

# Sashwat Tanay

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

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

## EDUCATION

---

<b>Ph.D. (Physics)</b> University of Mississippi	2016-2022
<b>Advisor:</b> Prof. Leo C. Stein	
<b>Dissertation title:</b> Post-Newtonian dynamics of eccentric, spinning binary black holes and the associated gravitational waveforms	
<b>B.Tech. (Mechanical Engineering)</b> Indian Institute of Technology Ropar	2009-2013

## EMPLOYMENT

---

<b>Adjunct instructor</b> University of Mississippi	2022-present
<b>Teaching and research Assistant</b> University of Mississippi	2016-2022
<b>Junior Research Fellow</b> Tata Institute of Fundamental Research, Mumbai	2013-2015

## AWARDS & FELLOWSHIPS

---

Postdoctoral fellowship, Paris Observatory - PSL University	2023-2025
FGSA Travel Award for Excellence in Graduate Research, APS (\$500)	2022
Graduate School Honors Fellowship, Univ. of Mississippi (\$12,000 in total)	2016-2020
Junior Research Fellowship, Tata Institute of Fundamental Research, Mumbai	2013-2015

## RESEARCH INTERESTS

---

- Binary black hole dynamics under post-Newtonian framework and the associated gravitational waves
- Quasi-normal mode ringdown of black holes • Hamiltonian dynamical systems • EMRIs • Inflationary cosmology

## RESEARCH ARTICLES

---

1. **S. Tanay**. Towards a more robust algorithm for computing the Kerr quasinormal mode frequencies, 2022, [arXiv:2210.03657](https://arxiv.org/abs/2210.03657) (to be submitted)
2. R. Samanta, **S. Tanay**, and L. C. Stein. Closed-form solutions of spinning, eccentric binary black holes at 1.5 post-Newtonian order, 2022, [arXiv:2210.01605](https://arxiv.org/abs/2210.01605) (submitted to Phys. Rev. D)
3. **S. Tanay**. Integrability and action-angle-based solution of the post-Newtonian BBH system (lecture notes), 2022, [arXiv:2206.05799](https://arxiv.org/abs/2206.05799)
4. **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) (submitted to Phys. Rev. D)
5. G. Cho, **S. Tanay**, A. Gopakumar, and H. M. Lee. Generalized quasi-Keplerian solution for eccentric, nonspinning compact binaries at 4PN order and the associated inspiral-merger-ringdown waveform. *Phys. Rev. D*, 105(6):064010, 2022, [arXiv: 2110.09608](https://arxiv.org/abs/2110.09608)

6. **S. Tanay**, L. C. Stein, and J. T. Gálvez Gherzi. Integrability of eccentric, spinning black hole binaries up to second post-Newtonian order. *Phys. Rev. D*, 103(6):064066, 2021, [arXiv:2012.06586](#)
7. **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](#)
8. **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](#)

## TEACHING EXPERIENCE

---

<b>Phys 211</b> Calculus-based undergrad physics (course website <a href="#">here</a> ) (as adjunct instructor, Univ. of Mississippi)	Summer 2023
<b>Phys 221, 222, 223, 224</b> Undergrad physics lab courses (as teaching assistant, Univ. of Mississippi)	2016-2022

## INVITED TALKS & LECTURES

---

Univ. of Illinois Urbana-Champaign (lecture workshop)	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

## PROFESSIONAL SERVICE

---

<b>Referee</b> Physical Review & Physical Review Letters	Feb 2023 - present
--	--------------------

## MENTORING

---

<b>Rickmoy Samanta</b> (postdoc, ISI Kolkata) worked on Publication (1)	Sep 2021 - Sep 2022
<b>Pranav Kasetty</b> (undergrad, IISc Bengaluru) (co-advisor)	Oct 2021-Apr 2022
<b>Undergrad thesis:</b> studying 4PN effects on gravitational waves from BBHs eccentric BBHs	

## COMPUTER SKILLS

---

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

## OUTREACH & SERVICE

---

YouTube videos on [research](#) and [popular science](#)

Invited public talk on astronomy - Univ. of MS (2023)

Judge at The Speaker's Edge Competition 2022 - Univ. of MS

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

Organized Spooky Physics Night - Univ. of MS (2016, 17, 18)

## LANGUAGES

---

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