Tim Linden

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Employment

Stockholm University — Stockholm, Sweden
Assistant Professor — Jan. 2020 – Present
- Department of Physics
- Member of the Oskar Klein Center

The Ohio State University — Columbus, OH
Postdoctoral Fellow — July 2015 — Jan. 2020
- Center for Cosmology and AstroParticle Physics Fellow (July 2015 — Present)
- Einstein Postdoctoral Fellow (July 2015 — June 2016)

University of Chicago — Chicago, IL
Postdoctoral Fellow — July 2013 — June 2015
- Kavli Institute for Cosmological Physics Postdoctoral Fellow
- Einstein Postdoctoral Fellow

Education

University of California, Santa Cruz — Santa Cruz, CA
Ph.D. in Physics — Sept. 2008 — June 2013
- Thesis: *Dark Matter Annihilation in the Galactic Center*
- Advisor: Stefano Profumo

Northwestern University — Evanston, IL
B.A. in Integrated Science Program, Physics, Mathematics — Sept. 2004 — June 2008

Publication Statistics

89 articles and letters (82 accepted, 7 under review)
inspire: **5130 citations**, h-index: **37**

Presentation Statistics

91 conference presentations, seminars, and colloquia since January 1, 2017
20 Physics or Astronomy Department colloquia
23 invited conference presentations

Accepted Proposals and Current Support

14 accepted proposals (**2** provide current funding)

Significant Honors & Awards

2018 **Michelson Postdoctoral Prize Lectureship** — Case Western Reserve University
2013 — 2016 **Einstein Postdoctoral Fellowship** — NASA

Accepted Proposals

Illuminating WIMP Dark Matter with Resilient Astrophysical Emission Models — Rymdstyrelsen Starting Grant
Primary Investigator — Jan. 2020 — Dec. 2023

Using TeV Gamma-Rays to Shed Light on Cosmic-Ray Propagation — Vetenskapsrådet Starting Grant
Primary Investigator — Jan. 2020 — Dec. 2023

Correlating Fermi-LAT and ASAS-SN Data to Understand Blazars — Fermi GI Cycle 12
Primary Investigator — Oct. 2019 — Sept. 2020

The mysterious solar gamma-ray emission: Powerful new tests at low energies — Fermi GI Cycle 12
Co-Investigator (PI: Annika Peter) — Oct. 2019 — Sept. 2020

Illuminating Inner Heliospheric Cosmic Rays with Gamma Rays — Fermi GI Cycle 11
Co-Investigator (PI: Annika Peter) — August 2018 — July 2019

Using XMM to study the TeV Halos Surrounding Energetic Pulsars — XMM-Newton AO-17
Co-Investigator (PI: Katie Auchettl) — 87 kS Observation (Oct. 2018)

Novel Diffuse Emission Models for the Central Molecular Zone — Fermi GI Cycle 10
Primary Investigator — October 2017 — Sept. 2018

Using Fermi Dark Matter Annihilation Constraints to Probe the Early Universe — Fermi GI Cycle 10
Co-Investigator (PI: Adrienne Erickcek) — October 2017 — Sept. 2018

Revealing the Sun's Coronal Magnetic Fields with Gamma Rays — Fermi GI Cycle 10
Co-Investigator (PI: Annika Peter) — October 2017 — Sept. 2018

Understanding γ-Rays from the Galactic Center: Constraining Millisecond Pulsars — Fermi GI Cycle 8
Co-Investigator (PI: Fabio Antonini) — October 2015 — Sept. 2016

The Smith Cloud: A High-Velocity Cloud Confined by Dark Matter — Fermi GI Cycle 6
Primary Investigator — August 2013 — July 2014

A Multiwavelength Model for Novel Physics in the Galactic Center — Einstein Fellowship
Fellowship Recipient (PI, Chicago: Dan Hooper, PI, Ohio State: Annika Peter) — July 2013 — June 2016

The Small Magellanic Cloud - A Case Study of X-Ray Populations at Low Metallicity — Chandra Cycle 14
Co-Investigator (PI: Andreas Zezas) — 2013

Current Students and Postdocs

Juri Smirnov
Postdoctoral Fellow — 2021 — Present

Pedro de la Torre Luque
Postdoctoral Fellow — 2021 — Present

Michael Korsmeier
Postdoctoral Fellow — 2020 — Present

Carlos Blanco
Postdoctoral Fellow — 2020 — 2021

Isabelle John
PhD Student — 2020 — Present

Simone Valenti
ERASMUS Student — 2021 – Present

Perine Miriot
Masters Student — 2021 – Present

Oskar Svenborm
Undergraduate Student — 2021 – Present

Publication List - Tim Linden

[1] Sunniva Jacobsen, Tim Linden, and Katherine Freese, "Constraining Axion-Like Particles with HAWC Observations of TeV Blazars," (2022), arXiv:2203.04332 [hep-ph].

[2] Joshua W. Foster, Samuel J. Witte, Matthew Lawson, Tim Linden, Vishal Gajjar, Christoph Weniger, and Benjamin R. Safdi, "Extraterrestrial Axion Search with the Breakthrough Listen Galactic Center Survey," (2022), arXiv:2202.08274 [astro-ph.CO].

[3] Payel Mukhopadhyay and Tim Linden, "Self-Generated Cosmic-Ray Turbulence Can Explain the Morphology of TeV Halos," (2021), arXiv:2111.01143 [astro-ph.HE].

[4] M. Sten Delos and Tim Linden, "Dark Matter Microhalos in the Solar Neighborhood: Pulsar Timing Signatures of Early Matter Domination," (2021), arXiv:2109.03240 [astro-ph.CO].

[5] Isabelle John and Tim Linden, "Cosmic-ray positrons strongly constrain leptophilic dark matter," JCAP **12**, 007 (2021), arXiv:2107.10261 [astro-ph.HE].

[6] Martin Wolfgang Winkler and Tim Linden, "Response to Comment on "Dark Matter Annihilation Can Produce a Detectable Antihelium Flux through $\bar{\Lambda}_b$ Decays"," (2021), arXiv:2106.00053 [hep-ph].

[7] Carlos Blanco and Tim Linden, "Gamma-Rays from Star Forming Activity Appear to Outshine Misaligned Active Galactic Nuclei," (2021), arXiv:2104.03315 [astro-ph.HE].

[8] Rebecca K. Leane and Tim Linden, "First Analysis of Jupiter in Gamma Rays and a New Search for Dark Matter," (2021), arXiv:2104.02068 [astro-ph.HE].

[9] Dan Hooper and Tim Linden, "Evidence of TeV Halos Around Millisecond Pulsars," (2021), arXiv:2104.00014 [astro-ph.HE].

[10] Rebecca K. Leane, Tim Linden, Payel Mukhopadhyay, and Natalia Toro, "Celestial-Body Focused Dark Matter Annihilation Throughout the Galaxy," Phys. Rev. D **103**, 075030 (2021), arXiv:2101.12213 [astro-ph.HE].

[11] Takahiro Sudoh, Tim Linden, and Dan Hooper, "The Highest Energy HAWC Sources are Likely Leptonic and Powered by Pulsars," JCAP **08**, 010 (2021), arXiv:2101.11026 [astro-ph.HE].

[12] Tim Linden, John F. Beacom, Annika H. G. Peter, Benjamin J. Buckman, Bei Zhou, and Guanying Zhu, "First observations of solar disk gamma rays over a full solar cycle," Phys. Rev. D **105**, 063013 (2022), arXiv:2012.04654 [astro-ph.HE].

[13] Ilias Cholis, Dan Hooper, and Tim Linden, "Constraining the Charge-Sign and Rigidity-Dependence of Solar Modulation," (2020), arXiv:2007.00669 [astro-ph.HE].

[14] Martin Wolfgang Winkler and Tim Linden, "Dark Matter Annihilation Can Produce a Detectable Antihe-

lium Flux through $\bar{\Lambda}_b$ Decays," Phys. Rev. Lett. **126**, 101101 (2021), arXiv:2006.16251 [hep-ph].

[15] Takahiro Sudoh, Tim Linden, and John F. Beacom, "Millisecond pulsars modify the radio-star-formation-rate correlation in quiescent galaxies," Phys. Rev. D **103**, 083017 (2021), arXiv:2005.08982 [astro-ph.GA].

[16] Ilias Cholis, Tim Linden, and Dan Hooper, "Antideuterons and antihelium nuclei from annihilating dark matter," Phys. Rev. D **102**, 103019 (2020), arXiv:2001.08749 [astro-ph.HE].

[17] M. Sten Delos, Tim Linden, and Adrienne L. Erickcek, "Breaking a dark degeneracy: The gamma-ray signature of early matter domination," Phys. Rev. D **100**, 123546 (2019), arXiv:1910.08553 [astro-ph.CO].

[18] Benjamin J. Buckman, Tim Linden, and Todd A. Thompson, "Cosmic Rays and Magnetic Fields in the Core and Halo of the Starburst M82: Implications for Galactic Wind Physics," Mon. Not. Roy. Astron. Soc. **494**, 2679–2705 (2020), arXiv:1908.09824 [astro-ph.GA].

[19] Tim Linden, "Robust method for treating astrophysical mismodeling in dark matter annihilation searches of dwarf spheroidal galaxies," Phys. Rev. D **101**, 043017 (2020), arXiv:1905.11992 [astro-ph.HE].

[20] Ilias Cholis, Tim Linden, and Dan Hooper, "A Robust Excess in the Cosmic-Ray Antiproton Spectrum: Implications for Annihilating Dark Matter," Phys. Rev. D **99**, 103026 (2019), arXiv:1903.02549 [astro-ph.HE].

[21] Takahiro Sudoh, Tim Linden, and John F. Beacom, "TeV Halos are Everywhere: Prospects for New Discoveries," Phys. Rev. D **100**, 043016 (2019), arXiv:1902.08203 [astro-ph.HE].

[22] Dan Hooper, Tim Linden, and Abby Vieregg, "Active Galactic Nuclei and the Origin of IceCube's Diffuse Neutrino Flux," JCAP **1902**, 012 (2019), arXiv:1810.02823 [astro-ph.HE].

[23] A. Albert *et al.* (HAWC), "Constraints on Spin-Dependent Dark Matter Scattering with Long-Lived Mediators from TeV Observations of the Sun with HAWC," Phys. Rev. **D98**, 123012 (2018), arXiv:1808.05624 [hep-ph].

[24] A. Albert *et al.* (HAWC), "First HAWC Observations of the Sun Constrain Steady TeV Gamma-Ray Emission," Phys. Rev. **D98**, 123011 (2018), arXiv:1808.05620 [astro-ph.HE].

[25] Carmelo Evoli, Tim Linden, and Giovanni Morlino, "Self-generated cosmic-ray confinement in TeV halos: Implications for TeV γ-ray emission and the positron excess," Phys. Rev. **D98**, 063017 (2018), arXiv:1807.09263 [astro-ph.HE].

[26] Laura A. Lopez, Katie Auchettl, Tim Linden, Alberto D. Bolatto, Todd A. Thompson, and Enrico Ramirez-Ruiz, "Evidence for Cosmic-Ray Escape in the Small Magellanic Cloud using Fermi Gamma-rays," Astrophys. J. **867**, 44 (2018), arXiv:1807.06595 [astro-ph.HE].

[27] Qing-Wen Tang, Kenny C. Y. Ng, Tim Linden, Bei Zhou, John F. Beacom, and Annika H. G. Peter, "Unexpected dip in the solar gamma-ray spectrum," Phys. Rev. **D98**, 063019 (2018), arXiv:1804.06846 [astro-ph.HE].

[28] Dan Hooper and Tim Linden, "Millisecond Pulsars, TeV Halos, and Implications For The Galactic Center Gamma-Ray Excess," Phys. Rev. **D98**, 043005 (2018), arXiv:1803.08046 [astro-ph.HE].

[29] Tim Linden, Bei Zhou, John F. Beacom, Annika H. G. Peter, Kenny C. Y. Ng, and Qing-Wen Tang, "Evidence for a New Component of High-Energy Solar Gamma-Ray Production," Phys. Rev. Lett. **121**, 131103 (2018), arXiv:1803.05436 [astro-ph.HE].

[30] J. Singal *et al.*, "The Radio Synchrotron Background: Conference Summary and Report," Publ. Astron. Soc. Pac. **130**, 985 (2018), arXiv:1711.09979 [astro-ph.HE].

[31] Dan Hooper and Tim Linden, "Measuring the Local Diffusion Coefficient with H.E.S.S. Observations of Very High-Energy Electrons," Phys. Rev. **D98**, 083009 (2018), arXiv:1711.07482 [astro-ph.HE].

[32] Richard Bartels, Dan Hooper, Tim Linden, Siddharth Mishra-Sharma, Nicholas L. Rodd, Benjamin R. Safdi, and Tracy R. Slatyer, "Comment on "Characterizing the Population of Pulsars in the Galactic Bulge with the Fermi Large Area Telescope" [arXiv:1705.00009v1]," Phys. Dark Univ. **20**, 88–94 (2018), arXiv:1710.10266 [astro-ph.HE].

[33] Tim Linden and Benjamin J. Buckman, "Pulsar TeV Halos Explain the TeV Excess Observed by Milagro," Phys. Rev. Lett. **120**, 121101 (2018), arXiv:1707.01905 [astro-ph.HE].

[34] Joseph Bramante, Tim Linden, and Yu-Dai Tsai, "Searching for dark matter with neutron star mergers and quiet kilonovae," Phys. Rev. **D97**, 055016 (2018), arXiv:1706.00001 [hep-ph].

[35] Dan Hooper, Ilias Cholis, and Tim Linden, "TeV Gamma Rays From Galactic Center Pulsars," Phys. Dark Univ. **21**, 40–46 (2018), arXiv:1705.09293 [astro-ph.HE].

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[37] Masha Baryakhtar, Joseph Bramante, Shirley Weishi Li, Tim Linden, and Nirmal Raj, "Dark Kinetic Heating of Neutron Stars and An Infrared Window On WIMPs, SIMPs, and Pure Higgsinos," Phys. Rev. Lett. **119**, 131801 (2017), arXiv:1704.01577 [hep-ph].

[38] Tim Linden, Katie Auchettl, Joseph Bramante, Ilias Cholis, Ke Fang, Dan Hooper, Tanvi Karwal, and Shirley Weishi Li, "Using HAWC to Discover Invisible Pulsars," Phys. Rev. **D96**, 103016 (2017), arXiv:1703.09704 [astro-ph.HE].

[39] Dan Hooper, Ilias Cholis, Tim Linden, and Ke Fang, "HAWC Observations Strongly Favor Pulsar Interpretations of the Cosmic-Ray Positron Excess," Phys. Rev. **D96**, 103013 (2017), arXiv:1702.08436 [astro-ph.HE].

[40] Ilias Cholis, Dan Hooper, and Tim Linden, "Possible Evidence for the Stochastic Acceleration of Secondary Antiprotons by Supernova Remnants," Phys. Rev. **D95**, 123007 (2017), arXiv:1701.04406 [astro-ph.HE].

[41] Daryl Haggard, Craig Heinke, Dan Hooper, and Tim Linden, "Low Mass X-Ray Binaries in the

Inner Galaxy: Implications for Millisecond Pulsars and the GeV Excess," JCAP **1705**, 056 (2017), arXiv:1701.02726 [astro-ph.HE].

[42] Tim Linden, "Star-Forming Galaxies Significantly Contribute to the Isotropic Gamma-Ray Background," Phys. Rev. **D96**, 083001 (2017), arXiv:1612.03175 [astro-ph.HE].

[43] Mattia Fornasa *et al.*, "Angular power spectrum of the diffuse gamma-ray emission as measured by the Fermi Large Area Telescope and constraints on its dark matter interpretation," Phys. Rev. **D94**, 123005 (2016), arXiv:1608.07289 [astro-ph.HE].

[44] Dan Hooper and Tim Linden, "The Gamma-Ray Pulsar Population of Globular Clusters: Implications for the GeV Excess," JCAP **1608**, 018 (2016), arXiv:1606.09250 [astro-ph.HE].

[45] Linda M. Carpenter, Russell Colburn, Jessica Goodman, and Tim Linden, "Indirect Detection Constraints on s and t Channel Simplified Models of Dark Matter," Phys. Rev. **D94**, 055027 (2016), arXiv:1606.04138 [hep-ph].

[46] Dan Hooper, Tim Linden, and Alejandro Lopez, "Radio Galaxies Dominate the High-Energy Diffuse Gamma-Ray Background," JCAP **1608**, 019 (2016), arXiv:1604.08505 [astro-ph.HE].

[47] Tim Linden, Nicholas L. Rodd, Benjamin R. Safdi, and Tracy R. Slatyer, "High-energy tail of the Galactic Center gamma-ray excess," Phys. Rev. **D94**, 103013 (2016), arXiv:1604.01026 [astro-ph.HE].

[48] Eric Carlson, Tim Linden, and Stefano Profumo, "Improved Cosmic-Ray Injection Models and the Galactic Center Gamma-Ray Excess," Phys. Rev. **D94**, 063504 (2016), arXiv:1603.06584 [astro-ph.HE].

[49] Bridget Bertoni, Dan Hooper, and Tim Linden, "Is The Gamma-Ray Source 3FGL J2212.5+0703 A Dark Matter Subhalo?" JCAP **1605**, 049 (2016), arXiv:1602.07303 [astro-ph.HE].

[50] Joseph Bramante and Tim Linden, "On the r-Process Enrichment of Dwarf Spheroidal Galaxies," Astrophys. J. **826**, 57 (2016), arXiv:1601.06784 [astro-ph.HE].

[51] Ilias Cholis, Dan Hooper, and Tim Linden, "A Predictive Analytic Model for the Solar Modulation of Cosmic Rays," Phys. Rev. **D93**, 043016 (2016), arXiv:1511.01507 [astro-ph.SR].

[52] Eric Carlson, Tim Linden, and Stefano Profumo, "Cosmic-Ray Injection from Star-Forming Regions," Phys. Rev. Lett. **117**, 111101 (2016), arXiv:1510.04698 [astro-ph.HE].

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[54] Ke Fang and Tim Linden, "Cluster Mergers and the Origin of the ARCADE-2 Excess," JCAP **1610**, 004 (2016), arXiv:1506.05807 [astro-ph.HE].

[55] Ilias Cholis, Carmelo Evoli, Francesca Calore, Tim Linden, Christoph Weniger, and Dan Hooper, "The Galactic Center GeV Excess from a Series of Leptonic Cosmic-Ray Outbursts," JCAP **1512**, 005 (2015), arXiv:1506.05119 [astro-ph.HE].

[56] Bridget Bertoni, Dan Hooper, and Tim Linden, "Examining The Fermi-LAT Third Source Catalog In Search Of Dark Matter Subhalos," JCAP **1512**, 035 (2015), arXiv:1504.02087 [astro-ph.HE].

[57] Dan Hooper and Tim Linden, "On The Gamma-Ray Emission From Reticulum II and Other Dwarf Galaxies," JCAP **1509**, 016 (2015), arXiv:1503.06209 [astro-ph.HE].

[58] Manoj Kaplinghat, Tim Linden, and Hai-Bo Yu, "Galactic Center Excess in γ Rays from Annihilation of Self-Interacting Dark Matter," Phys. Rev. Lett. **114**, 211303 (2015), arXiv:1501.03507 [hep-ph].

[59] Tassos Fragos, Tim Linden, Vassiliki Kalogera, and Panos Sklias, "On the Formation of Ultraluminous X-ray Sources with Neutron Star Accretors: the Case of M82 X-2," Astrophys. J. **802**, L5 (2015), arXiv:1501.02679 [astro-ph.HE].

[60] Ke Fang and Tim Linden, "Anisotropy of the extragalactic radio background from dark matter annihilation," Phys. Rev. **D91**, 083501 (2015), arXiv:1412.7545 [astro-ph.HE].

[61] Dan Hooper, Tim Linden, and Philipp Mertsch, "What Does The PAMELA Antiproton Spectrum Tell Us About Dark Matter?" JCAP **1503**, 021 (2015), arXiv:1410.1527 [astro-ph.HE].

[62] Eric Carlson, Dan Hooper, and Tim Linden, "Improving the Sensitivity of Gamma-Ray Telescopes to Dark Matter Annihilation in Dwarf Spheroidal Galaxies," Phys. Rev. **D91**, 061302 (2015), arXiv:1409.1572 [astro-ph.HE].

[63] Ilias Cholis, Dan Hooper, and Tim Linden, "A Critical Reevaluation of Radio Constraints on Annihilating Dark Matter," Phys. Rev. **D91**, 083507 (2015), arXiv:1408.6224 [astro-ph.HE].

[64] Ilias Cholis, Dan Hooper, and Tim Linden, "Challenges in Explaining the Galactic Center Gamma-Ray Excess with Millisecond Pulsars," JCAP **1506**, 043 (2015), arXiv:1407.5625 [astro-ph.HE].

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[66] Tim Linden, "Circular Polarization of Pulsar Wind Nebulae and the Cosmic-Ray Positron Excess," Astrophys. J. **799**, 200 (2015), arXiv:1406.6060 [astro-ph.HE].

[67] Joseph Bramante and Tim Linden, "Detecting Dark Matter with Imploding Pulsars in the Galactic Center," Phys. Rev. Lett. **113**, 191301 (2014), arXiv:1405.1031 [astro-ph.HE].

[68] Alex Drlica-Wagner, German A. Gómez-Vargas, Jack W. Hewitt, Tim Linden, and Luigi Tibaldo, "Searching for Dark Matter Annihilation in the Smith High-velocity Cloud," ApJ **790**, 24 (2014), arXiv:1405.1030 [astro-ph.HE].

[69] Ke Fang, Toshihiro Fujii, Tim Linden, and Angela V. Olinto, "Is the Ultra-high Energy Cosmic-Ray Excess Observed by the Telescope Array Correlated with IceCube Neutrinos?" ApJ **794**, 126 (2014), arXiv:1404.6237 [astro-ph.HE].

[70] Tansu Daylan, Douglas P. Finkbeiner, Dan Hooper, Tim Linden, Stephen K. N. Portillo, Nicholas L. Rodd,

and Tracy R. Slatyer, "The characterization of the gamma-ray signal from the central Milky Way: A case for annihilating dark matter," Phys. Dark Univ. **12**, 1–23 (2016), arXiv:1402.6703 [astro-ph.HE].

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[72] Manoj Kaplinghat, Ryan E. Keeley, Tim Linden, and Hai-Bo Yu, "Tying Dark Matter to Baryons with Self-Interactions," Physical Review Letters **113**, 021302 (2014), arXiv:1311.6524.

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[76] Eric Carlson, Dan Hooper, Tim Linden, and Stefano Profumo, "Testing the dark matter origin of the WMAP-Planck haze with radio observations of spiral galaxies," JCAP **7**, 026 (2013), arXiv:1212.5747 [astro-ph.CO].

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[78] Dan Hooper and Tim Linden, "Are lines from unassociated gamma-ray sources evidence for dark matter annihilation?" PRD **86**, 083532 (2012), arXiv:1208.0828 [astro-ph.HE].

[79] Tim Linden and Stefano Profumo, "Exploring the Nature of the Galactic Center γ-Ray Source with the Cherenkov Telescope Array," ApJ **760**, 23 (2012), arXiv:1206.4308 [astro-ph.HE].

[80] Stefano Profumo and Tim Linden, "Gamma-ray lines in the Fermi data: is it a bubble?" JCAP **7**, 011 (2012), arXiv:1204.6047 [astro-ph.HE].

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[85] Tim Linden, Francesca Valsecchi, and Vassiliki Kalogera, "On the Rarity of X-Ray Binaries with Naked Helium Donors," ApJ **748**, 114 (2012), arXiv:1111.5012 [astro-ph.GA].

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[88] Dan Hooper and Tim Linden, "Gamma rays from the Galactic center and the WMAP haze," PRD **83**, 083517 (2011), arXiv:1011.4520 [astro-ph.HE].

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