

Sashwat Tanay

204, Lewis Hall
University of Mississippi
University, MS 38677-1848, USA

stanay@go.olemiss.edu
sashwattanay.github.io/sashwat_site
ORCID: [0000-0002-2964-7102](https://orcid.org/0000-0002-2964-7102)

EDUCATION

- Ph.D. (Physics)** University of Mississippi 2016-2022
Advisor: Prof. Leo C. Stein
Dissertation title: Post-Newtonian dynamics of eccentric, spinning binary black holes and the associated gravitational waveforms
Courses: One course each on post-Newtonian and black-hole perturbations; two courses on quantum fields
- B.Tech. (Mechanical Engineering)** Indian Institute of Technology Ropar 2009-2013

TEACHING & WORK EXPERIENCE

- Teaching/Research Assistant** University of Mississippi 2016-present
Lab teaching and grading for Phys 221 and 222 (introductory physics)
- Junior Research Fellow** Tata Institute of Fundamental Research, Mumbai 2013-2015

HONORS & AWARDS

- Graduate School Honors Fellowship**, Univ. of Mississippi (\$12,000 in total) 2016-2020

PUBLICATIONS

1. R. Samanta and **S. Tanay**. Closed-form solution of spinning, eccentric binary black-holes at 1.5 post-Newtonian order (*manuscript in preparation*)
2. **S. Tanay** and L. C. Stein. A more efficient way to compute the quasi-normal mode frequencies of Kerr black holes (*manuscript in preparation*)
3. **S. Tanay**, G. Cho, and L. C. Stein. Action-angle variables of a binary black-hole with arbitrary eccentricity, spins, and masses at 1.5 post-Newtonian order, 2021, [arXiv:2110.15351](https://arxiv.org/abs/2110.15351)
4. G. Cho, **S. Tanay**, A. Gopakumar, and H. M. Lee. Generalized quasi-Keplerian solution for eccentric, non-spinning compact binaries at 4PN order and the associated IMR waveform. *Phys. Rev. D*, 105:064010, 2022, [arXiv: 2110.09608](https://arxiv.org/abs/2110.09608)
5. **S. Tanay**, L. C. Stein, and J. T. Gálvez Ghersi. Integrability of eccentric, spinning black hole binaries up to second post-Newtonian order. *Phys. Rev. D*, 103(6):064066, 2021, [arXiv: 2012.06586](https://arxiv.org/abs/2012.06586)
6. **S. Tanay**, A. Klein, E. Berti, and A. Nishizawa. Convergence of Fourier-domain templates for inspiraling eccentric compact binaries. *Phys. Rev. D*, 100(6):064006, 2019, [arXiv:1905.08811](https://arxiv.org/abs/1905.08811)
7. **S. Tanay**, M. Haney, and A. Gopakumar. Frequency and time domain inspiral templates for comparable mass compact binaries in eccentric orbits. *Phys. Rev. D*, 93(6):064031, 2016, [arXiv:1602.03081](https://arxiv.org/abs/1602.03081)

RESEARCH EXPERIENCE & INTERESTS

Past work • Theoretical study of the dynamics of binary black holes (BBHs) under the post-Newtonian Hamiltonian framework within Einstein's general relativity (GR) • Modeling their trajectories and gravitational waves (GWs) emitted by them • Exploring preliminary data analysis implications with these waveforms. • More efficient ways to compute the QNM frequencies of Kerr BHs.

Ongoing work • Compute 2PN action-angles of BBHs with arbitrary masses, spins and eccentricity • Construct the power spectrum of scalar and tensor fluctuations sourced by many-field inflationary models of cosmology

INVITED TALKS

Univ. of Illinois Urbana-Champaign (<i>upcoming</i>)	Jun 2022
Montana State Univ. (Relativity, Astrophysics and Space Science Seminar)	Apr 2022
Max Planck Inst. for Gravitational Physics Potsdam (ACR Seminar)	Jun 2021
Simon Fraser Univ. (Cosmology Seminar)	Sep 2020

MENTORING

Rickmoy Samanta (postdoc, ISI Kolkata) worked on publication (1)	Sep 2021-present
Subhayu Bagchi (grad, Univ. of Mississippi) Identifying libration-rotation regions of binary black holes (BBHs) using 1.5PN action-angle variables	Jan 2022-present
Pranav Kasetty (undergrad, IISc Bengaluru) (co-advisor) Undergrad thesis: studying 4PN effects on gravitational waves from BBHs eccentric BBHs	Oct 2021-present

COMPUTER SKILLS

- Mathematica, C/C++, Python, Matlab, Fortran, Jekyll (web development), Bash
- Github: github.com/sashwattanay

OUTREACH & SERVICE

Judge at The Speaker's Edge Competition 2022 - Univ. of MS (organized by schools of business, accountancy and leadership)

Organized STEM Summer Camp - Univ. of MS (2018, 19)

Organized Spooky Physics Night - Univ. of MS (2016-18)

LANGUAGES

Hindi (native), English (fluent), German (elementary)