

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

Galactic astrophysics

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

Early universe cosmology

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

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

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

6. **Classical Cosmological Collider Physics** Nov. 2021
 Sharif University of Technology, Tehran, Iran [Online]

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]

4. Galactic Acceleration from Pulsar Timing

May 2021

PHENO 2021: The 2021 Phenomenology Symposium, University of Pittsburgh, Pittsburgh, Pennsylvania, USA [Online]

3. Classical Cosmological Collider Physics

May 2021

PHENO 2021: The 2021 Phenomenology Symposium, University of Pittsburgh, Pittsburgh, Pennsylvania, USA [Online]

2. Milky Way Accelerometry via Millisecond Pulsar Timing

Aug. 2020

Cosmology Journal Club, Johns Hopkins University, Maryland, USA [Online]

1. Do Black Holes Talk to Axions?

Feb. 2019

Sharif University of Technology, Tehran, Iran

**Teaching
experience**

Teaching assistant, University of Maryland – College Park

PHY404 Introduction to Statistical Thermodynamics

Fall 2019 & Spring 2020

PHY420 Principles of Modern Physics

Fall 2019

Services

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

Outreach

Science writing

Gravitational Waves: A New Window to Cosmos

Sharifdaily, Jun. 2020

Lessons from the Summer Research School “Quantum to Cosmos: Ideas and Applications,”
Gebze, Turkey

Takaneh, Mar. 2020

Primordial Universe: Standard Clocks and the Cosmological Collider

Sharifdaily, Jul. 2019

What is the Dark Matter?

Zharfa, Nov. 2018

Mentoring

Brady Egleston, Undergraduate Student University of Maryland, College Park

Andrew Gilpin, Undergraduate Student, University of Maryland, College Park

Cate Sturmer, Undergraduate Student, College of William & Mary

**Professional
memberships**

American Physical Society

2021 – Present

Student Membership

Other interests

Climbing – Running – Hiking – Reading