Vera Gluscevic

Curriculum Vitae

University of Southern California
825 Bloom Walk, ACB 526
Los Angeles, CA 90089, USA
☎ *+1 (213) 740 1140*
✉ *vera.gluscevic@usc.edu*
https://www.gluscevic.org/

Research Interests

Cosmological and astrophysical probes of new physics; fundamental nature of dark matter and dark energy; dark matter direct detection; cosmic microwave background theory and analysis; near-field cosmology; 21-cm cosmology; forward modeling and inference in physics.

Appointments

2019–Present **University of Southern California, Department of Physics and Astronomy**, *Los Angeles, CA*
- Gabilan Assistant Professor

2018–2019 **University of Florida, Department of Physics**, *Gainesville, FL*
- Assistant Professor (on leave)

2018–2019 **Princeton University, Department of Physics**, *Princeton, NJ*
- Visiting Research Scholar

2013–2018 **Institute for Advanced Study**, *Princeton, NJ*
- Postdoctoral Member, School of Natural Sciences
- Maternity leave (summer 2013; spring 2017)

Education

June 2013 **Ph.D. in Astrophysics, California Institute of Technology**, *Pasadena, CA*
- Thesis: *CMB as a Probe of New Physics and Old Times.*
- Adviser: Prof. Marc Kamionkowski.

June 2007 **B.S. in Astrophysics, University of Belgrade**, *Belgrade, Serbia*
- Award for the best Astronomy student in class of 2007.

External funding

- **NSF–Particle Astrophysics and Cosmology–Theory.** Award number: PHY-2013951. Award period: 09/2020-08/2023. **$225,000 (single PI)**. Title: "Probing Dark Matter Physics Throughout Cosmic History."
- **NASA Astrophysics Theory Program.** Award number: 21-ATP21-0135. Award period: 06/2022-07/2025. **$545,084 (lead PI)**. Title: "Cosmological Signals of Light Dark Matter: New Predictions and Connections."

Fellowships and honors

- Packard fellowship nomination, University of Southern California (2022).
- Gabilan Assistant Professorship, University of Southern California (2019–Present).
- Eric Schmidt Fellowship, Institute for Advanced Study (2016-2018).
- Award "Prof. Zaharije Brkic," University of Belgrade (for the best astronomy student in class of 2007).
- Award for Excellence in Studies, Faculty for Mathematics, University of Belgrade (2004 and 2005).
- Serbian Ministry of Education and Faculty for Mathematics Excellence Award (2006).

Leadership and Service

2022 **KITP Program: Dark Matter Theory, Simulation, and Analysis in the Era of Large Surveys**
- Accepted KITP program for Summer 2024.
- Lead organizer of a 2-month program at KITP, Santa Barbara.

2020–Present **NASA PhysPAG**
- NASA Physics of the Cosmos Program Analysis Group (PhysPAG) member of the Executive Committee and Co-chair of the Cosmic Structures Science Interest group.

2018–Present **Simons Observatory Collaboration**
- Analysis pipeline development co-lead (2018-2020)
- Likelihood and Theory working group co-lead (2018-2020)

2018–Present **CMB-S4 Collaboration**, *community-wide effort to design the next-generation ground-based cosmic microwave background experiment*
- Member of the Science Council (2018-2020)
- Lead of the Dark Matter working group (2018-2020)

2021 **Snowmass21**, *particle physics community planning process*
- **Principal author of a Letter of Interest** "Cosmic Probes of Dark Matter Interactions: Challenges for Theory and Analysis", submitted to Snowmass Cosmic Frontiers working group, August 2020.

2019 **Astro2020 Decadal Survey**, *community input coordination*
- **Principal author of science white paper** "Cosmological Probes of Dark Matter Interactions: The Next Decade", submitted to the National Academies, March 2019 [ArXiv:1903.05140].
- Key contributor to four science white papers, submitted to the National Academies, March 2019. (`https://sites.nationalacademies.org/SSB/CurrentProjects/SSB_185159`)
- Key contributor to three project white papers (Simons Observatory, CMB-S4, PICO).

2021–Present **USC Physics and Astronomy Climate Committee**, chair.

2019–Present **USC Physics and Astronomy Women in Physics**, founder, faculty adviser.

2019/2020 **USC Diversity, Equity, and Inclusion Caucus**, member.

2015–2018 **IAS Committee on Diversity**, member.

2022 **DOE Office of Science Graduate Student Research (SCGSR) Program**, reviewer.

2016, 2020 **NSF astrophysics grant proposal review**, panelist.

2020 **NASA grant proposal review**, panelist.

2013–Present **Journal referee**: Physical Review D, Physical Review Letters, Journal of Cosmology and Astroparticle Physics.

2019–Present USC CosmoLab, founder and organizer.

2019, 2021 COSMO21 conference, invited co-convener.

2019/2020 USC Physics and Astronomy Colloquium, organizer.

Teaching (Recent)

Fall 2022 **Advanced Cosmology (ASTR 540)**, *Graduate course*, Department of Physics and Astronomy, University of Southern California, CA

Spring 2021, Fall 2021, Spring 2022 **The Universe (ASTR 100)**, *General Education Course*, Department of Physics and Astronomy, University of Southern California, CA

Spring 2020 **Cosmology (ASTR 424)**, *Upper-division course for undergraduates*, Department of Physics and Astronomy, University of Southern California, CA

Spring 2021 **International School of Astroparticle Physics (ISAPP)**, *DARK MATTER: From theory to detection*, Vienna, Austria

Student Mentoring

2019–Present **Ph.D. thesis adviser**
Wendy Crumrine, Aryan Rahimieh, George (Trey) Driskell, Adam He

2019–Present **Undergraduate student project advisor**
Karime Maamari (USC, class of 2020), Dimple Sarnaaik (USC, class of 2021), David Nguyen (USC, class of 2021), Brenda Zhou (USC, class of 2021), Resherle Verna (USC, class of 2020), Christian Glover (USC, class of 2020), Connor Powers (USC, class of 2021), Francisco Silva Pavon (USC, class of 2021, capstone project), Praayas Aggarwal (USC, class of 2021, capstone project), Arjun Bamba (USC, class of 2022, capstone project), Shuxing Fang (USC, class of 2022, capstone project), Nyal McCrea (Central Washington University, NSBP-Simons program 2021)

2016-2020 **External project advisor (graduate students)**
Jack Lashner (USC, 2020), Ethan Nadler (Stanford, 2019), Zack Li (Princeton, 2017/18), Samuel Witte (UCLA, 2016)

Invited Talks/Workshops (Recent)

Jun 2022 SYNCRETISM 2022: Particle physicists dining with Astrophysicists, Crete, Greece, invited talk.

April 2022 Novel Hidden Sectors: From Colliders to Cosmology, MIAPP, Garching, Germany, invited participant of the workshop.

Oct. 2021 Racontres the Blois Conference, France, invited plenary talk, turned down invitation due to COVID-19 travel restrictions.

Oct. 2021 Perimeter Institute Astrophysics Seminar (via zoom); Title: *Dark matter interactions throughout cosmic history.*

Aug. 2021 Summer workshop on Dark Matter, Aspen, invited participant.

Jul. 2021 International School of Astroparticle Physics (ISAPP) "DARK MATTER: from theory to detection," Vienna, Austria (via zoom); Title: *Dark matter cosmology.*

May 2021 XIV International Conference on Interconnections between Particle Physics and Cosmology (via zoom); Title: *Dark matter interactions.*

May 2021 TRIUMF Astrophysics Seminar (via zoom); Title: *Dark matter interactions.*

Apr. 2021 DKM LSST, Vera Rubin Observatory dark matter meeting (via zoom); Title: *Dark matter interactions.*

Mar. 2021 OKC Colloquium, Stockholm (via zoom); Title: *Dark matter throughout cosmic history.*

Mar. 2021 Astronomy Colloquium, UC Riverside (via zoom); Title: *Dark matter throughout cosmic history.*

Peer-Reviewed Publications

- Short, K., Bernal, J. L., Boddy, K. K., **Gluscevic, V., Verde, L.** 2022. Dark matter-baryon scattering effects on temperature perturbations and implications for cosmic dawn. JCAP, submitted [arXiv:2203.16524].
- An, R.*, **Gluscevic, V.**, Calabrese, E., Hill, J. C. 2022. What does cosmology tell us about the mass of thermal-relic dark matter? JCAP, accepted [arXiv:2202.03515].
- Nguyen, D. V.*, Sarnaaik, D.*, Boddy, K. K., Nadler, E. O.*, **Gluscevic, V.** 2021. Observational constraints on dark matter scattering with electrons. Physical Review D 104. doi:10.1103/PhysRevD.104.103521
- Nadler, E. O.* and 68 colleagues (DES Collaboration) including **Gluscevic, V.** as external key contributor 2021. Constraints on Dark Matter Properties from Observations of Milky Way Satellite Galaxies. Physical Review Letters 126. doi:10.1103/PhysRevLett.126.091101
- Maamari, K.*, **Gluscevic, V.**, Boddy, K. K., Nadler, E. O.*, 2021. Bounds on Velocity-dependent Dark Matter-Proton Scattering from Milky Way Satellite Abundance. The Astrophysical Journal 907. doi:10.3847/2041-8213/abd807
- Nadler, E. O.*, **Gluscevic, V.**, Boddy, K. K., 2019. Constraints on Dark Matter Microphysics from the Milky Way Satellite Population. The Astrophysical Journal 878. doi:10.3847/2041-8213/ab1eb2
- Li, Z.*, **Gluscevic, V.**, Boddy, K. K., Madhavacheril, M. S. 2018. Disentangling dark physics with cosmic microwave background experiments. Physical Review D 98. doi:10.1103/PhysRevD.98.123524

- Boddy, K. K., **Gluscevic, V.**, Poulin, V., Kovetz, E. D., , 2018. Critical assessment of CMB limits on dark matter-baryon scattering: New treatment of the relative bulk velocity. Physical Review D 98. doi:10.1103/PhysRevD.98.123506
- Kovetz, E. D., Poulin, V., **Gluscevic, V.**, Boddy, K. K., , 2018. Tighter limits on dark matter explanations of the anomalous EDGES 21 cm signal. Physical Review D 98. doi:10.1103/PhysRevD.98.103529
- Boddy, K. K., **Gluscevic, V.** 2018. First cosmological constraint on the effective theory of dark matter-proton interactions. Physical Review D 98. doi:10.1103/PhysRevD.98.083510
- **Gluscevic, V.**, Boddy, K. K. 2018. Constraints on Scattering of keV-TeV Dark Matter with Protons in the Early Universe. Physical Review Letters 121. doi:10.1103/PhysRevLett.121.081301
- **Gluscevic, V.**, Venumadhav, T., Fang, X., , Oklopčić, A., Mishra, A. 2017. New probe of magnetic fields in the pre-reionization epoch. II. Detectability. Physical Review D 95. doi:10.1103/PhysRevD.95.083011
- Venumadhav, T., Oklopčić, A., **Gluscevic, V.**, Mishra, A., 2017. New probe of magnetic fields in the prereionization epoch. I. Formalism. Physical Review D 95. doi:10.1103/PhysRevD.95.083010
- Witte, S. J.*, **Gluscevic, V.**, McDermott, S. D. 2017. Prospects for distinguishing dark matter models using annual modulation. Journal of Cosmology and Astroparticle Physics 2017. doi:10.1088/1475-7516/2017/02/044
- **Gluscevic, V.**, , McDermott, S. D., , 2015. Identifying the theory of dark matter with direct detection. Journal of Cosmology and Astroparticle Physics 2015. doi:10.1088/1475-7516/2015/12/057
- , **Gluscevic, V.**, , Kavanagh, B. J., Lee, S. K. 2014. WIMP physics with ensembles of direct-detection experiments. Physics of the Dark Universe 5, 45–74. doi:10.1016/j.dark.2014.10.006
- **Gluscevic, V.**, 2014. Understanding WIMP-baryon interactions with direct detection: a roadmap. Journal of Cosmology and Astroparticle Physics 2014. doi:10.1088/1475-7516/2014/09/040
- **Gluscevic, V.**, , M., Hanson, D. 2013. Patchy screening of the cosmic microwave background by inhomogeneous reionization. Physical Review D 87. doi:10.1103/PhysRevD.87.047303
- **Gluscevic, V.**, Hanson, D., , 2012. First CMB constraints on direction-dependent cosmological birefringence from WMAP-7. Physical Review D 86. doi:10.1103/PhysRevD.86.103529
- , **Gluscevic, V.**, 2011. Cross-correlation of cosmological birefringence with CMB temperature. Physical Review D 84. doi:10.1103/PhysRevD.84.043504
- **Gluscevic, V.**, 2010. Statistics of 21-cm fluctuations in cosmic reionization simulations: PDFs and difference PDFs. Monthly Notices of the Royal Astronomical Society 408, 2373–2380. doi:10.1111/j.1365-2966.2010.17293.x
- **Gluscevic, V.**, 2010. Testing parity-violating mechanisms with cosmic microwave background experiments. Physical Review D 81. doi:10.1103/PhysRevD.81.123529
- **Gluscevic, V.**, , 2009. Derotation of the cosmic microwave background polarization: Full-sky formalism. Physical Review D 80. doi:10.1103/PhysRevD.80.023510
- Hill, J. C. and 41 colleagues (ACT Collaboration) including **Gluscevic, V.** 2021. The Atacama Cosmology Telescope: Constraints on Pre-Recombination Early Dark Energy. arXiv:2109.04451; submitted to PRD
- Li, Y. and 32 colleagues (ACT Collaboration) including **Gluscevic, V.** 2021. Constraining Cos-

mic Microwave Background Temperature Evolution With Sunyaev-Zel'Dovich Galaxy Clusters from the Atacama Cosmology Telescope. The Astrophysical Journal 922. doi:10.3847/1538-4357/ac26b6

- Aiola, S. and 140 colleagues (ACT Collaboration) including **Gluscevic, V.** 2020. The Atacama Cosmology Telescope: DR4 maps and cosmological parameters. Journal of Cosmology and Astroparticle Physics 2020. doi:10.1088/1475-7516/2020/12/047
- Choi, S. K. and 138 colleagues (ACT Collaboration) including **Gluscevic, V.** 2020. The Atacama Cosmology Telescope: a measurement of the Cosmic Microwave Background power spectra at 98 and 150 GHz. Journal of Cosmology and Astroparticle Physics 2020. doi:10.1088/1475-7516/2020/12/045
- Madhavacheril, M. S. and 55 colleagues (ACT Collaboration) including **Gluscevic, V.** 2020. Atacama Cosmology Telescope: Component-separated maps of CMB temperature and the thermal Sunyaev-Zel'dovich effect. Physical Review D 102. doi:10.1103/PhysRevD.102.023534
- Namikawa, T. and 53 colleagues (ACT Collaboration) including **Gluscevic, V.** 2020. Atacama Cosmology Telescope: Constraints on cosmic birefringence. Physical Review D 101. doi:10.1103/PhysRevD.101.083527
- Ade, P. and 249 colleagues (Simons Observatory Collaboration) including **Gluscevic, V.** 2019. The Simons Observatory: science goals and forecasts. Journal of Cosmology and Astroparticle Physics 2019. doi:10.1088/1475-7516/2019/02/056

References

Prof. Jo Dunkley (jdunkley@princeton.edu)

Prof. Risa Wechsler (rwechsler@stanford.edu)

Prof. Dragan Huterer (huterer@umich.edu)

Prof. Marc Kamionkowski (kamion@pha.jhu.edu)

Prof. Annika Peter (peter.33@osu.edu)