Tathagata Karmakar

Andrew N. Jordan ⧉ group

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Expertise

Quantum measurements, quantum optics, analytical/numerical modelling and optimization.
Programming languages: Python (5+ yrs), Mathematica (5+ yrs), QuTiP, Fortran, C.

Education

- Ph.D., Department of Physics and Astronomy, University of Rochester   *2018–present*
- BS Physics CPI: 9.9/10, Indian Institute of Technology, Kanpur   *2014–2018*

Internships & academic affiliations

- Research Intern, PHI Lab, NTT Research, Inc., Sunnyvale, CA.   *Jul. –Sep. 2023*
- Affiliated student researcher, Chapman University.   *Aug. 2021–present*
- Summer research assistant, CCA, Simons Foundation, NYC.   *May – Jul., 2017*

Publications

[1] **T. Karmakar**, A. Chakraborty, A. N. Vamivakas and A. N. Jordan, "Supergrowth and sub-wavelength object imaging", ARXIV: 2307.03352 (2023).

[2] **T. Karmakar** and A. N. Jordan, "Beyond Superoscillation: General Theory of Approximation with Bandlimited Functions", ARXIV: 2306.03963 (2023).

[3] **T. Karmakar**, É. Jussiau, S. K. Manikandan, and A. N. Jordan, "Cyclic superconducting quantum refrigerators using guided fluxon propagation", 10.48550/ARXIV. 2212.00277 (2022).

[4] **T. Karmakar**, P. Lewalle, and A. N. Jordan, "Stochastic path-integral analysis of the continuously monitored quantum harmonic oscillator", PRX Quantum **3**, 010327 (2022).

[5] **T. Karmakar**, S. Genel, and R. S. Somerville, "The relationship between galaxy and halo sizes in the Illustris and IllustrisTNG simulations", Monthly Notices of the Royal Astronomical Society, **520**, 1630 (2023).

[6] **T. Karmakar** and T. Sarkar, "Distinguishing Between Kerr and Rotating JNW Space-Times via Frame Dragging and Tidal Effects", General Relativity and Gravitation **50**, 85 (2018).

Research Experience

- **Superoscillations and supergrowth [1,2].**   *Jun. 2022 – Jun. 2023*
  - Developed an algorithm for image postprocessing for subwavelength object reconstruction using superoscillatory/supergrowing point spread functions.
  - Prescribed a Legendre polynomial based algorithm for generating functions with arbitrary superoscillatory properties.

- **Fluxon refrigerator [3].**   *Apr. 2021 – Dec. 2022*
  - Devised and optimized a refrigeration scheme utilizing the flow of magnetic field vortices along a magnetic field gradient in a type-II superconducting device.

- **Stochastic path integral [4].**   *Jan. 2020 – Mar. 2021*
  - Formulated and optimized a stochastic action principle based description of a harmonic oscillator undergoing continuous simultaneous position and momentum measurements.

Other Experiences

- Mentor, PASSAGE, Dept. of Physics and Astronomy, University of Rochester (2020-2021).
- Teaching assistant, 20th Century Physics (Jan–Apr 2019).
- Teaching assistant, Gravitation & General Relativity (Aug–Nov 2018).

Selected Coursework

Quantum optics I and II (UR), Machine learning by Andrew Ng (Coursera).