

# GABRIEL LEE

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Korea University  
145 Anam-Ro, Seongbuk-Gu, Seoul 02841, Korea

Physical Sciences Building, Room 442  
Cornell University  
245 East Ave, Ithaca, NY 14853, USA

## RESEARCH INTERESTS

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I have broad interests in various aspects of high-energy phenomenology and BSM physics, including supersymmetry (SUSY), Higgs physics, dark matter, effective field theory, and collider physics.

## EDUCATION

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**University of Chicago** 09.2007 – 08.2014  
M.S. (2008) and Ph.D. (2014), Physics.  
Thesis title: Applications of Effective Field Theory to the Higgs Mass Problem and the Proton Radius Puzzle.  
Advisors: Carlos Wagner, Richard Hill.

**University of Toronto** 09.2003 – 05.2007  
H.B.Sc. with High Distinction, Mathematics & Physics.

## RESEARCH EXPERIENCE

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- Cornell University/Korea University** 09.2017 – present  
*Postdoctoral Fellow, CLASSE/Research Professor, Institute of Basic Science* Ithaca, US/Seoul, KR
- Collider phenomenology of composite naturalness models and dark matter model building.
- Technion – Israel Institute of Technology** 09.2014 – 08.2017  
*Postdoctoral Fellow, Faculty of Physics* Haifa, IL
- Investigated collider phenomenology of SUSY flavour models, bound states in BSM physics, and dark matter.
- University of Chicago** 09.2007 – 08.2014  
*Research Assistant, Enrico Fermi Institute* Chicago, US
- With Carlos Wagner, SUSY model building and effective field theory applied to MSSM Higgs physics.
  - With Richard Hill, studied low-energy nuclear interactions and the proton charge radius problem.
- TRIUMF** 05.2006 – 09.2006  
*Summer Research Scholarship Student, Nuclear Structure Group* Vancouver, CA
- Active in the commissioning of the TIGRESS gamma-ray detector, with first measurements examining the nuclear structure of  $^{21}\text{Ne}$  and  $^{21}\text{Na}$ .
- University of Toronto** 2004 – 2006  
*Research Assistant, NSERC Summer Student* Toronto, CA
- With Stephen R. Julian, designed and constructed low-noise electronics for measurements of properties of crystalline metals and oxides under high magnetic field in a dilution refrigerator.
  - With Paul J. Kushner, investigated localization of signatures of annular modes (large-scale atmospheric patterns).

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INSPIRE BAI: Gabriel.Lee.1      ORCID: 0000-0002-7594-364X

## TEACHING EXPERIENCE

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Department of Physics, University of Chicago  
*Teaching Assistant*

09.2007 – 06.2014  
*Chicago, US*

- Graduate: mathematical methods, statistical mechanics, quantum mechanics, and quantum field theory.
- Undergraduate: introductory physics, thermodynamics, mechanics, quantum mechanics, electrodynamics.
- Nominated for Physical Sciences Teaching Prize, 2009.

## AWARDS AND HONOURS

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- NSERC Postgraduate Scholarship D3, 2009–2012.
- Sachs Fellowship (Physics, U. Chicago), 2008.
- Ontario Graduate Scholarship, 2007 (declined).
- NSERC Postgraduate Scholarship M, 2007–2011 (declined).
- St. Michael's College Silver Medal in Mathematics, 2007.
- TRIUMF Summer Research Award, 2006.
- NSERC Undergraduate Summer Research Award, 2005.
- University of Toronto Scholar, 2005 and 2006.
- St. Michael's College Entrance Scholarship, 2003.

## PUBLICATIONS

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- [1] M. Geller, S. Iwamoto, G. Lee, Y. Shadmi and O. Telem, “Dark quarkonium formation in the early universe,” arXiv:1802.07720 [hep-ph].
- [2] Z. Ye, J. Arrington, R. J. Hill and G. Lee, “Proton and neutron electromagnetic form factors and uncertainties,” Phys. Lett. B **777**, 8 (2018) [arXiv:1707.09063 [nucl-ex]].
- [3] S. Iwamoto, G. Lee, Y. Shadmi and Y. Weiss, “Tagging new physics with charm,” JHEP **1709**, 114 (2017) [arXiv:1703.05748 [hep-ph]].
- [4] S. Iwamoto, G. Lee, Y. Shadmi and R. Ziegler, “Diphoton Signals from Colorless Hidden Quarkonia,” Phys. Rev. D **94**, no. 1, 015003 (2016) [arXiv:1604.07776 [hep-ph]].
- [5] N. Ierushalmi, S. Iwamoto, G. Lee, V. Nepomnyashy and Y. Shadmi, “LHC Benchmarks from Flavored Gauge Mediation,” JHEP **1607**, 058 (2016) [arXiv:1603.02637 [hep-ph]].
- [6] G. Lee and C. E. M. Wagner, “Higgs Bosons in Heavy Supersymmetry with an Intermediate  $m_A$ ,” Phys. Rev. D **92**, no. 7, 075032 (2015) arXiv:1508.00576 [hep-ph].
- [7] G. Lee, J. R. Arrington and R. J. Hill, “Extraction of the proton radius from electron-proton scattering data,” Phys. Rev. D **92**, no. 1, 013013 (2015) [arXiv:1505.01489 [hep-ph]].
- [8] P. Draper, G. Lee and C. E. M. Wagner, “Precise estimates of the Higgs mass in heavy supersymmetry,” Phys. Rev. D **89**, no. 5, 055023 (2014) [arXiv:1312.5743 [hep-ph]].
- [9] R. J. Hill, G. Lee, G. Paz and M. P. Solon, “The NRQED lagrangian at order  $1/M^4$ ,” Phys. Rev. D **87**, 053017 (2013) [arXiv:1212.4508 [hep-ph]].
- [10] R. Huo, G. Lee, A. M. Thalappilil and C. E. M. Wagner, “ $SU(2) \otimes SU(2)$  Gauge Extensions of the MSSM Revisited,” Phys. Rev. D **87**, 055011 (2013) [arXiv:1212.0560 [hep-ph]].
- [11] M. A. Schumaker *et al.*, “Coulomb excitation of the proton-dripline nucleus Na-20,” Phys. Rev. C **80**, 044325 (2009) [Phys. Rev. C **82**, 069902 (2010)].
- [12] A. M. Hurst *et al.*, “Narrowing of the neutron sd-pf shell gap in Na-29,” Phys. Lett. B **674**, 168 (2009).
- [13] M. A. Schumaker *et al.*, “Coulomb excitation of radioactive Na-21 and its stable mirror Ne-21,” Phys. Rev. C **78**, 044321 (2008).
- [14] P. J. Kushner and G. Lee, “Resolving the Regional Signature of the Annular Modes”, J. Climate, **20**, 2840 (2007).

## REVIEW PUBLICATIONS

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- [1] D. de Florian *et al.* [LHC Higgs Cross Section Working Group Collaboration], “Handbook of LHC Higgs Cross Sections: 4. Deciphering the Nature of the Higgs Sector,” arXiv:1610.07922 [hep-ph].
- [2] E. Bagnaschi *et al.*, “Benchmark scenarios for low  $\tan\beta$  in the MSSM”, LHCHSWG-2015-002, <https://cds.cern.ch/record/2039911>.

## CODE

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- MhEFT, `Mathematica` package for computing mass and couplings of the SM-like Higgs in the MSSM using effective field theory.
- Python fitting code for world elastic  $ep$ -scattering cross-section data and neutron form factors, included in Supplemental Material of Phys. Lett. B **777**, 8 (2018).

## INVITED TALKS

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- 2018.05.04 | Korea Advanced Institute for Science and Technology, KR.
- 2018.05.01 | Korea Institute for Advanced Study, KR.
- 2018.02.21 | Cornell U., US.
- 2018.02.15 | U. Toronto, CA.
- 2018.01.11 | Carleton U., CA.
- 2017.11.21 | New York U., US.
- 2017.05.29 | Korea U., KR.
- 2017.05.18 | Oxford U., UK.
- 2017.05.17 | King’s College London, UK.
- 2017.05.12 | U. Manchester, UK.
- 2017.05.09 | U. Sussex, UK.
- 2017.04.05 | Joint Seminar in Particle Physics (Israel), Weizmann Institute, IL.
- 2016.10.21 | U. Pittsburgh, US.
- 2016.10.20 | U. Cincinnati, US.
- 2016.10.18 | Argonne National Laboratory, US.
- 2016.10.13 | U. Wisconsin Madison, US.
- 2016.01.18 | Johannes Gutenberg-Universität Mainz, DE.
- 2015.09.10 | York U., CA.
- 2015.09.08 | Perimeter Institute, CA.
- 2015.09.01 | SCIPP, U. California Santa Cruz, US.
- 2015.03.25 | Joint Seminar in Particle Physics (Israel), Technion, IL.
- 2014.02.25 | Argonne National Laboratory, US.

## CONFERENCE AND WORKSHOP TALKS AND PARTICIPATION

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- 2017.08 | Reaching New Summits: The LHC at Full Strength (Aspen Institute, US).
- 2016.08 | EFT’s as Discovery Tools (Mainz ITP, DE): “Bound States for (Diphoton) Signals”.
- 2016.06 | Precision Higgs Mass Initiative (IFT Madrid, ES): “MhEFT Package”.
- 2016.05 | Physics of Simple Atomic Systems (Hebrew U., IL): “New Extraction of the Proton Radius from  $ep$ -Scattering Data”.
- 2015.12 | Israel Physical Society (Bar-Ilan U., IL): “Higgs Bosons in Heavy SUSY with Intermediate  $m_A$ ”.
- 2015.09 | Higgs Days (IFCA, Santander, ES): “Higgs Bosons in Heavy SUSY with Intermediate  $m_A$ ”.
- 2015.08 | SUSY 2015 (Lake Tahoe, US): “Higgs Bosons in Heavy SUSY with Intermediate  $m_A$ ”.
- 2015.06 | Indirect Searches for New Physics in the LHC and Flavour Precision Era (MIAPP, DE): “New Extraction of the Proton Radius from  $ep$ -Scattering Data”.
- 2015.05 | Precision Higgs Mass Initiative (LPTHE, FR): “Higgs Bosons in Heavy SUSY with Intermediate  $m_A$ ”.

- 2014.06 | Proton Radius Puzzle (Mainz ITP, DE): “Model-Independent Fits to  $ep$  Scattering Cross-Section Data”.
- 2014.04 | Precision Higgs Mass Initiative (MPI Munich, DE): “Precise Estimates of the Higgs Mass in Heavy SUSY”.
- 2013.06 | New Perspectives (Fermilab, US): “The NRQED Lagrangian at Order  $1/M^4$ ”.
- 2013.05 | Pheno 2013 (U. Pittsburgh, US): “The NRQED Lagrangian at Order  $1/M^4$ ”.
- 2011.05 | Pheno 2011 (U. Wisconsin-Madison, US): “Constraints on a Dark Matter Model with an Axino LSP and a Gravitino NLSP”.

## SUMMER SCHOOLS

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- 2011.08 | Pre-SUSY Summer School (Chicago, US).
- 2011.07 | SLAC Summer Institute (Stanford, US).

## ACADEMIC SERVICE

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### Referee

- European Physical Journal C, 2016–18.

### Seminar and Conference Organization

- Co-organizer, Israel Joint Seminar in Particle Physics, 2015–16.
- Local coordinator for students of Pre-SUSY summer school, 2011.

### Student Activities

- Organizer of gravity/fluids group meetings at U. Chicago, 2011.
- Student member of the 2010–2011 Graduate Student Admissions Committee, Dept. of Physics of U. Chicago.

## OTHER

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**Citizenship:** Canadian.

**Languages:** English (fluent), French (functional), Cantonese (basic conversational).

**Skills:** Canadian Private Pilot and Glider Licenses.