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Jennifer Kile
Department of Physics and Astronomy
Northwestern University
2145 Sheridan Road
Evanston, IL 60208-3112
Phone: (847)-467-2387
Fax: (847)-467-6857
Email: jenkile@northwestern.edu

January 20, 2013

Prof. Gustavo C. Branco
Centro de Fisica Teorica de Particulas
Instituto Superior Tecnico
Av. Rovisco Pais, P-1049-001 Lisboa
Portugal

Dear Prof. Gustavo C. Branco,

I am writing this letter to apply for a postdoctoral position in your particle theory group starting in the fall of 2013. I received my PhD in 2007 from the California Institute of Technology (supervised by Profs. Mark Wise and Michael Ramsey-Musolf) and am currently a postdoc in the theory group at Northwestern University. My research interests are concentrated on physics beyond the Standard Model.

I am including here a copy of my CV, a list of my publications and talks, and a short description of my research interests. You should also separately receive letters of reference from André de Gouvêa of Northwestern University, from Prof. Michael Ramsey-Musolf of the University of Wisconsin-Madison, and from Amarjit Soni of Brookhaven National Laboratory. If you have any questions, please feel free to contact me via email at jenkile@northwestern.edu.

Sincerely,

A handwritten signature in black ink, appearing to read "Jennifer E. Kile".

Jennifer E. Kile

Curriculum Vitae

Jennifer Kile

PERSONAL INFORMATION

Address:	Department of Physics & Astronomy Northwestern University 2145 Sheridan Road Evanston, IL 60208-3112	Phone: (847) 467-2387 Fax: (847) 467-6857 Email: jenkile@northwestern.edu Citizenship: USA
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RESEARCH INTERESTS

Particle theory beyond the Standard Model, including: dark matter, flavor physics, neutrino physics, LHC phenomenology, Higgs physics, precision electroweak physics, extra dimensions.

EDUCATION AND RESEARCH EXPERIENCE

Northwestern University

Postdoctoral Research Associate, Sept. 2010-present

Research focus: Higgs physics, fermionic extensions of the Standard Model, flavored dark matter

Brookhaven National Laboratory

Postdoctoral Research Associate, Sept. 2007-Aug. 2010

Research focus: Model-independent analysis of dark matter detection in neutrino experiments, lepton-flavor-violating top decays

California Institute of Technology

PhD, Physics, 2007

Thesis: "Constraints on physics beyond the standard model and its observable effects"

Supervisors: Mark B. Wise, Michael J. Ramsey-Musolf

Research focus: Higgs physics, muon decay, neutrino mass, extra dimensions

University of Wisconsin-Madison

Member of ALEPH Collaboration, Sept. 1998-June 2001

Supervisor: Prof. Sau Lan Wu

Research focus: Search for the Higgs boson with the ALEPH detector at LEP

Massachusetts Institute of Technology

BS, Physics, 1998

Thesis: "Measuring CP violation in B Meson Decays"

Supervisor: Richard K. Yamamoto

BS, Electrical Engineering and Computer Science, 1998

FELLOWSHIPS

Robert A. Millikan Fellowship, California Institute of Technology, 2001

Fellowship, University of Wisconsin-Madison, 1999

PUBLICATIONS AND TALKS

See accompanying list.

TEACHING EXPERIENCE

Teaching Assistant, California Institute of Technology, 2002-2007.

Courses Taught:	Physics 2a & 2b (Statistical Physics, Waves, and Quantum Mechanics).
Duties:	Preparing material for and leading 2 recitation sections/week, weekly office hours, grading, and assistance in preparing exams.

REFERENCES

Michael J. Ramsey-Musolf
University of Wisconsin-Madison
mjrm@physics.wisc.edu
(608) 262-3051

André de Gouvêa
Northwestern University
degouvea@northwestern.edu
(847) 467-6462

Amarjit Soni
Brookhaven National Laboratory
adlersoni@gmail.com
(631) 344-3850

PUBLICATIONS AND TALKS

THEORY PUBLICATIONS

“Dark Matter from Weak Polypelets”, André de Gouvêa, Wei-Chih Huang, Jennifer Kile, arXiv:1207.0510 [hep-ph], (submitted to Phys. Rev. D).

“Flavored Dark Matter in Direct Detection Experiments and at LHC”, Jennifer Kile, Amarjit Soni, Phys. Rev. D84:035016, 2011, arXiv:1104.5239 [hep-ph].

“Light Fermionic Dark Matter and its Possible Detection in Neutrino Experiments”, contributed to the proceedings of SUSY '09, Boston, MA, June 2009, arxiv:0910.5051 [hep-ph].

“Light Hidden Fermionic Dark Matter in Neutrino Experiments”, Jennifer Kile, contributed to the proceedings of DPF-2009, Detroit, MI, July 2009, eConf C090726, arxiv:0910.3177 [hep-ph].

“Hidden MeV-Scale Dark Matter in Neutrino Detectors”, Jennifer Kile, Amarjit Soni, Phys. Rev. D80:115017, 2009, arXiv:0908.3892 [hep-ph].

“Model-Independent Constraints on Lepton-Flavor-Violating Decays of the Top Quark”, Jennifer Kile, Amarjit Soni, Phys. Rev. D78:094008, 2008, arXiv:0807.4199 [hep-ph].

“Constraints on physics beyond the standard model and its observable effects”, (PhD Thesis, Caltech).

“Fermionic effective operators and Higgs production at a linear collider”, Jennifer Kile, Michael J. Ramsey-Musolf, Phys. Rev. D76:054009, 2007, arXiv:0705.0554 [hep-ph].

“Constraints on muon decay parameters from neutrino mass”, Rebecca J. Erwin, Jennifer Kile, Michael J. Ramsey-Musolf, Peng Wang, in the proceedings of CIPANP 2006: 9th Conference on the Intersections of Particle and Nuclear Physics, Rio Grande, Puerto Rico, 30 May - 3 June 2006, AIP Conf. Proc. 870:240-242, 2006, hep-ph/0608163.

“Neutrino mass implications for muon decay parameters”, Rebecca J. Erwin, Jennifer Kile, Michael J. Ramsey-Musolf, Peng Wang, Phys. Rev. D75:033005, 2007, hep-ph/0602240.

“Gravitational perturbations of a six-dimensional selftuning model”, M. L. Graesser, J. E. Kile, P. Wang, Phys. Rev. D70:024008, 2004, hep-th/0403074.

SELECTED EXPERIMENTAL PUBLICATIONS

“Observation of an excess in the search for the standard model Higgs boson at ALEPH”, ALEPH Collaboration, Phys. Lett. B495:1-17, 2000.

“Searches for neutral Higgs bosons in $e^+ e^-$ collisions at center-of-mass energies from 192-GeV to 202-GeV”, ALEPH Collaboration, Phys. Lett. B499:53-66, 2001.

“Search for the neutral Higgs bosons of the standard model and the MSSM in $e^+ e^-$ collisions at $\sqrt{s}=189$ -GeV”, ALEPH Collaboration, Eur. Phys. J. C17:223-240, 2000.

SEMINARS AND CONFERENCE TALKS

Invited Talks:

- “Dark Matter from Weak Polypelets”, NPAC Forum, U. Wisconsin-Madison, Apr. 26, 2012.
- “Dark Matter from Weak Polypelets”, UIC Theory Seminar, U. Illinois-Chicago, Apr. 9, 2012.
- “Flavored Dark Matter”, Argonne National Lab Theory Seminar, June 7, 2011.
- “Flavored Dark Matter”, DIS 2011, Newport News, VA, Apr. 13, 2011.
- “Flavored Dark Matter”, Northwestern University High Energy Physics Seminar, Feb. 7, 2011.
- “Hidden Light Dark Matter in Neutrino Detectors”, High Energy Seminar, Northeastern University, Apr. 26, 2010.
- “Hidden Light Dark Matter in Neutrino Detectors”, Seminar, Los Alamos National Laboratory, Jan. 14, 2010.
- “Hidden Light Dark Matter in Neutrino Detectors”, Berkeley/LBL Particle Seminar, UC Berkeley, Jan. 11, 2010.
- “Hidden Light Dark Matter in Neutrino Detectors”, SLAC Theory Seminar, SLAC, Dec. 9, 2009.
- “Light Hidden Fermionic Dark Matter in Neutrino Experiments”, Workshop on Lepton and Baryon Number Violation, Madison, WI, Sept. 22, 2009.
- “Hidden Light Dark Matter in Neutrino Detectors”, Theory Seminar, Fermilab, Sept. 17, 2009.
- “Hidden Light Dark Matter in Neutrino Detectors”, HEP Theory Seminar, Argonne National Laboratory, Sept. 15, 2009.
- “Hidden Dark Matter at Neutrino Experiments”, Joint Particle Seminar, UC Irvine, May 6, 2009.
- “Hidden Dark Matter at Neutrino Experiments”, HEP Monday Seminar, California Institute of Technology, May 4, 2009.
- “Effective Operators, Neutrino Mass, Muon Decay, and Higgs Production” , INFO '07, Santa Fe, NM, July 3, 2007 .
- “Effective Operators, Neutrino Mass, Muon Decay, and Higgs Production” , Seminar, Brookhaven National Lab, Mar. 9, 2007.
- “Effective Operators, Neutrino Mass, Muon Decay, and Higgs Production” , Kellogg Seminar, California Institute of Technology, Feb. 9, 2007.
- “Effective Operators, Neutrino Mass, Muon Decay, and Higgs Production” , Seminar, U. Maryland, Feb. 2, 2007.
- “Search for Higgs Bosons at LEP II”, Quarks 2000, Pushkin, Russia, May 21, 2000. (Plenary).

Other Talks:

- “Dark Matter from Weak Polypelets”, Pheno 2012, Pittsburgh, PA, May 8, 2012.

"Flavored Dark Matter", Brookhaven Forum, Upton, NY, Oct. 19, 2011.

"Flavored Dark Matter", SUSY 2011, Batavia, IL, Aug. 30, 2011.

"Flavored Dark Matter", Pheno 2011, Madison, WI, May 10, 2011.

"Flavored Dark Matter and LHC", Brookhaven Forum, Upton, NY, May 27, 2010.

"Nonstandard Dark Matter Interactions and Connections to LHC", Pheno 2010, Madison, WI, May 10, 2010.

"Light Hidden Fermionic Dark Matter in Neutrino Experiments", Meeting of the Division of Particles and Fields of the American Physical Society, Detroit, MI, July 31, 2009.

"Light Fermionic Dark Matter and its Possible Detection in Neutrino Experiments", SUSY Conference, Boston, MA, June 7, 2009.

"Hidden Dark Matter at Neutrino Experiments", Pheno 2009, Madison, WI, May 12, 2009.

"Model-Independent Constraints on Lepton-Flavor-Violating Top Decays", Brookhaven Forum, Upton, NY, Nov. 6, 2008.

"Model-Independent Constraints on Lepton-Flavor-Violating Decays of the Top Quark", Pheno 2008, Madison, WI, Apr. 28, 2008.

"Fermionic Operators and Higgs Production at the Linear Collider", BNL Forum, Upton, NY, May 30, 2007.

"Constraints on Muon Decay Parameters from Neutrino Mass", CIPANP 2006, Rio Grande, PR, May 31, 2006.

"Neutrino Mass Implications for Muon Decay Parameters", American Physical Society Meeting, Dallas, TX, Apr. 23, 2006.

Statement of Research Interests
Jennifer Kile
Northwestern University

Although my interests range over the entire field of theoretical particle physics, the focus of my research is on physics beyond the Standard Model (SM), including dark matter (DM), flavor physics, Higgs physics, and neutrino physics. As a result, I am interested in how the signatures of new physics can be observed at LHC or other colliders, in neutrino and dark matter experiments, and in low-energy precision electroweak observables. When possible, I like to find projects which combine more than one of these subjects or experiments in interesting ways.

My recent work reflects these interests. In our recent paper¹, André de Gouvêa, Wei-Chih Huang and I considered the possibility of obtaining a DM candidate through the introduction of new multiplets of fermions charged under the SM gauge group. We considered colorless fermions which were charged under $SU(2) \times U(1)$, required that they receive their masses via Yukawa interactions with the SM Higgs boson, and required cancellation of all triangle anomalies. For sufficiently large multiplets, the DM stability is ensured by an accidental symmetry; however, we focused on a simplified model and stabilized the DM by imposing an additional discrete symmetry, which we refer to as pseudo-lepton number. We then investigated the phenomenology of this simplified model, considering constraints from the DM relic density and direct detection experiments as well as from colliders and precision electroweak measurements. We found that a viable DM candidate could be found for large Higgs masses, while, for $m_H = 125$ GeV, a subdominant component of DM could be obtained.

In another recent work², Amarjit Soni and I introduced the idea of flavored DM. As both the number of DM species and the interactions of DM are not known, we investigated the hypothesis that DM belongs to a dark sector which contains more than one type of particle. We then took these different components of the dark sector to be different flavors and hypothesized that the dark sector and the SM share a common flavor interaction. Instead of concentrating on a specific model of flavor, we chose to do an effective operator analysis in order to be as model-independent as possible. For simplicity, we restricted our analysis to flavor interactions which involved only s and d quarks; we considered both flavor-conserving and flavor-changing interactions. We considered constraints from meson decays, kaon mixing, and the Tevatron and studied the potential for observing a monojet signature of flavored DM at LHC.

Previous to these two recent papers, my work has included investigating the direct detection of DM in neutrino experiments, lepton-flavor-violating top decays, and extra dimensions. While I was pursuing my PhD at Caltech, my work included two projects that relied heavily on model-independent effective-operator analyses to constrain physics beyond the SM. In the first of these³, Rebecca Erwin, Michael Ramsey-Musolf, Peng Wang and I constrained the effects of new physics on the muon decay

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- 1 A. de Gouvêa, W.-C. Huang, and J. Kile, “Dark Matter from Weak Polymplets,” [[arXiv:1207.0510](https://arxiv.org/abs/1207.0510)] [hep-ph], (submitted to Phys. Rev. D).
 - 2 J. Kile and A. Soni, “Flavored Dark Matter in Direct Detection Experiments and at LHC,” Phys. Rev. D **84**, 035016 (2011) [[arXiv:1104.5239](https://arxiv.org/abs/1104.5239)] [hep-ph].
 - 3 R. J. Erwin, J. Kile, M. J. Ramsey-Musolf and P. Wang, “Neutrino Mass Implications for Muon Decay Parameters,” Phys. Rev. D **75**, 033005 (2007)[[arXiv:hep-ph/0602240](https://arxiv.org/abs/hep-ph/0602240)].

parameters. In the second⁴, Michael Ramsey-Musolf and I considered the effects of new physics in Higgs production at a linear collider.

In addition to these projects, I also have some works currently in progress. André de Gouvêa, Roberto Vega-Morales and I are investigating the implications of the Higgs decay $H \rightarrow \gamma\gamma$ on physics beyond the SM. Also, Amarjit Soni, Andrew Kobach and I are working on a follow-up to the flavored DM paper involving the possible interactions of DM with leptons. I expect my research in the immediate future (over the next several months) to include these projects but to also have an increasing emphasis on collider signatures of new physics.

In summary, I intend to maintain my research focus on physics beyond the SM and hope to continue looking for interesting ways to use dark matter, collider physics, flavor physics and precision measurements to potentially uncover tantalizing hints of new physics.

⁴ J. Kile and M. J. Ramsey-Musolf, “Fermionic effective operators and Higgs production at a linear collider,” Phys. Rev. D 76, 054009 (2007)[arXiv:0705.0554 [hep-ph]].