

Reza Ebadi

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Pronouns: He/Him/His
Citizenship: Iranian

Research interests

Precision measurement tests of fundamental physics

Dark matter direct detection — Quantum sensing for particle physics

Early universe cosmology

Primordial non-Gaussianity — Cosmological Collider physics — Primordial Clocks — Observational tests of alternatives to inflation

Galactic astrophysics

Precision astrophysics for particle physics — Pulsars — White dwarfs — Gravitational waves

Education

University of Maryland – College Park

Ph.D. in Physics

Advisor: Ronald L. Walsworth

Thesis: TBD

Maryland, USA

2019 – Present

Sharif University of Technology

B.Sc. in Physics

Advisors: Mohammad Hossein Namjoo and Hassan Firouzjahi

Thesis: Black hole superradiance and axion physics

Tehran, Iran

2014 – 2019

Academic Appointments

Graduate Research Assistant

Jun. 2020 – Present

Quantum Technology Center (QTC), University of Maryland, College Park, Maryland, USA

Research Assistant

Jun. 2018 – Mar. 2020

School of Astronomy, Institute for Research in Fundamental Sciences (IPM), Tehran, Iran

Visiting Student

Jul. 2017 – Jun. 2018

School of Astronomy, Institute for Research in Fundamental Sciences (IPM), Tehran, Iran

Honors and fellowships

Dean's Fellowship, University of Maryland, College Park, MD

\$5,000 – 2019-2020

Distinguished Student Award, Sharif University of Technology, Tehran

2016

Publications

6. “Classical Cosmological Collider Physics and Primordial Features,”

Xingang Chen, *Reza Ebadi*, and Soubhik Kumar,

[JCAP 08 \(2022\) 083 \[arXiv: 2205.01107\]](#)

5. “Directional Detection of Dark Matter Using Solid-State Quantum Sensing,”

Reza Ebadi, Mason C. Marshall, David F. Phillips, Johannes Cremer, Tao Zhou, Michael Titze, Pauli Kehayias, Maziar Saleh Ziabari, Nazar Deegan, Surjeet Rajendran, Alexander O. Sushkov, F. Joseph Heremans, Edward S. Bielejec, Martin V. Holt, and Ronald L. Walsworth, [AVS Quantum Science 4 \(4\), 044701 \[arXiv: 2203.06037\]](#)

📖 Highlighted by Scilight at [Looking for dark matter with diamonds](#)

4. “High-precision mapping of diamond crystal strain using quantum interferometry,”

- Mason C. Marshall, *Reza Ebadi*, Connor Hart, Matthew J Turner, Mark J.H. Ku, David F. Phillips, and Ronald L. Walsworth,
[Phys. Rev. Applied 17, 024041 \(2022\) \[arXiv: 2108.00304\]](#).
3. **“Ultra-Heavy Dark Matter Search with Electron Microscopy of Geological Quartz,”**
Reza Ebadi, Anubhav Mathur, Erwin H. Tanin, Nicholas D. Tailby, Mason C. Marshall, Aakash Ravi, Raisa Trubko, Roger R. Fu, David F. Phillips, Surjeet Rajendran, and Ronald L. Walsworth,
[Phys. Rev. D **104**, 015041 \(2021\) \[arXiv: 2105.03998\]](#)
2. **“Milky Way Accelerometry via Millisecond Pulsar Timing,”**
David F. Phillips, Aakash Ravi, *Reza Ebadi*, and Ronald L. Walsworth,
[Phys. Rev. Lett. **126**, 141103 \(2021\) \[arXiv: 2008.13052\]](#)
1. **“Resonant instability of axion cloud,”**
Reza Ebadi and Mohammad Hossein Namjoo,
[Iranian Journal of Physics Research 20 \(2020\), no.1, 125-137](#)

White Papers

3. **“Mineral Detection of Neutrinos and Dark Matter. A Whitepaper,”**
Sebastian Baum, Patrick Stengel *et al.* (including *Reza Ebadi*), [arXiv: 2301.07118](#)
2. **“Snowmass2021 Cosmic Frontier Dark Matter Direct Detection to the Neutrino Fog,”**
D. S. Akerib *et al.* (including *Reza Ebadi*), [arXiv: 2203.08084](#)
1. **“Snowmass2021 Cosmic Frontier White Paper: Ultraheavy particle dark matter,”**
Daniel Carney, Nirmal Raj *et al.* (including *Reza Ebadi*), [arXiv: 2203.06508](#)

Talks

15. **Dark matter detection strategies using diamond and quartz** Oct. 2022
Mineral detection of dark matter and neutrinos, Institute for Fundamental Physics of the Universe, Trieste, Italy [Online]
14. **Cosmological Collider Physic using Primordial Clocks and Clicks** Jul. 2022
K. N. Toosi University of Technology, Tehran, Iran [Online]
13. **Quantum sensing methods for directional dark matter detection** Jun. 2022
DAMOP 2022: The 53rd Annual Meeting of the APS Division of Atomic, Molecular and Optical Physics, Orlando, Florida, USA
12. **Cosmological Collider Physic using Primordial Clocks and Clicks** May 2022
Sharif University of Technology, Tehran, Iran [Online]
11. **Classical Cosmological Collider Physic** May 2022
School of Astronomy, IPM, Tehran, Iran [Online]
10. **Milky Way Accelerometry via Pulsar Timing to Probe the Distribution of Dark Matter** May 2022
CPT'22: Ninth Meeting on CPT and Lorentz Symmetry, Indiana University, Bloomington, Indiana, USA [Online]
9. **Cosmological Collider Physic using Primordial Clocks and Clicks** May 2022
PHENO 2022: The 2022 Phenomenology Symposium, University of Pittsburgh, Pittsburgh, Pennsylvania, USA
8. **Geological quartz as a detector for ultra-heavy dark matter** Apr. 2022
APS April Meeting 2022, New York, NY, USA
7. **Directional dark matter detection in diamond: principles and experimental progress** Dec. 2021
PIKIMO 11, Pittsburgh, Pittsburgh, Pennsylvania, USA

	<p>6. Classical Cosmological Collider Physics Nov. 2021 Sharif University of Technology, Tehran, Iran [Online]</p> <p>5. Precision NV-Diamond Strain Imaging for Directional Dark Matter Detection Jun. 2021 DAMOP 2021: The 52nd Annual Meeting of the APS Division of Atomic, Molecular and Optical Physics [Online]</p> <p>4. Galactic Acceleration from Pulsar Timing May 2021 PHENO 2021: The 2021 Phenomenology Symposium, University of Pittsburgh, Pittsburgh, Pennsylvania, USA [Online]</p> <p>3. Classical Cosmological Collider Physics May 2021 PHENO 2021: The 2021 Phenomenology Symposium, University of Pittsburgh, Pittsburgh, Pennsylvania, USA [Online]</p> <p>2. Milky Way Accelerometry via Millisecond Pulsar Timing Aug. 2020 Cosmology Journal Club, Johns Hopkins University, Maryland, USA [Online]</p> <p>1. Do Black Holes Talk to Axions? Feb. 2019 Sharif University of Technology, Tehran, Iran</p>
Teaching experience	<p>Teaching assistant, University of Maryland – College Park</p> <p>PHY404 Introduction to Statistical Thermodynamics Fall 2019 & Spring 2020</p> <p>PHY420 Principles of Modern Physics Fall 2019</p>
Services	<p>Member of scientific advisory board Fall 2018 & Spring 2019 Zharfa multi-major scientific society of students of Physics, Mathematics and Philosophy of Science, Sharif University of Technology</p>
Outreach	<p>Co-host for Quantum Lab tour Visit of Montgomery Blair High School students as part of the Outreach program for the NSF Institute for Robust Quantum Simulation (RQS) UMD, Feb. 2023</p> <p>Science writing</p> <p>Gravitational Waves: A New Window to Cosmos Sharifdaily, Jun. 2020</p> <p>Lessons from the Summer Research School “Quantum to Cosmos: Ideas and Applications,” Gebze, Turkey Takaneh, Mar. 2020</p> <p>Primordial Universe: Standard Clocks and the Cosmological Collider Sharifdaily, Jul. 2019</p> <p>What is Dark Matter? Zharfa, Nov. 2018</p>
Mentoring	<p><i>Brady Egleston</i>, Undergraduate Research Assistant, University of Maryland, College Park</p> <p><i>Andrew Gilpin</i>, Undergraduate Research Assistant, University of Maryland, College Park</p> <p><i>Cate Sturmer</i>, Undergraduate Research Assistant, College of William & Mary</p>
Professional memberships	<p>American Physical Society 2021 – Present</p> <p>Student Membership</p>
Other interests	Climbing – Running – Hiking – Books – History – Music