# Sashwat Tanay

sashwat.tanay@obspm.fr
Laboratoire Univers et Theories (LUTH), Paris Observatory
5 place Jules Janssen, 92190 Meudon, France

sashwattanay.github.io/site
ORCID: 0000-0002-2964-7102
Google Scholar profile

## 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

**B.Tech. (Mechanical Engineering)** Indian Institute of Technology Ropar 2009-2013

## EMPLOYMENT

**Postdoctoral Fellow** LUTH, Paris Observatory - PSL University 2023-2025

**Adjunct Instructor** University of Mississippi 2022-2023

**Teaching and Research Assistant** University of Mississippi 2016-2022

**Junior Research Fellow** 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

## TEACHING EXPERIENCE

**Phys 211** Instructor of record for calculus-based undergrad Physics Summer 2023
(as adjunct instructor, Univ. of Mississippi; course website here)

**Phys 221, 222, 223, 224** undergrad physics lab courses 2016-2022
(as teaching assistant, Univ. of Mississippi)

## RESEARCH INTERESTS

• Gravitational waves • Post-Newtonian dynamics of binary black holes • Quasi-normal mode ringdown of black holes • Hamiltonian systems • Extreme mass ratio inspirals

## INVITED TALKS & LECTURES

Institut d'astrophysique de Paris (GReCO seminar) Jan 2024

IISER Pune (Physics Seminar) Jan 2024

Missouri University of Science and Technology (Department Colloquium) Aug 2023

Northwestern University Jul 2023

Univ. of Illinois Urbana-Champaign (lecture workshop; lecture notes here) Jun 2022

Montana State Univ. (Relativity, Astrophysics and Space Science Seminar) Apr 2022

Max Planck Inst. for Gravitational Physics Potsdam (ACR Seminar, *remote*) Jun 2021

Simon Fraser Univ. (Cosmology Seminar, *remote*) Sep 2020

## PROFESSIONAL SERVICE

**Referee** Physical Review & Physical Review Letters Feb 2023-present

## MENTORING

**Manuel Alva** (undergrad, Universidad Nacional de Trujillo, Peru) worked on Publication (1) Nov 2023-present

**Tom Colin** (postgrad, Ecole Normale Supérieure, Paris) worked on Publication (1) Oct 2023-present

**Rickmoy Samanta** (postdoc, ISI Kolkata) worked on Publication (4) Sep 2021-Sep 2022

**Pranav Kasetty** (undergrad thesis co-advisor, IISc Bengaluru) Oct 2021-Apr 2022

## COMPUTER SKILLS

• Mathematica (xAct), C/C++, Python, Fortran, Matlab, Jekyll (web development), Bash • GitHub profile

## OUTREACH & SERVICE

• 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) • Public talk in French (Journée du LUTH), Paris Observatory (2024) • YouTube videos on research and popular science

## LANGUAGES

Hindi, English, French (elementary)

## PUBLICATIONS

1. T. Colin, **S. Tanay**, and L. Bernard. Revisiting 2PN Hamiltonian mechanics of binary black holes, *in prep.* 2024
2. L. C. Stein, V. Witzany, **S. Tanay**, and V. Skoupý. Action angle variables of a spinning body in a Kerr background, *in prep.* 2024
3. **S. Tanay**. Towards a more robust algorithm for computing the Kerr quasinormal mode frequencies, 2022, arXiv:2210.03657 (to be submitted)
4. R. Samanta, **S. Tanay**, and L. C. Stein. Closed-form solutions of spinning, eccentric binary black holes at 1.5 post-Newtonian order. *Phys. Rev. D*, 108(14):124039, 2023, arXiv:2210.01605
5. **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. *Phys. Rev. D*, 107(26):103040, 2021, arXiv:2110.15351
6. 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
7. **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
8. **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

9. **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