate, such as white papers or technical reports.*

*Numbered Y# for reference.*

- Y4: \* Report from Working Group 2 : Higgs Physics at the HL-LHC and HE-LHC  
M. Cepeda, S. Gori, P. Ilten, M. Kado, F. Riva et al.  
e-Print: 1902.00134 [hep-ph]  
CERN Yellow Rep.Monogr. 7 (2019), 221-584
- Y3: \* Handbook of LHC Higgs Cross Sections: 4. Deciphering the Nature of the Higgs Sector  
LHC Higgs Cross Section Working Group -- D. de Florian et al.  
e-Print: 1610.07922 [hep-ph]
- Y2: Physics at a 100 TeV pp collider: Higgs and EW symmetry breaking studies  
R. Contino, D. Curtin, A. Katz, M.L. Mangano, G. Panico et al.  
e-Print: 1606.09408 [hep-ph]  
CERN Yellow Rep. (2017) 3, 255-440
- Y1: Physics at a 100 TeV pp collider: beyond the Standard Model phenomena  
T. Golling ), M. Hance ), P. Harris, M.L. Mangano, M. McCullough et al.  
e-Print: 1606.00947 [hep-ph]  
CERN Yellow Rep. (2017) 3, 441-634

## 10. Other Non-Refereed Reports or White Papers

*Numbered N# for reference.*

- N27: \* TF07 Snowmass Report: Theory of Collider Phenomena  
F. Maltoni (Louvain U., CP3 and INFN, Bologna and U. Bologna, DIFA), S. Su,  
J. Thaler, T.K. Aarrestad, A. Aboubrahim et al.  
e-Print: 2210.02591 [hep-ph]  
Contribution to: 2022 Snowmass Summer Study
- N26: \* Report of the Topical Group on Physics Beyond the Standard Model at  
Energy Frontier for Snowmass 2021  
Tulika Bose, Antonio Boveia, Caterina Doglioni, Simone Pagan Griso, James  
Hirschauer et al.  
e-Print: 2209.13128 [hep-ph]  
Contribution to: 2022 Snowmass Summer Study
- N25: \* Snowmass Theory Frontier: Astrophysics and Cosmology  
Daniel Green, Joshua T. Ruderman, Benjamin R. Safdi, Jessie Shelton, Ana  
Achucarro et al.  
e-Print: 2209.06854 [hep-ph]  
Contribution to: 2022 Snowmass Summer Study
- N24: \* Muon Collider Forum Report  
K.M. Black ), S. Jindariani, D. Li, F. Maltoni (Louvain U., CP3 and INFN,  
Bologna and U. Bologna, DIFA), P. Meade et al.  
e-Print: 2209.01318 [hep-ex]
- N23: \* Theory, phenomenology, and experimental avenues for dark showers: a  
Snowmass 2021 report  
Guillaume Albouy, Jared Barron, Hugues Beauchesne, Elias Bernreuther,  
Marcella Bona et al.  
e-Print: 2203.09503 [hep-ph]  
Eur.Phys.J.C 82 (2022) 12, 1132  
Contribution to: 2022 Snowmass Summer Study
- N22: \*\* Simulated Detector Performance at the Muon Collider  
Muon Collider Collaboration -- N. Bartosik et al.  
e-Print: 2203.07964 [hep-ex]  
Contribution to: 2022 Snowmass Summer Study
- N21: Recent Progress and Next Steps for the MATHUSLA LLP Detector  
MATHUSLA Collaboration -- Cristiano Alpigiani et al.  
e-Print: 2203.08126 [hep-ex]  
Contribution to: 2022 Snowmass Summer Study
- N20: \* The Physics of Light Relics  
Cora Dvorkin, Joel Meyers ), Peter Adshead, Mustafa Amin, Carlos A.  
Argüelles et al.  
e-Print: 2203.07943 [hep-ph]  
Contribution to: 2022 Snowmass Summer Study
- N19: \*\* A Muon Collider Facility for Physics Discovery  
Muon Collider Collaboration -- D. Stratakis et al.  
e-Print: 2203.08033 [physics.acc-ph]

- N18: \*\* Promising Technologies and R&D Directions for the Future Muon Collider Detectors  
Muon Collider Collaboration -- S. Jindariani et al.  
e-Print: 2203.07224 [physics.ins-det]  
Contribution to: 2022 Snowmass Summer Study
- N17: \* Muon Collider Physics Summary  
Chiara Aime, Aram Apyan, Mohammed Attia Mahmoud Mohammed, Nazar Bartosik, Fabian Batsch et al.  
e-Print: 2203.07256 [hep-ph]  
Contribution to: 2022 Snowmass Summer Study
- N16: The physics case of a 3 TeV muon collider stage  
Muon Collider Collaboration -- Jorge de Blas et al.  
e-Print: 2203.07261 [hep-ph]  
Contribution to: 2022 Snowmass Summer Study
- N15: Snowmass2021 Cosmic Frontier White Paper: Dark Matter Physics from Halo Measurements  
Keith Bechtol, Simon Birrer, Francis-Yan Cyr-Racine, Katelin Schutz, Susmita Adhikari et al.  
e-Print: 2203.07354 [hep-ph]  
Contribution to: 2022 Snowmass Summer Study
- N14: Early-Universe Model Building  
Pouya Asadi, Saurabh Bansal, Asher Berlin, Raymond T. Co, Djuna Croon et al.  
e-Print: 2203.06680 [hep-ph]  
Contribution to: 2022 Snowmass Summer Study
- N13: Review of opportunities for new long-lived particle triggers in Run 3 of the Large Hadron Collider  
Juliette Alimena, James Beacham ), Freya Blekman, Adrián Casais Vidal, Xabier Cid Vidal et al.  
e-Print: 2110.14675 [hep-ex]
- N12: An Update to the Letter of Intent for MATHUSLA: Search for Long-Lived Particles at the HL-LHC  
MATHUSLA Collaboration -- Cristiano Alpigiani et al.  
e-Print: 2009.01693 [physics.ins-det]
- N11: \*\* The Large Hadron-Electron Collider at the HL-LHC  
LHeC Collaboration and FCC-he Study Group -- P. Agostini et al.  
e-Print: 2007.14491 [hep-ex]  
J.Phys.G 48 (2021) 11, 110501
- N10: Explore the lifetime frontier with MATHUSLA  
MATHUSLA Collaboration -- Henry Lubatti et al.  
e-Print: 1901.04040 [hep-ex]  
JINST 15 (2020) 06, C06026  
Input to the update process of the European Strategy for Particle Physics

- N9: \*\* HE-LHC: The High-Energy Large Hadron Collider : Future Circular Collider Conceptual Design Report Volume 4  
FCC Collaboration -- A. Abada et al.  
Eur.Phys.J.ST 228 (2019) 5, 1109-1382
- N8: \*\* FCC-hh: The Hadron Collider : Future Circular Collider Conceptual Design Report Volume 3  
FCC Collaboration -- A. Abada et al.  
Eur.Phys.J.ST 228 (2019) 4, 755-1107
- N7: \*\* FCC-ee: The Lepton Collider : Future Circular Collider Conceptual Design Report Volume 2  
FCC Collaboration -- A. Abada et al.  
Eur.Phys.J.ST 228 (2019) 2, 261-623
- N6: \*\* FCC Physics Opportunities : Future Circular Collider Conceptual Design Report Volume 1  
FCC Collaboration -- A. Abada et al.  
Eur.Phys.J.C 79 (2019) 6, 474
- N5: \* Summary Report of Physics Beyond Colliders at CERN  
R. Alemany, C. Burrage, H. Bartosik, J. Bernhard, J. Boyd et al.  
e-Print: 1902.00260 [hep-ex]
- N4: \*\* CEPC Conceptual Design Report: Volume 2 - Physics & Detector  
CEPC Study Group -- João Barreiro Guimarães da Costa et al.  
e-Print: 1811.10545 [hep-ex]
- N3: A Letter of Intent for MATHUSLA: A Dedicated Displaced Vertex Detector above ATLAS or CMS.  
MATHUSLA Collaboration -- Cristiano Alpigiani et al.  
e-Print: 1811.00927 [physics.ins-det]
- N2: \*\* The Higgs Portal and Cosmology  
Ketevi Assamagan, Chien-Yi Chen, John Paul Chou, David Curtin, Michael A. Fedderke et al.  
e-Print: 1604.05324 [hep-ph]
- N1: \*\* CEPC-SPPC Preliminary Conceptual Design Report. 1. Physics and Detector  
Muhammd Ahmad, Daniele Alves, Haipeng An, Qi An, Abdesslam Arhrib (Hassan 1st U., Settat) et al.

## 11. **Conference Proceedings**

*Numbered C# for reference.*

- C4: \*\* Mirror Neutron Stars: How QCD can be used to study dark matter through gravitational waves  
Maurício Hippert, Jack Setford, Hung Tan, David Curtin, Jacquelyn Noronha-Hostler et al.  
e-Print: 2207.13063 [nucl-th]

- C3: \*\* Probing BSM physics with electron-proton colliders  
David Curtin, Kaustubh Deshpande, Oliver Fischer, José Zurita  
e-Print: 1805.12533 [hep-ph]  
PoS DIS2018 (2018), 090
- C2: \*\* Towards an Understanding of the Correlations in Jet Substructure  
D. Adams, A. Arce, L. Asquith ), M. Backovic, T. Barillari et al.  
e-Print: 1504.00679 [hep-ph]  
Eur.Phys.J.C 75 (2015) 9, 409
- C1: \*\* Boosted Objects and Jet Substructure at the LHC. Report of BOOST2012,  
held at IFIC Valencia, 23rd-27th of July 2012  
A. Altheimer, A. Arce, L. Asquith, J. Backus Mayes, E. Bergeaas Kuutmann et al.  
e-Print: 1311.2708 [hep-ex]  
Eur.Phys.J.C 74 (2014) 3, 2792

## 12. Manuscripts on arXiv, submitted to publishers

*Numbered A# for reference.*

- A4: Precision Cosmological Constraints on Atomic Dark Matter  
Saurabh Bansal, Jared Barron, David Curtin, Yuhsin Tsai  
e-Print: 2212.02487 [hep-ph]
- A3: Gravitational waves and tadpole resummation: Efficient and easy convergence  
of finite temperature QFT  
David Curtin, Jyotirmoy Roy, Graham White  
e-Print: 2211.08218 [hep-ph]
- A2: Dark Matter or Regular Matter in Neutron Stars? How to tell the difference from  
the coalescence of compact objects  
Maurício Hippert, Emily Dillingham, Hung Tan, David Curtin, Jacquelyn  
Noronha-Hostler et al.  
e-Print: 2211.08590 [astro-ph.HE]
- A1: Indirect Detection of Dark Matter Annihilating into Dark Glueballs  
David Curtin, Caleb Gemmell  
e-Print: 2211.05794 [hep-ph]

## 13. Invited Lectures

### i. Pre-Eminent Seminars and Colloquia:

*Numbered P# for reference.*

- P14: “A no-lose theorem for discovering the new physics of  $(g - 2)_\mu$ ”, Physics Theory Colloquium/Seminar
- UC Berkeley Theory Seminar, Berkeley, CA (12. April 2021, virtual)
  - Theory Colloquium, Fermi National Accelerator Laboratory, Batavia, IL (14. April 2021, virtual)
  - Stanford Phenomenology Seminar, Palo Alto, CA (7 May 2021, virtual)
  - Light Dark World Workshop, PITT, Pittsburgh, PA (14 Dec 2021)
- P13: “Searching for Dark Complexity with Colliders and Telescopes”, Physics Theory Colloquium
- University of Arizona, Tucson, AZ (13. Nov 2020, virtual)
  - University of Washington, Seattle, WA (16. Nov 2020, virtual)
- P12: “Cosmology and Astrophysics of the Twin Higgs: from the CMB to Mirror Stars”, Physics Theory Colloquium
- University of Illinois, Urbana-Champaign, IL (4. Nov 2019)
  - McMaster University, Hamilton, Ontario (27. Nov 2019)
- P11: “Hidden Sectors and Long-Lived Particle Signatures”
- Plenary Talk, COSMO19 Conference, Aachen, Germany (5. September 2019)
  - Plenary Talk, SUSY 2019 Conference, Corpus Christi, TX, (22 May 2019)
- P10: “Searches for Long-Lived Particles”, Plenary Talk, Phenomenology 2019 Symposium, Pittsburgh, PA, (6 May 2019)
- P9: “Particle Physics at the Lifetime Frontier”, Physics Theory Colloquium,
- TUM, SFB 1258, Munich, Germany (3 June 2019)
  - University of Toronto, Toronto, Canada (11 Oct 2018)
  - MIT, Boston, MA (22 Oct 2018)
  - University of Oklahoma, Norman, OK (8 Nov 2018)
  - Carleton University, Carleton, Canada (20 Nov 2018)
- P8: “Long-lived particles at the Energy Frontier”, Plenary talk, 30th Rencontres de Blois on “Particle Physics and Cosmology”, Blois, France (5 Jun 2018)
- P7: “Flashes of Hidden Worlds at Colliders”, Physics Theory Colloquium,
- York University, Toronto ON (6 Feb 2018)
  - University of Oregon, Eugene, OR (16 Nov 2017)
  - Simon Fraser University, Vancouver, Canada (29 Sep 2017)
  - TRIUMF, Vancouver, Canada (28 Sep 2017)
  - UCSC, Santa Cruz, CA (3 April 2017)
- P6: “New physics with exotic or long-lived signatures”, Plenary talk, SEARCH 2016 Workshop, Oxford, U.K. (2 Sep 2016)
- P5: “Neutral Naturalness – Theory and Signatures”, Plenary talk, “Higgs and Beyond” PITT-PACC Workshop, Pittsburgh, PA (3-5 Dec 2015)
- P4: “BSM Higgs Sectors”, Invited talk, “FCC Week 2015”, Washington, DC (23 - 27 Mar 2015)

- P3: “Ratios and characteristic distributions in the search for deviation from the SM productions”, Plenary talk, “Next Steps in the Energy Frontier” Workshop, FNAL, IL (25-28 Aug 2014)
- P2: “Exotic Higgs Sectors”, University of Maryland / John Hopkins Joint Seminar, MA (28 Apr 2014)
- P1: “Exotic Higgs Sectors”, Plenary talk, “Exotics Physics with ATLAS at 14 TeV” Workshop, Eilat, Israel (9 Feb 2014)

## ii. Invited Seminars:

*Numbered S# for reference.*

- S98: “Complex Dark Matter Dynamics”, QMAP Particles/Cosmology seminar, UC Davis, Davis, California (9 May 2022)
- S97: “Complex Dark Matter Dynamics”, “Mega Dark Matter Workshop”, Mainz Institute for Theoretical Physics, Mainz, Germany (4 May 2022)
- S96: “Cosmology and Astrophysics of Dark Complexity”, Virtual Particle-Astro-Nuclear (PAN) Seminar, Wayne State University, Detroit, MI (16 Oct 2021)
- S95: “MATHUSLA LLP Detector Proposal: Current Status and Prospects”, Virtual Experimental Seminar, SUNY Stony Brook, NY (28 Sep 2021)
- S94: “MATHUSLA LLP Detector Proposal: Current Status and Prospects”, Invited contribution at Quarks “2020” virtual workshop (8 June 2021)
- S93: “Prospects to search for light feebly- interacting scalar particles at MATHUSLA, CODEX-b, FASER, ANUBIS”, Feebly Interacting Particles 2020 virtual workshop, CERN, Geneva, Switzerland (4 Sep 2020)
- S92: “Perspectives on Hidden Sector Searches; From Colliders to Astrophysics”, IPP Virtual Town Hall, Canada (21 Jul 2020)
- S91: “MATHUSLA LLP Detector Proposal: Current Status and Prospects”, Virtual Experimental Seminar, NISER, Odisha, India (2 Jun 2020)
- S90: “Mirror Stars: A New Probe of Dark Complexity”, Theory Seminar, SUNY Buffalo, Buffalo, NY (25 Feb 2020)
- S89: “Mirror Stars: A New Probe of Dark Complexity”, Theory Seminar, University of Maryland, College Park, MD (4 Nov 2019)
- S88: “Current Status and Prospects for the MATHUSLA dedicated LLP detector at the HL-LHC”, TRIUMF particle physics Seminar, TRIUMF, Vancouver, Canada (23 Sep 2019)
- S87: “Cosmology and Astrophysics of the Twin Higgs”, Seminar as “DESY Theorist of the Month”, DESY, Hamburg, Germany (9 Sep 2019)

- S86: “Neutral Naturalness From Colliders to Cosmology and Astrophysics”, New Physics with LLPs Workshop, 15th Recontres du Vietnam 2019, ICISE, Qui Nhon, Vietnam (3 Jul 2019)
- S85: “Cosmology and Astrophysics of the Twin Higgs “, Theory Seminar, Boston University, Boston, MA (25 Apr 2019)
- S84: “Cosmology and Astrophysics of the Twin Higgs “, Theory Seminar, Leinweber Center for Theoretical Physics, University of Michigan, Ann Arbor, MI (12 Apr 2019)
- S83: “Cosmology and Astrophysics of the Twin Higgs “, Theory Seminar, Perimeter Institute, Waterloo, Canada (27 Nov 2018)
- S82: “Goals for Invisible Particle Searches at Future Facilities”, Johns Hopkins Workshop on “Beyond Standard Model: Where do we go from here?”, GGI, Florence, Italy (4 Oct 2018)
- S81: “Long Lived Particles”, CERN-CKC workshop on “Physics at the LHC and Beyond”, CERN, Geneva, Switzerland (2 Aug 2018)
- S80: “The Lifetime Frontier”, KITP Workshop on “High Energy Physics at the Sensitivity Frontier “, UCSB, Santa Barbara, CA (23 May 2018)
- S79: “Top-down Physics Case for LLPs @ the LHC”, Searching for long-lived particles at the LHC: Third workshop of the LHC LLP Community, CERN, Geneva (16-18 May 2018)
- S78: “BSM Opportunities at e-p Colliders”, Cornell University, Ithaca, NY (3 Nov 2017)
- S77: “Probing Hidden Sectors with New External Detectors at the HE or HL-LHC”, Workshop on the physics of HL-LHC, and perspectives at HE-LHC, CERN, Geneva (31 Oct 2017)
- S76: “BSM Opportunities at e-p Colliders”, NYU, New York, NY (25 Oct 2017)
- S75: “The MATHUSLA Detector”, University of Toronto Experimental Seminar, ON, Canada (18 Sep 2017)
- S74: “The MATHUSLA Detector: Exploring the Lifetime Frontier and Cosmic Ray Physics”, TeVPA 2017, Columbus, OH (7-11 Aug 2017)
- S73: “Searches for Unconventional Signatures at Future Accelerators”, Gordon Particle Physics Conference, HKUST, Hong Kong (25-30 June 2017)
- S72: “Triggering on Long-Lived Particle Signatures”, 1st workshop of LHC LLP Community, CERN, Geneva (23-26 April 2017)
- S71: “Thermal Resummation and the Electroweak Phase Transition”, UMass Amherst workshop on Electroweak Phase Transition, MA (6-8 April 2017)
- S70: “Flashes of Hidden Worlds at Colliders”, Physics Theory Colloquium, UCSC, Santa Cruz, CA (3 April 2017)
- S69: “Hidden Sectors and New Signatures”, UCLA, Los Angeles, CA (2 March 2017)



- S68: “Hidden Sectors and New Signatures”, UMass Amherst, MA, (23 Feb 2017)
- S67: “Hidden Sectors and New Signatures”, University of Toronto, ON, Canada (13 Feb 2017)
- S66: “Hidden Sectors and New Signatures”, University of Maryland, College Park, MD (10 Feb 2017)
- S65: “Neutral Long-Lived Particle Searches at Future Colliders”, 1st FCC Physics Workshop, CERN, Geneva (16-20 Jan 2017)
- S64: “Neutral Naturalness Phenomenology”, HXSWG Workshop on Exotic Higgs Decays, SLAC, Palo Alto, CA (7 Nov 2016)
- S63: “Exploring the Cosmological Frontier with High Energy Colliders”, SLAC, Palo Alto, CA (4 Nov 2016)
- S62: “The Lifetime Frontier”, Carleton University, ON, Canada (6 Oct 2016)
- S61: “Exotic Physics at the LHC”, Multi-Boson Interaction Workshop, University of Wisconsin-Madison, WI (26. Aug 2016)
- S60: “The Lifetime Frontier”, CERN-Korean Theory Institute on new LHC Data, CERN, Switzerland (29 July 2016)
- S59: “Exotic Higgs Decays and Naturalness”, Brookhaven National Lab, NY (17 May 2016) “Discovering Neutral Naturalness”, UC Berkeley, CA (30 Mar 2016)
- S58: “Discovering Neutral Naturalness”, University of Illinois at Urbana-Champaign, IL (14 Mar 2016)
- S57: “Exploring the Cosmological Frontier with High Energy Colliders”, University of Maryland, MD (8 Feb 2016)
- S56: “Discovering Neutral Naturalness”, Harvard University, MA (24 Nov 2015)
- S55: “Discovering Neutral Naturalness”, Workshop on long-lived particle searches, UMass Amherst, MA (12-14 Nov 2015)
- S54: “Discovering Neutral Naturalness”, Workshop on “Discoveries at the Dawn of LHC Run 2”, TRIUMF, BC (28-30 Oct 2015)
- S53: “Discovering Neutral Naturalness”, Rutgers University, NJ (20 Oct 2015)  
“Discovering Neutral Naturalness”, University of Minnesota, MN (for 16 Oct 2015)
- S52: “Probing Electroweak Baryogenesis at Future Colliders”, Electroweak Baryogenesis Workshop, UMass Amherst, MA (17 Sep 2015)
- S51: “Towards A No-Lose Theorem For Naturalness”, SUSY 15, Lake Tahoe, CA (26 Aug 2015)
- S50: “Probing Uncolored Naturalness”, “Anticipating 14 TeV” Workshop, MIAPP, Munich, Germany (1 Jul 2015)
- S49: “Probing Uncolored Naturalness”, Durham IPPP, United Kingdom (24 Jun 2015)  
“Probing Uncolored Naturalness”, Oxford University, United Kingdom (23 Jun 2015)

- S48: “Probing Electroweak Baryogenesis with Exotic Higgs Decays”, Higgs Cross Section WG 3 Meeting (Exotic Higgs Decays), Fermilab, IL (21-22 May 2015)
- S47: “BSM Higgs Sectors”, 9th MC4BCM Workshop, Fermilab, IL (18-20 May 2015)
- S46: “Probing Colorless Naturalness”, Institute of Advanced Study, Princeton, NJ (8 May 2015)
- S45: “Probing Colorless Naturalness”, CERN-CKC Theory Institute on Neutral Naturalness, CERN, Switzerland (23-26 Apr 2015)
- S44: “Probing Electroweak Baryogenesis at Future Colliders”, University of Sydney, Australia (14 Apr 2015)
- S43: “Probing Electroweak Baryogenesis at Future Colliders”, University of Melbourne, Australia (2 Apr 2015)
- S42: “BSM Higgs and EW scale baryogenesis”, Higgs & BSM at 100 TeV Workshop, CERN, Switzerland (11-13 Mar 2015)
- S41: “BSM Higgs and EW scale baryogenesis”, FCC Higgs/EWSB WG Meeting, CERN, Switzerland (25 Feb 2015)
- S40: “Probing Electroweak Baryogenesis at Future Colliders”, Aspen Center for Physics, 2015 Winter Workshop (26 Jan - 1 Feb 2015)
- S39: “Excluding Electroweak Baryogenesis at Future Colliders”, University of Cincinnati, OH (20 Jan 2015)
- S38: “Excluding Electroweak Baryogenesis at Future Colliders”, University of Michigan, MI (22 Oct 2014)
- S37: “Excluding Electroweak Baryogenesis at Future Colliders”, University of Delaware, DE (25 Sep 2014)
- S36: “The Double-Dark Portal”, Brookhaven National Lab, NY (30 May 2014)
- S35: “Efficient Simulation of Fake Leptons”, 8th MC4BCM Workshop, IBS, Daejeon, South Korea, (19-24 May 2014)
- S34: “The Double-Dark Portal”, University of Wisconsin-Madison, WI (6. May 2014)
- S33: “SUSY in Standard Model Standard Candles”, FNAL CMS LPC Seminar, IL (2. May 2014)
- S32: “Introduction to Monte Carlo for Particle Physics”, Lectures at CFHEP, Beijing, China (16 Mar - 13 Apr 2014)
- S31: “SUSY in Standard Model Standard Candles”, Natural Supersymmetry Workshop, University of Oregon, OR (10-12 Mar 2014)
- S30: S:z“Exotic Higgs Decays @ 100 TeV”, “BSM Physics Opportunities at 100 TeV” Workshop, CERN, Switzerland (11 Feb 2014)
- S29: “The Double-Dark Portal”, Technion, Israel (3 Feb 2014)
- S28: “The Double-Dark Portal”, Tel Aviv University, Israel (30 Jan 2014)

- S27: "Pseudo-Light Dark Matter", Princeton, NJ (15 Nov 2013)
- S26: "Sniffing out new physics with Standard Model Standard Candles", New York University, NY (3 Oct 2013)
- S25: "Sniffing out new physics with Standard Model Standard Candles", Rutgers University, NJ (10 Sep 2013)
- S24: "Sniffing out new physics with Standard Model Standard Candles", UC Berkeley, CA (29 May 2013)
- S23: "Sniffing out new physics with Standard Model Standard Candles", UC Irvine, CA (22 May 2013)
- S22: "Sniffing out new physics with Standard Model Standard Candles", Caltech, CA (20 May 2013)
- S21: "Sniffing out new physics with Standard Model Standard Candles", SLAC, CA (15 May 2013)
- S20: "Multi-Jet Resonances and New Color-Flow Variables", University of Maryland, MD (11 Mar 2013)
- S19: "Multi-Jet Resonances and New Color-Flow Variables", MIT, MA (25 Feb 2013)
- S18: "Multi-Jet Resonances and New Color-Flow Variables", Brookhaven National Lab, NY (15 Jan 2013)
- S17: "Multi-Jet Resonances and New Color-Flow Variables", Florida State University, FL (5 Dec 2012)
- S16: "Multi-Jet Resonances and New Color-Flow Variables", University of California, Davis, CA (13 Nov 2012)
- S15: "New Electroweak Physics at the LHC", INFN, Padova, Italy (20 Jul 2012)
- S14: "New Electroweak Physics at the LHC", DESY, Hamburg, Germany (10 Jul 2012)
- S13: "Singlet-Stabilized Minimal Gauge Mediation", IPMU, Tokyo, Japan (22 Feb 2012)
- S12: "EdgeFitter: A tool for unbiased mass measurement at hadron colliders", MC4BCM Workshop, Cornell University, NY (22 - 24 Mar 2012)
- S11: "Mixing It Up With MT2: Unbiased Mass Measurements at Hadron Colliders", POwLHC Workshop, KEK, Tsukuba, Japan (17 Feb 2012)
- S10: "SUSY-Breaking via Non-Perturbative Monopole Dynamics", CERN, Geneva, Switzerland (30 Jun 2011)
- S9: "SUSY-Breaking via Non-Perturbative Monopole Dynamics", University of Western Australia (23 Jun 2011)
- S8: "SUSY-Breaking via Non-Perturbative Monopole Dynamics", University of Melbourne, Australia (20 Jun 2011)

- S7: “Singlet-Stabilized Minimal Gauge Mediation”, John Hopkins University, MD (15 Apr 2011)
- S6: “Singlet-Stabilized Minimal Gauge Mediation”, University of Chicago, IL (9 Mar 2011)
- S5: “Singlet-Stabilized Minimal Gauge Mediation”, Harvard University, MA (1 Mar 2011)
- S4: “Singlet-Stabilized Minimal Gauge Mediation”, University of California, Berkeley, CA (23 Feb 2011)
- S3: “SUSY Sum Rules and MT2 Combinatorics”, Syracuse University, NY (6 Dec 2010)
- S2: “Singlet-Stabilized Minimal Gauge Mediation”, University of California, Davis, CA (8 Nov 2010)
- S1: “SUSY Sum Rules and MT2 Combinatorics”, University of Florida, FL (12 Oct 2010) “SUSY Sum Rules and MT2 Combinatorics”, University of Michigan, MI (15 Sep 2010)

#### 14. Other Talks

*Numbered O# for reference.*

- O16: “Mirror Stars and other probes of Dark Complexity”  
TeVPA 2022, Queens University, Kingston, Ontario (8-12 Aug 2022)
- O15: “A no-lose theorem for discovering the new physics of  $(g - 2)_\mu$ ”, Brookhaven Forum Virtual Workshop, Brookhaven, NY (3-5 Nov 2021)
- O14: “Thermal Resummation and Phase Transitions”, MIAPP Baryogenesis Workshop, Munich, Germany (13 - 24 Jun 2016)
- O13: “Towards a No-Lose Theorem for Naturalness”, Brookhaven Forum, NY (7-9 Oct 2015)
- O12: “Electroweak Baryogenesis at Future Colliders”, Aspen Center for Physics, 2014 Summer Session (29 Jun - 18 Jul 2014)
- O11: “The Double-Dark Portal”, “New Perspectives on Dark Matter” Workshop, FNAL, Batavia IL (28 Apr - 2 May 2014)
- O10: “Dark Mediator Dark Matter”, Aspen Center for Physics, 2014 Winter Workshop (18 - 24 Jan 2014)
- O9: “Multi-Jet Resonances and New Color-Flow Variables”, BOOST 2013 Workshop, Flagstaff, AZ (12-16 Aug 2013)
- O8: “Multi-Jet Resonances and New Color-Flow Variables”, SB-ATLAS hep-ex Meeting, Stony Brook University, NY (24 Sep 2012)

- O7: “New Electroweak Physics at the LHC”, Aspen Center for Physics, 2012 Summer Session (12 Aug - 2 Sep 2012)
- O6: “Boosted RPV Gluinos”, BOOST 2012 Workshop, Valencia, Spain (23 - 27 Jul 2012)
- O5: “Are Charginos Hiding in Plain Sight?”, CERN BSM-TH Workshop, Geneva, Switzerland (18 - 29 Jun 2012)
- O4: “Supersymmetry Breaking Triggered by Monopoles”, SUSY 11, Fermilab, IL (28 Aug 2011 - 2 Sep 2011)
- O3: “SUSY-Yukawa Sum Rule at the LHC”, SUSY 10, Bonn, Germany (23 Aug 2010)
- O2: “Testing the Stop-Top Cancellation at the LHC”, Pheno 2010 Symposium, University of Wisconsin-Madison, (10 May 2010)
- O1: “Testing the Stop-Top Cancellation at the LHC”, CU-CMS hep-ex Meeting, LEPP, Cornell University (6 May 2010)

## 15. **Media and Other Public Engagements**

### **i. Public Talks:**

*Numbered U# for reference.*

- U2: “Dark Matter and Metaphor: A Panel Discussion on Art and Astrophysics”, University of Toronto Art Gallery (21 Sep 2022)
- U2: “Dark Matter and Metaphor: A Panel Discussion on Art and Astrophysics”, Art Museum at the University of Toronto, [video link](#). (21 Sep 2022)
- U1: “Echoes of the Big Bang at the Large Hadron Collider”, Pint of Science Canada Festival, Imperial Pub, Toronto (20 May 2019)

### **ii. Media Engagements:**

*Numbered M# for reference.*

- M6: Faculti podcast interview, 28 Aug 2020. The subject of the interview was our recent papers on Mirror Stars and their signatures.  
<https://podcasts.apple.com/ca/podcast/faculti/id1471855284>

- M5: New Scientist, December 2018: popular news article about Hidden Sectors and new experimental proposals to look for them, including MATHUSLA. Based on interviews with me and other scientists.  
<https://www.newscientist.com/article/mg24032061-600-particles-crossing-to-our-world-could-open-portal-to-dark-matter-realm/>
- M4: Live Science, 22 May 2018: popular news article about our MATHUSLA detector proposal, based on interviews with me and collaborators.  
<https://www.livescience.com/62633-lhc-stray-particles-mathusla-detection.html>
- M3: Quanta Magazine, September 2017: long-form article about Hidden Sectors and MATHUSLA, resulting from many interviews with me and my collaborators.  
<https://www.quantamagazine.org/how-the-hidden-higgs-could-reveal-our-universes-dark-sector-20170926/>  
 This article was also picked up by Wired magazine:  
<https://www.wired.com/story/hidden-higgs-dark-sector/>
- M2: Joint Quantum Institute Podcast, July 2017. The subject of the episode was an interview with me about our MATHUSLA proposal and Hidden Sector Theories.  
<https://jqj.umd.edu/news/podcast/long-live-mathusla>
- M1: Scientific American, September 2014: I was interviewed about my work on new physics explanations of an anomalous LHC measurement at the time.  
<https://www.scientificamerican.com/article/signs-of-new-physics-from-the-lhc/>

## D. **TEACHING AND MENTORING**

### 16. **Courses taught**

#### i. **Undergraduate Courses**

PHY197: Modern Physics for the Curious  
 Fall 2020, 2021

University of Toronto, Department of Physics

A discussion-based introductory course to modern physics for non-physics-majors, covering topics like quantum and particle physics, general relativity, black holes, dark matter, cosmology and string theory.

PHY354: Classical Mechanics  
 Spring 2018, 2019, 2020, 2021

University of Toronto, Department of Physics

Primary textbook: Landau and Lifshitz, "Mechanics"

This course introduces the principle of least action, Lagrangian mechanics, symmetries and conservation laws, central field motion, Euler angles, solid body motion, and motion in noninertial frames.

Basic features of Hamiltonian dynamics are also discussed. Other topics will be covered as time permits.

PHY484: Relativity Theory II

Spring 2022, 2023

University of Toronto, Department of Physics

Primary textbooks: variety of lecture notes and current reviews.

We begin by outlining how Einstein's equations can be derived from an action principle from scratch, then discuss possible alternative theories of gravity and extra dimensions. We then discuss the production and detection of gravitational waves as a probe of astrophysical and cosmological phenomena. Next, we develop the story of homogeneous isotropic FRW cosmology, and introduce the idea of inflation. Then we discuss aspects of the thermal physics of the early universe. After that, we give an outline of the theory of inflationary perturbations, how they grow over time, and how this can be read off the cosmic microwave background and directly dictates the formation of large scale structure in our universe today.

#### i. **Graduate Courses**

PHY2404: Quantum Field Theory II

Spring 2019, 2020, 2021, 2022, 2023

University of Toronto, Department of Physics

Primary textbooks: Schwartz "Quantum Field Theory and the Standard Model", Peskin and Schroeder "An Introduction to Quantum Field Theory"

This QFT2 course continues the study of quantum field theory started with PHY2403 (QFT1) into more advanced topics. We will be covering: path integral formulation of quantum field theory; loops and renormalization; the renormalization group; non-abelian gauge theories; the Higgs mechanism; anomalies; effective field theory; effective potentials.

PHY1484: Relativity Theory II

cross-listed with PHY484, see above.

### 17. **Postdocs and Students Supervised**

I am primary supervisor unless otherwise indicated.

Note that while I give descriptive project titles for each person, in practice their research portfolio may be much more varied, since research by advanced graduate students and postdocs in high energy phenomenology ideally involves work on an evolving variety of subject areas in response to theoretical and experimental advances, and students are encouraged to independently pursue their own research

directions, in addition to the agenda set by their supervisors, as early as possible.

### Current Postdocs:

Name	Dates	Project(s)
Gonzalo Alonso Álvarez	Sep 2022 - ongoing	Theory and Cosmology of Dark Complexity

### Past Postdocs:

Name	Dates	Project(s)	Current or Last Known Position
Rodolfo Capdevilla (joint w/ Perimeter)	Sep 2019 - Sep 2022	Physics of Future Muon Colliders	Postdoc at Fermilab
Jack Setford	Sep 2018 - Aug 2021	Theory and Detection of Mirror Stars. <i>Received Faculty of Arts &amp; Science Postdoctoral Fellowship Award</i>	Pursuing Legal AI startup in the UK

### Current PhD Students:

Name	Dates	Project(s)
Mikah Mellors	Jan 2023 - ongoing	TBA
Keegan Humphrey	Aug 2022 - ongoing	Signatures of Dark Complexity.
Linda Yuan	Jan 2022 - ongoing	Origin of matter in Twin Higgs theories.
Andrija Rasovic	Jan 2022 - ongoing	Origin of matter in Twin Higgs theories. <i>Received Connaught International Scholarship</i>
Caleb Gemmell	Jan 2020 - ongoing	Hidden sector signatures in colliders and astrophysics. <i>Received Connaught International Scholarship, Lachlan Gilchrist Fellowship, Graduate Student Exchange award from McDonald Institute</i>
Jared Barron	Jan 2019 - ongoing	Dark Complexity at the LHC, MATHUSLA and in Cosmology. <i>Received NSERC CGS-M, NSERC PGS-D. Moving to Postdoc at YITP Stony Brook in Sep 2023</i>

### Past PhD Students:



Name	Dates	Thesis Title	Current or Last Known Position
Shayne Gryba	Jan 2018 - May 2022	From Dark Matter to Leptoquarks: Phenomenology of Physics Beyond the Standard Model. <i>Received NSERC PGS-D.</i>	Part-time teaching and pursuing his own startup idea.

### Past Masters Students:

Name	Dates	Project Title	Current or Last Known Position
Imran Alkhatib	May - Aug 2019	Geometric Optimization of the MATHUSLA Detector	PhD student at U of T working with Prof. Miriam Diamond
Harrison Winch (co-supervised with Prof. Jo Bovy)	May - Aug 2019	Using LSST Microlensing to Constrain Dark Compact Objects in Spherical and Disk Configurations	PhD student at U of T, working with Prof. Renee Hlozek

### Current Undergraduate Research Students

Name	Dates	Position	Project
Isabella Armstrong (co-supervised with Prof. Chris Matzner)	Jan 2022 - ongoing	part-time RA	Precision computation of Mirror Star matter accumulation and electromagnetic emission signatures.
Berkin Gorbuz (co-supervised with Prof. Chris Matzner)	Jan 2022 - ongoing	part-time RA	Precision computation of Mirror Star matter accumulation and electromagnetic emission signatures.

### Past Undergraduate Research Students

Name	Dates	Position	Project	Current or Last Known Position
Jaipratap Grewal	Aug 2021 - Aug 2022	part-time RA	LLP Signal Acceptance and Sensitivity Estimate Studies for MATHUSLA	PhD student at U of T, working with Prof. Michael Luke

Aaron Howe	May - Dec 2020	NSERC USRA	Searching for Mirror Stars with Gaia	PhD student at U of T, working with Prof. Michael Luke
Lillian Luo	Oct 2019 - June 2021	PHY479, NSERC USRA, part-time RA	LLP Signal Acceptance Studies for MATHUSLA	PhD student at Cornell University
Wentao Cui	Oct 2019 - Oct 2020	PHY479, part-time RA	LLP Signal Acceptance Studies for MATHUSLA	PhD student at MIT

## 18. Advisory and Examining Committees

*(Excluding Thesis that I supervised, listed above.)*

### Current Member of Ph.D. Advisory Committees:

- Aaron Howe, Dec 2022 - ongoing
- Sebastien Roy-Garand, Dec 2021 - ongoing
- Amalia Madden, co-supervised with Asimina Arvanitaki (PI), May 2020 - ongoing
- Timothy Knight, May 2020 - ongoing
- Harrison Winch, May 2020 - ongoing
- Imran Alkhatib, Jan 2020 - ongoing
- Frank (David) Wandler, Aug 2019 - ongoing
- Thomas Morrison, Jun 2019 - ongoing
- Henry Meng, Jan 2019 - ongoing
- Alex Lague, Dec 2018 - ongoing
- Tae Hyoun Park, Nov 2018 - ongoing
- Bianca Ciungu, Nov 2018 - ongoing
- Dylan Kisliuk, Oct 2017 - ongoing
- Jyotirmoy Roy, Nov 2017 - ongoing
- Yifei Han, Oct 2017 - ongoing

### Past Member of Ph.D. Advisory Committees:

- Aris Spourdlakis, 2022
- Jordan Fazio, Dec 2017 - Jun 2021
- Randy Conklin, Oct 2019 - Jun 2021
- Thomas De Beer, Nov 2017 - 2019

### Member of B.Sc. Thesis Examining Committees:

N/A

**Member of M.Sc. Examining Committees:**

- Imran Alkhatib, Aug 2019
- Thomas Morrison, Aug 2018

**Member of Physics Department and/or School of Graduate Studies Ph.D. Examining Committees:**

- Matthew Inglis-Whalen, Mar 2021
- Dylan Linthorne, Dec 2021
- Matthew Wilson, Nov 2021
- Martin Ojeda, May 2021
- Charles J. Woodford, Sep 2020
- Haider Abidi, May 2020
- Kyle Cormier, Oct 2019
- Erfan Shalchian, Aug 2019
- Jesse Cresswell, Aug 2019
- David DeMarco, Mar 2019

**E. ADMINISTRATIVE POSITIONS**

19. i. Positions held and service on committees/organizations within the University

**University of Toronto Physics Department:**

- Inclusivity, Diversity, Equity & Accessibility Committee, Aug 2021 - ongoing
- Graduate Admissions Committee, Aug 2019 - ongoing
- Organizer of Shuttle between University of Toronto and Perimeter Institute, Jan 2018 - ongoing
- Space & Renovations Committee, Aug 2021 - ongoing
- Physics Computing Services Committee, Jan 2020 - Apr 2021
- Public Outreach Committee, Jan 2019 - Apr 2021.
- hep-ex hiring committee, Jan - Jun 2020
- Weekly Colloquium Series Organizational Committee, Aug 2019 - Apr 2020
- Undergraduate Curriculum Committee, Jan 2019 - May 2019.

- ii. Positions held and service on committees and organizations outside the University of scholarly and academic significance.

- Co-founder and organizer of the BSM PANDEMIC virtual seminar series (Phenomenology And Networking Despite Everyone Meandering Inside Cautiously). [www.bsmpandemic.com](http://www.bsmpandemic.com) (May 2020 - Dec 2021).
- Local organizing committee for Lepton Photon 2019: XXIX International Symposium on Lepton Photon Interactions at High Energies, Toronto, Canada (5-10 Aug 2019).
- Organizer: 1st workshop of the MATHUSLA Collaboration, Simons Center, Stony Brook University, Stony Brook, NY (27-31 Aug 2018)
- Organizer: “New ideas in detecting long-lived particles at the LHC” workshop, Lawrence Berkeley National Laboratory, (10-13 July 2018)
- Organizer: “Hidden Naturalness Workshop”, University of Maryland, MD (28-30 April 2016)
- Organizer: “The Many Faces of Naturalness” workshop, Aspen, CO (29 May - 19 Jun 2016)

## F. **OTHER RELEVANT INFORMATION**

### **Referee Experience:**

- Physical Review Letters
- Physical Review D
- Journal of High Energy Physics
- European Physical Journal C
- Computer Physics Communications
- Machine Learning: Science and Technology

### **Attended Workshops, Conferences and Schools:**

*Numbered W# for reference.*

- W83: Cosmological Probes of New Physics workshop, Maryland Center for Fundamental Physics, University of Maryland, College Park, MD (15-17 Sep 2022)
- W82: 2022 Aspen summer workshop on Effective Field Theories, Aspen, Colorado (15-26 Aug 2022)
- W81: 2022 MITP Workshop on “Mega Dark Matter”, Mainz, Germany (2-5 May 2022)
- W80: 2022 MIAPP Workshop on “Novel Hidden Sectors”, Munich, Germany (25-29 Apr 2022)

- W79: GGI Workshop “New Physics from the Sky”, Florence, Italy (8-12 Nov 2021)
- W78: Brookhaven Forum, Brookhaven National Laboratory, NY (3-5 Nov 2021, virtual)
- W77: PITT PACC Workshop: Muon collider physics, University of Pittsburgh, PA (30 Nov - 2 Dec 2020, virtual)
- W76: Searching for Long-Lived Particles at the LHC and beyond: 8th workshop of the LHC LLP Community, CERN, Geneva, Switzerland (16 - 20 Nov 2020, virtual)
- W75: Feebly Interacting Particles 2020 virtual workshop, CERN, Geneva, Switzerland (31 Aug - 4 Sep 2020)
- W74: Searching for long-lived particles at the LHC: Seventh workshop of the LHC LLP Community, CERN, Geneva, Switzerland (25 - 27 May 2020, virtual)
- W73: KITP Workshop on “Origin of the Vacuum Energy and Electroweak Scales”, UCSB, Santa Barbara, CA (22 Jul - 2 Aug 2019)
- W72: New Physics with LLPs Workshop, 15th Rencontres du Vietnam 2019, ICISE, Qui Nhon, Vietnam (1-5 Jul 2019)
- W71: 2019 MIAPP Workshop “The Weak Scale at a Crossroads: Lessons from the LHC and Beyond”, Munich, Germany, (3-14 Jun 2019)
- W70: SUSY 2019 Conference, Corpus Christi, TX, (20-24 May 2019)
- W69: Phenomenology 2019 Symposium, Pittsburgh, PA, (6-8 May 2019)
- W68: Johns Hopkins Workshop on “Beyond Standard Model: Where do we go from here?”, GGI, Florence, Italy (1-5 Oct 2018)
- W67: CERN-CKC workshop on “Physics at the LHC and Beyond”, CERN, Geneva, Switzerland (30 Jul - 9 Aug 2018)
- W66: “Long-lived particles at the Energy Frontier”, Plenary talk, 30th Rencontres de Blois on “Particle Physics and Cosmology”, Blois, France (4-8 Jun 2018)
- W65: KITP Workshop on “High Energy Physics at the Sensitivity Frontier”, UCSB, Santa Barbara, CA (21-25 May 2018)
- W64: Searching for long-lived particles at the LHC: Third workshop of the LHC LLP Community, CERN, Geneva (16-18 May 2018)
- W63: TevPA 2017, Columbus, OH (7-11 Aug 2017)
- W62: Aspen Center for Physics, 2017 Summer Session (24 Jul - 4 Aug 2017)
- W61: Gordon Particle Physics Conference, HKUST, Hong Kong (25-30 June 2017)
- W60: 1st workshop of LHC LLP Community, CERN, Geneva (23-26 April 2017)
- W59: UMass Amherst workshop on Electroweak Phase Transition, MA (6-8 April 2017)
- W58: 1st FCC Physics Workshop, CERN, Geneva (16-20 Jan 2017)

- W57: HXSWG Workshop on Exotic Higgs Decays, SLAC, Palo Alto, CA (7-8 Nov 2016)
- W56: MITP Workshop on “EFTs as Discovery Tools”, Mainz, Germany (5-7 Sep 2016)
- W55: SEARCH 2016 Workshop, Oxford, U.K. (31 Aug - 2 Sep 2016)
- W54: Multi-Boson Interaction Workshop, University of Wisconsin-Madison, WI (26. Aug 2016)
- W53: CERN-Korean Theory Institute on new LHC Data, CERN, Switzerland (25 July - 5 Aug 2016)
- W52: MIAPP Baryogenesis Workshop, Munich, Germany (13 - 24 Jun 2016)
- W51: KITP New Accelerators Workshop, Santa Barbara, CA, (1-2 June 2016)
- W50: Aspen Center for Physics, 2016 Summer Session (30 May - 10 June 2016)
- W49: New Physics at the LHC Workshop, University of Oregon, Eugene, OR (18-20 May 2016)
- W48: KITP EXPERLHC16 Workshop, Santa Barbara, CA, (9-13 May 2016)
- W47: “Higgs and Beyond” PITT-PACC Workshop, Pittsburgh, PA (3-5 Dec 2015)
- W46: Workshop on long-lived particle searches, UMass Amherst, MA (12-14 Nov 2015)
- W45: “Discoveries at the Dawn of LHC Run 2” Workshop, TRIUMF, BC (28-30 Oct 2015)
- W44: Brookhaven Forum, NY (7-9 Oct 2015)
- W43: GGI Workshop “Gearing up for LHC13”, Florence, Italy (7-20 Sep 2015)
- W42: SUSY 15, Lake Tahoe, CA (24-29 Aug 2015)
- W41: “Anticipating 14 TeV” Workshop, MIAPP, Munich, Germany (29 Jun - 12 Jul 2015)
- W40: “Preparing for the HL-LHC” Workshop, Perimeter Institute, ON (8-9 Jun 2015)
- W39: Higgs Cross Section WG 3 Meeting (Exotic Higgs Decays), Fermilab, IL (21-22 May 2015)
- W38: 9th MC4BCM Workshop, Fermilab, IL (18-20 May 2015)
- W37: CERN-CKC Theory Institute on Neutral Naturalness, CERN, Switzerland (23-26 Apr 2015)
- W36: FCC Week 2015, Washington, DC (11-15 Apr 2015)
- W35: Higgs & BSM at 100 TeV Workshop, CERN, Switzerland (11-13 Mar 2015)
- W34: FCC Higgs/EWSB WG Meeting, CERN, Switzerland (25 Feb 2015)
- W33: Aspen Center for Physics, 2015 Winter Workshop (26 Jan - 1 Feb 2015)

- W32: “Next Steps in the Energy Frontier” Workshop, FNAL, IL (25-28 Aug 2014)
- W31: Aspen Center for Physics, 2014 Summer Session (29 Jun - 18 Jul 2014)
- W30: “New Perspectives on Dark Matter” Workshop, FNAL, IL (28 Apr - 2 May 2014)
- W29: “Dark Interactions” Workshop, BNL, NY (11-13 Jun 2014)
- W28: 8th MC4BCM Workshop, IBS, Daejeon, South Korea, (19-24 May 2014)
- W27: “New Perspectives on Dark Matter” Workshop, FNAL, Batavia IL (28 Apr - 2 May 2014)
- W26: “Natural Supersymmetry” Workshop, University of Oregon, OR (10-12 Mar 2014)
- W25: “BSM Physics Opportunities at 100 TeV” Workshop, CERN, Switzerland (10-11 Feb 2013)
- W24: “Exotics Physics with ATLAS at 14 TeV” Workshop, Eilat, Israel (5-9 Feb 2013)
- W23: Aspen Center for Physics, 2014 Winter Workshop (18 - 24 Jan 2014)
- W22: “The DM Paradigm: Current Status and Challenges” Workshop, PCTS, NJ (Oct 16 - 19 2013)
- W21: SEARCH Workshop, Simons Center, Stony Brook, NY (20 - 22 Aug 2013)
- W20: BOOST 2013 Workshop, Flagstaff, AZ (12-16 Aug 2013)
- W19: CERN Visitor, Geneva, Switzerland (29 Jul - 11 Aug 2013)
- W18: Pheno 2013 Symposium, University of Pittsburgh, PA (6 - 8 May 2013)
- W17: Brookhaven Forum, NY (May 1 - 3 2013)
- W16: “Higgs Physics After Discovery”, PCTS, NJ (25 - 26 Apr 2013)
- W15: Snowmass Energy Frontier Meeting at BNL, Brookhaven, NY (3 - 6 Apr 2013)
- W14: Applications of Jet Substructure to New Physics Searches, PI, ON (21 - 24 Feb 2013)
- W13: Aspen Center for Physics, 2012 Summer Session (12 Aug - 2 Sep 2012)
- W12: BOOST’12 Workshop, Valencia, Spain (23 - 27 Jul 2012)
- W11: CERN BSM-TH Workshop, Geneva, Switzerland (18 - 29 Jun 2012)
- W10: MC4BCM Workshop, Cornell University, NY (22 - 24 Mar 2012)
- W9: SEARCH Workshop, University of Maryland, Baltimore, MD (17 - 19 Mar 2012)
- W8: P OWLHC Workshop, KEK, Tsukuba, Japan (16 - 18 Feb 2012)
- W7: Brookhaven Forum, Brookhaven National Laboratory, NY (19 - 21 Oct 2011)

- W6: SUSY 11, Fermilab, IL (28 Aug 2011 - 2 Sep 2011)
- W5: Pheno 2011 Symposium, University of Wisconsin-Madison, (9-11 May 2011)
- W4: SUSY 10, Physikalisches Institut, Bonn, Germany (23 - 28 Aug 2010)
- W3: Pheno 2010 Symposium, University of Wisconsin-Madison, (10 - 12 May 2010)
- W2: Prospects in Theoretical Physics, Institute of Advanced Study, Princeton, NJ (19 - 30 Jul 2010)
- W1: Theoretical Advanced Studies Institute, University of Colorado at Boulder (1 - 26 Jun 2009)