

Joseph Bramante

Curriculum Vitae

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Contact Information

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Positions

- Assistant Professor, Queen's University, 2017 - present
- Visiting Fellow, Perimeter Institute, 2017 - present
- Postdoctoral Fellow, Perimeter Institute, 2016 - 2017
- Postdoctoral Fellow, University of Notre Dame, 2013 - 2016

Education

University of Hawaii Manoa, HI
PhD, September 2013
Thesis: Probing Dark Particles and Primordial Perturbations

Sarah Lawrence College Bronxville, NY
BA Liberal Arts, 2007
Senior thesis: X-ray absorption fine structure of heterogeneous atmospheric particles

Research

Google Scholar: [Link](#) Inspire: [Link](#) ORCID: 0000-0001-8905-1960
Authors below listed alphabetically, except as indicated.

Manuscripts under review

44. Etching Plastic Searches for Dark Matter
Bhoonah, Bramante, Courtman, Song
arxiv:2012.13406

43. Nuclear Fusion Inside Dark Matter
Acevedo, Bramante, Goodman
arxiv:2012.10998

42. Dark Matter, Destroyer of Worlds: Neutrino, Thermal, and Existential Signatures from Black Holes in the Sun and Earth
Acevedo, Bramante, Goodman, Kopp, Opferkuch
arxiv:2012.09176
41. Detecting Composite Dark Matter with Long Range and Contact Interactions in Gas Clouds
Bhoonah, Bramante, Schon, Song
arxiv:2010.07420
40. Gravitational Waves from Dark Sectors, Oscillating Inflatons, and Mass Boosted Dark Matter
Bhoonah, Bramante, Nerval, Song
arxiv:2008.12306

Peer Reviewed Publications

39. Electric But Not Eclectic: Thermal Relic Dark Matter for the XENON1T Excess
Bramante, Song
arxiv:2006.14089 **Physical Review Letters** 125 (2020) 16, 161805
38. Warming Nuclear Pasta with Dark Matter: Kinetic and Annihilation Heating of Neutron Star Crusts
Acevedo, Bramante, Leane, Raj
arxiv:1911.04456 **Journal of Cosmology and Astroparticle Physics** 2003 (2020) 038
37. Anomalous anomalies from virtual black holes
Bramante, Gould
arxiv:1911.04456 **Phys. Rev. D**101 (2020) no.5, 055007
36. Material matter effects in gravitational UV/IR mixing
Bramante, Gould
arxiv:1910.07905 **Phys. Rev. D**101 (2020) no.8, 084022
35. Dark matter astrometry at underground detectors with multiscatter events
Bramante, Kumar, Raj
arxiv:1910.05380, **Phys.Rev. D**100 (2019) no.12, 123016
34. Terrestrial and Martian Heat Flow Limits on Dark Matter
Bramante, Buchanan, Goodman, Lodhi
arxiv:1909.11683 **Phys. Rev. D**101 (2020) no.4, 043001
33. Superradiant Searches for Dark Photons in Two Stage Atomic Transitions
Bhoonah, Bramante, Song
arxiv:1909.07387 **Phys. Rev. D**101 (2020) no.5, 055040

32. Supernovae Sparked By Dark Matter in White Dwarfs
Acevedo, Bramante
arxiv:1904.11993, **Phys. Rev. D**100 (2019) no.2, 043020
31. Galactic Center Gas Clouds and Novel Bounds on Ultra-Light Dark Photon, Vector Portal, Strongly Interacting, Composite, and Super-Heavy Dark Matter
Bhoonah, Bramante, Elahi, Schon
arxiv:1812.10919 **Phys. Rev. D**100 (2019) no.2, 023001
30. Foraging for dark matter in large volume liquid scintillator neutrino detectors with multiscatter events
Bramante, Broerman, Kumar, Lang, Pospelov, Raj
arxiv:1812.09325 **Phys. Rev. D**99 (2019) no.8, 083010
29. Calorimetric Dark Matter Detection With Galactic Center Gas Clouds
Bhoonah, Bramante, Elahi, Schon
arxiv:1806.06857 **Physical Review Letters** 121 (2018) no.13, 131101
28. Saturated Overburden Scattering and the Multiscatter Frontier: Discovering Dark Matter at the Planck Mass and Beyond
Bramante, Broerman, Lang, Raj
arxiv:1803.08044 **Phys. Rev. D**98 (2018) no.8, 083516
27. Searching for dark matter with neutron star mergers and quiet kilonovae
Bramante, Linden, Tsai
arxiv:1706.00001 **Phys. Rev. D**97 (2018) no.5, 055016
26. Dark Kinetic Heating of Neutron Stars and an Infrared Window on WIMPs, SIMPs, and pure Higgsinos
Baryakhtar, Bramante, Weishi Li, Linden, Raj
arxiv:1704.01577 **Physical Review Letters** 119 (2017) no.13, 131801
25. Using HAWC to Discover Invisible Pulsars
Lead author ordered: Linden, Auchettl, Bramante, Cholis, Fang, D Hooper, Karwal, Li
arxiv:1703.09704 **Phys. Rev. D**96 (2017) no.10, 103016
24. Multiscatter Stellar Capture of Dark Matter
Bramante, Delgado, Martin
arxiv:1703.04043 **Phys. Rev. D**96 (2017) no.6, 063002
23. Superheavy Thermal Dark Matter and Primordial Asymmetries
Bramante, Unwin
arxiv:1701.05859 **Journal of High Energy Physics** 1702 (2017) 119

22. Low Scale Inflation at High Energy Colliders and Meson Factories
Bramante, Cook, Delgado, Martin
arxiv:1608.08625 **Phys. Rev. D**94 (2016) no.11, 115012
21. The Inelastic Frontier: Discovering Dark Matter at High Recoil Energy
Bramante, Fox, Kribs, Martin
arxiv:1608.02662 **Phys. Rev. D**94 (2016) no.11, 115026
20. On the R-Process Enrichment of Dwarf Spheroidal Galaxies
Bramante, Linden
arxiv:1601.06784, **Astrophys. J.** 826 (2016) no.1, 57
19. Towards the Final Word on Neutralino Dark Matter
Bramante, Desai, Fox, Adam Martin, Ostdiek, Plehn
arxiv:1510.03460, **Phys. Rev. D**93 (2016) no.6, 063525
18. Dark Matter Ignition of Type Ia Supernovae
Bramante
arxiv:1505.07464, **Physical Review Letters** 115 (2015) 141301
- 17 Higgs Portals to Pulsar Collapse
Bramante and Elahi
arxiv:1504.04019, **Phys. Rev. D**91 (2015) 11, 115001
16. Generically Large Nongaussianity in Small Multifield Inflation
Bramante
arxiv:1502.02674, **Journal of Cosmology and Astroparticle Physics** 1507 (2015) 07, 006
15. The Relic Neutralino Surface at a 100 TeV Collider
Bramante, Fox, Martin, Ostdiek, Plehn, Schell, and Takeuchi
arxiv:1412.4789, **Phys. Rev. D**91 (2015) 054015
14. Proton Annihilation at Hadron Colliders and Kamioka: High Energy vs High Luminosity
Bramante, Kumar, and Learned
arxiv:1412.2140, **Phys. Rev. D**91 (2015) 3, 035012
13. Boosted Higgses from Chromomagnetic b's: $b\bar{b}h$ at High Luminosity
Bramante, Delgado, Lehman, and Martin
arxiv:1410.3484, **Phys. Rev. D**93 (2016) no.5, 053001
12. Catching Sparks from Well-Forged Neutralinos
Bramante, Delgado, Elahi, Martin, and Ostdiek
arxiv:1408.6530, **Phys. Rev. D**90 (2014) 9, 095008

11. The Last Stand of Solo Small Field Inflation
Bramante, Downes, Lehman, and Martin
arxiv:1405.7563, **Phys. Rev. D**90 (2014) 023530
10. Detecting Dark Matter with Imploding Pulsars in the Galactic Center
Bramante and Linden
arxiv:1405.1031, **Physical Review Letters** 113 (2014) 191301
9. Cornering a Hyper Higgs: Angular Kinematics for Boosted Higgs Bosons with Top Pairs
Bramante, Delgado, and Martin
arxiv:1402.5985, **Phys. Rev. D**89 (2014) 093006
8. Bounds on Self-Interacting Fermion Dark Matter from Observations of Old Neutron Stars
Bramante, Fukushima, Kumar, and Stopnitzky
arxiv:1310.3509, **Phys. Rev. D**87 (2013) 055012
7. Cosmic Variance of the Spectral Index from Mode Coupling
Bramante, Kumar, Nelson, and Shandera
arxiv:1307.5083, **Journal of Cosmology and Astroparticle Physics** 1311 (2013) 021
6. Constraints on Bosonic Dark Matter from Observations of Old Neutron Stars
Bramante, Fukushima, and Kumar
arxiv:1301.0036, **Phys. Rev. D**87 (2013) 055012
5. Sterile Neutrino Production Through a Matter Effect Enhancement at Long Baselines
Bramante
arxiv:1110.4871, **Int.J.Mod.Phys. A**28 (2013) 1350067
4. Large Jet Multiplicities and New Physics at the LHC
Bramante, Kumar, and Thomas
arxiv:1109.6014, **Phys. Rev. D**86 (2012) 015014
3. Local Scale-Dependent Non-Gaussian Curvature Perturbations at Cubic Order
Bramante and Kumar
arxiv:1107.5362, **Journal of Cosmology and Astroparticle Physics** 1109 (2011) 036
2. Collider Searches For Fermiophobic Gauge Bosons
Bramante, R.S. Hundi, Kumar, Rajaraman, and Yaylali
arxiv:1106.3819, **Phys. Rev. D**84 (2011) 115018
1. Exploration of Heterogeneous Chemistry in Model Atmospheric Particles Using Extended X-ray Absorption Fine Structure Analysis
Lead author ordered: Bramante, Hinrichs, Brown, and Calvin
Atmospheric Environment 41 35 (2007) 7649

Selected Reports and Proceedings

3. FCC Physics Opportunities: Future Circular Collider Conceptual Design Report Volume 1
Eur. Phys. J. C79 (2019) no.6, 474

2. Physics at a 100 TeV pp collider: beyond the Standard Model phenomena
arxiv:1606.00947, **CERN Yellow Report** (2017) no.3, 441-634

1. Super Cosmic Variance and Nongaussianity as a Portal to the Superhorizon
Bramante
arxiv:1401.7205, COSPA 2013 Conference Proceedings

Grants and Awards

4. NSERC Discovery Grant and Early Career Accelerator Supplement (2020-2025),
total \$160k over 5 years for astroparticle theory research

3. Canada Foundation for Innovation, John R. Evans Leaders Fund (2019-2025),
total \$100k over 3 years for equipment and renovations

2. NSERC Grant as part of the McDonald Institute, (2017-2023)
total \$750k over 6 years for postdoctoral fellows, graduate students, research expenses

1. Robert and Doris Pulley Award in Physics from the ARCS foundation, (2012).

Seminars

- **CIFAR Group Meeting**, “Detecting dark matter with thermal emission from neutron stars” Toronto, ON (virtual). August 19, 2020.
- **IPP Town Hall**, “WIMP Dark Matter and the Next Two Decades” Toronto, ON (virtual). July 16, 2020.
- **TRIUMF**, Theory Workshop, “Searching for Dark Photons in Two Stage Atomic Transitions” Vancouver, BC. March 11, 2020.
- **University of Toronto**, Seminar, “Anomalous anomalies from virtual black holes” Toronto, ON. November 1, 2019.
- **Quantum Theory and Symmetries Conference**, “Gas Clouds as Dark Matter Detectors” Montreal, QC. July 3, 2019.
- **CAP Conference**, “Overview of Dark Matter Direct Detection” Vancouver, BC. June 4, 2019.

- **MIT**, Seminar, “Gas Clouds as Dark Matter Detectors” Cambridge, MA. April 22, 2019.
- **McGill University**, Seminar, “Asymmetric Dark Matter Exploding White Dwarfs and Converting Neutron Stars to Black Holes” Montreal, QC. November 7, 2018.
- **Carleton University**, Seminar, “Asymmetric Dark Matter Exploding White Dwarfs and Converting Neutron Stars to Black Holes” Ottawa, ON. October 29, 2018.
- **Santa Fe Workshop**, “Calorimetric Dark Matter Detection With Galactic Center Gas Clouds” Santa Fe, NM. July 5, 2018.
- **U Waterloo**, Seminar, “Saturated Overburden Scattering and the Multiscatter Frontier: Discovering Dark Matter at the Planck Mass and Beyond” Waterloo, ON. April 11, 2018.
- **CERN**, 2nd FCC Physics Workshop, “Dark Matter at FCC: Conclusions, prospects and discussion” Geneva, CH. January 19, 2018.
- **Lawrence Berkeley National Labs**, Seminar, “Finding Dark Matter with Neutron Star Mergers and Thermal Emission” Berkeley, CA. November 30, 2017.
- **Cornell University**, Seminar, “Finding Dark Matter with Neutron Star Mergers and Thermal Emission” Ithaca, NY. November 1, 2017.
- **GGI Conference 2017**, “Dark Kinetic Heating of Neutron Stars” Florence, Italy. October 9, 2017.
- **Galileo Institute**, Seminar, “Low Scale Inflation at Colliders” Florence, Italy. October 4, 2017.
- **University of California, Irvine**, Seminar, “Dark Matter Heating Nearby Neutron Stars to BBQ Temperatures” Irvine, CA. May 24, 2017.
- **University of Oregon**, Seminar, “Dark Matter Heating Nearby Neutron Stars to BBQ Temperatures” Eugene, OR. May 4, 2017.
- **University of Victoria**, Seminar, “Dark Matter Heating Neutron Stars to BBQ Temperatures” Victoria, BC. March 16, 2017.
- **TRIUMF**, Seminar, “Dark Matter Heating Neutron Stars to BBQ Temperatures” Vancouver, BC. March 14, 2017.
- **University of Illinois, Chicago**, Seminar, “Dark Matter Heating Neutron Stars to BBQ Temperatures” Chicago, IL. March 4, 2017.
- **Perimeter Institute**, Seminar, “Low Scale Inflation at High Energy Colliders and Meson Factories” Waterloo, ON. September 29, 2016.
- **Santa Fe Workshop**, “Heavy Metals From Dark Matter” Santa Fe, NM. July 4-8, 2016.
- **University of Illinois, Urbana-Champaign**, Seminar, “Type Ia Supernovae and Heavy Metals from Dark Matter” Champaign, IL. April 8, 2016.

- **University of Wisconsin**, Seminar, “Type Ia Supernovae and Heavy Metals from Dark Matter” Madison, WI. March 29, 2016.
- **University of Illinois, Chicago**, Seminar, “Type Ia Supernovae and Heavy Metals from Dark Matter” Chicago, IL. March 4, 2016.
- **Caltech**, Seminar, “Type Ia Supernovae and Heavy Metals from Dark Matter” Pasadena, CA. February 8, 2016.
- **Ohio State University**, Seminar, “Dark Production of R-Process Elements” Columbus, OH. January 29, 2016.
- **University of Heidelberg**, ABHM Workshop, “Singlet WIMP Dark Matter at a 100 TeV Collider” Heidelberg, Germany. December 4-6, 2015.
- **Fermilab**, FCC-hh Workshop, “Singlet WIMP Dark Matter at a 100 TeV Collider” Batavia, IL. December 14-16, 2015.
- **University of Minnesota**, Seminar, “Dark Matter Ignition of Type Ia Supernovae” Minneapolis, MN. November 6, 2015.
- **University of Notre Dame**, Seminar, “Dark Matter Ignition of Type Ia Supernovae” Notre Dame, IN. October 1, 2015.
- **Aspen Institute**, Notes on “Cosmological Collider Physics” Aspen, CO. June 10, 2015.
- **CERN**, FCC-hh BSM forum, “The Relic Neutralino Surface at a 100 TeV Collider” Geneva, CH. March 13, 2015.
- **CERN**, FCC-hh BSM group informal meeting, Remote talk, “Update on Photon Signals To Discover Neutralinos in Compressed Spectra,” February 26, 2015.
- **Virtual Institute of Astroparticle Physics**, Seminar, “Signals of Asymmetric Dark Matter from Galactic Center Pulsar Implosions,” <http://viavca.in2p3.fr>, February 20, 2015.
- **University of Notre Dame**, Seminar, “Detecting Dark Matter with Imploding Pulsars in the Galactic Center” South Bend, IN. February 3, 2015.
- **Perimeter Institute**, Seminar, “Detecting Dark Matter with Imploding Pulsars in the Galactic Center” Waterloo, CA. January 20, 2015.
- **CERN**, Seminar, “Detecting Dark Matter with Imploding Pulsars in the Galactic Center” Geneva, CH. November 20, 2014.
- **NORDITA**, Seminar, “Detecting Dark Matter with Imploding Pulsars in the Galactic Center” Stockholm, SE. November 17, 2014.
- **Santa Fe Workshop**, “Catching a Bouncing Higgs with Top Quarks” Santa Fe, NM. June 29-July 4, 2014.
- **First International Conference on the Fundamental Laws of the Universe**, “Catching a Bouncing Higgs with Top Quarks” Chengdu, CN. March 22-26, 2014.

- **University of Chicago**, Seminar, “Exploring Dark Interactions by Destroying Neutron Stars with Dark Black Holes” Chicago, IL. January 29, 2014.
- **Argonne National Lab**, Seminar, “Exploring Dark Interactions by Destroying Neutron Stars with Dark Black Holes” Lemont, IL. January 28, 2014.
- **Fermilab**, Seminar, “Exploring Dark Interactions by Destroying Neutron Stars with Dark Black Holes” Batavia, IL. January 23, 2014.
- **University of Arizona**, Seminar, “Exploring Dark Interactions by Destroying Neutron Stars with Dark Black Holes” Tucson, AZ. November 22, 2013.
- **Arizona State University**, Seminar, “Exploring Dark Interactions by Destroying Neutron Stars with Dark Black Holes” Tempe, AZ. November 20, 2013.
- **Symposium on Cosmology and Particle Astrophysics 2013 (COSPA 2013)**, “The Spectral Index May Be Blue: Superhorizon Coupling to Subhorizon Modes,” November 12-15, 2013.
- **University of Notre Dame**, Seminar, “Exploring Dark Interactions by Destroying Neutron Stars with Dark Black Holes” Notre Dame, IN. September 10, 2013.
- **University of Massachusetts**, Seminar, “Constraining Multifield Inflation,” Amherst, MA. November 20th, 2012.
- **Pennsylvania State University**, Seminar, “Constraining Multifield Inflation,” State College, PA. November 16th, 2012.
- **Johns Hopkins**, Seminar, “One way to evade the Suyama-Yamaguchi Inequality,” Baltimore, MD. November 15th, 2012.
- **University of Hawaii**, Seminar, “Inflation and Structure Formation in the Early Universe,” Honolulu, HI. November 1, 2012.
- **Theoretical Advanced Study Institute (TASI 2012)**, Seminar on “Methods for Evaluating Large N-point M-loop Momentum-Space Diagrams for Inflationary Perturbations,” Boulder, CO. June 3 - June 29, 2012

Conference Talks

- **TMT Science Forum 2017**, “Discovering Dark Matter with Very Large Telescope Observations of Kinetically Heated Neutron Stars” Mysore, India. November 8, 2017.
- **TeVPA 2017**, “Au Genesis From Co Genesis: Heavy Asymmetric Dark Matter Makes Gold” Columbus, OH. August 7, 2017.
- **TAUP 2017**, “Dark Kinetic Heating of Neutron Stars” Sudbury, ON. July 27, 2017.
- **Cosmo Cruise 2015**, Dark Matter Session, “Signals of asymmetric dark matter from galactic center pulsar implosions” Mediterranean Sea. September 6, 2015.

- **CETUP 2015**, Dark Matter Session, “Dark matter ignition of type Ia supernovae” Deadwood, SD. June 22, 2015.
- **PHENO 2015**, “Higgs portals to pulsar collapse” Pittsburgh, PA. May 4-6, 2015.
- **PHENO 2014**, “Catching a Bouncing Higgs with Top Quarks” Pittsburgh, PA. May 5-7, 2014.

Colloquia

- **Western University**, Colloquium, “New searches for dark matter with neutron stars, exploding white dwarfs, and multiscatter events at underground experiments ” London, ON. March 14, 2019.
- **University of Alberta**, Colloquium, “New searches for dark matter with neutron stars, exploding white dwarfs, and multiscatter events at underground experiments ” Edmonton, AB. March 8, 2019.
- **McMaster University**, Colloquium, “New searches for dark matter with neutron stars, exploding white dwarfs, and multiscatter events at underground experiments ” Hamilton, ON. February 27, 2019.
- **TRIUMF**, Colloquium, “Saturated Overburden Scattering and the Multiscatter Frontier: Discovering Dark Matter at the Planck Mass and Beyond” Vancouver, BC. April 5, 2018.
- **Perimeter Institute**, Colloquium, “Revealing Dark Matter With Imploding Pulsars, White Dwarf Explosions, and Warm Neutron Stars” Waterloo, ON. May 11, 2017.
- **Queen’s University**, Colloquium, “Discovering Dark Matter With Imploding Pulsars, High Recoil Events, and Hot Neutron Stars” Kingston, ON. May 8, 2017.

Public Talks

- **Astro on Tap**, Public Talk, “Dark Matter and Exploding Stars” Youtube Broadcast. April 9, 2020.
- **Queen’s University Observatory**, Public Talk, “Dark Matter and Exploding Stars” Kingston, ON. January 12, 2019.
- **McDonald Institute**, Public Talk: “Dark Matter and Alchemy” Kingston, ON. October 23, 2017.

Other Research Experience

- Free electron laser design at University of Hawaii with John Madey, Winter 2008.
- NSF REU and follow-on research at Brookhaven National Lab, 2006-2007. Collection and modeling of fine structure spectra for gold-coated iron nanoparticles and atmospheric aerosol particles at Brookhaven’s National Synchrotron Light Source.

Teaching

Queen's University

- PHYS 921 Quantum Field Theory. Winter 2021.
- PHYS 831, Classical Electrodynamics - Graduate electrodynamics with emphasis on condensed matter topics. Winter 2019
- PHYS 490/891, Nuclear and Particle Physics - An advanced undergraduate and graduate course in nuclear and particle physics. Fall 2018, Fall 2019, Fall 2020.
- PHYS 832, Classical Electrodynamics - Graduate electrodynamics with emphasis on relativistic electrodynamics and astroparticle topics. Winter 2018, Fall 2019.

Advising

Postdoctoral Fellows

- Sarah Schon, May 2018 - present
- Elizabeth Gould, Sep 2018 - present
- Ningqiang Song, Sep 2018 - present

PhD Students

- Amit Bhoonah, May 2018 - present
- Javier Acevedo, Sep 2018 - present

MSc Students

- Alan Goodman, May 2019 - present
- Simran Nerval, Sep 2019 - present
- Yilda Boukhtouchen Sep 2020 - present

Press

- **Physics**, "Theorists React to Potential Signal in Dark Matter Detector," [Link to Article](#), October 12, 2020.
- **New Scientist**, "Black holes formed from dark matter could be making dead stars explode," [Link to Article](#), December 6, 2019.
- **Symmetry Magazine**, "Get to know 10 early career theorists," [Link to Article](#), July 16, 2019.

- **Blind Date With Knowledge**, “Dark Matter and What Goes Bump in the Night,” [Link to Radio Interview](#), November 14, 2018.
- **Physics**, “Focus: Gas Cloud Temperature Constrains Dark Matter,” [Link to Article](#), September 24, 2018.
- **Physics**, “Viewpoint: Neutron-Star Implosions as Heavy-Element Sources,” [Link to Article](#), August 7, 2017.
- **Physics World**, “Rare elements could be forged by neutron stars eaten by black holes,” [Link to Article](#), August 17, 2017.
- **Cosmos**, “Primordial black holes may create gold and other heavy elements,” [Link to Article](#), August 10, 2017.
- **New Scientist**, “Exploding stars could be lit by hearts of dark matter,” [Link to Article](#), October 28, 2015.
- **Physics World**, “Dark matter may power supernovae,” [Link to Article](#), October 7, 2015.
- **Daily Galaxy**, “Pulsars Imploding Into Black Holes—May Unveil Secrets of Dark Matter,” [Link to Article](#), March 21, 2015.
- **Space**, “Dark Matter Murder Mystery: Is Weird Substance Destroying Neutron Stars?,” [Link to Article](#). November 18, 2014.
- **International Business Times**, “Space: Could Dark Matter Be Turning Milky Way’s Pulsars Into Black Holes?,” [Link to Article](#), November 11, 2014.
- **Scientific American**, “Dark Matter Black Holes Could Be Destroying Stars at the Milky Way’s Center,” [Link to Article](#), [Link to Salon Article](#), [Link to Le Scienze Article](#), November 10, 2014.
- **Universe Today**, “Where Have All the Pulsars Gone? The Mystery at the Center of Our Galaxy,” [Link to Article](#), [Link to Technology Article](#), [Link to Phys.org Article](#), November 5, 2014.
- **Wired**, “Mysterious Missing Pulsars May Have Gotten Wrapped in Dark Matter and Turned Into Black Holes,” [Link to Article](#), November 3, 2014.