Sashwat Tanay

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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

TEACHING & WORK EXPERIENCE

Adjunct instructor University of Mississippi 2022-present

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

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 (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 (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

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 (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

6. **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

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

Phys 211 Calculus-based undergrad physics (personal course website here) Summer 2023
(as adjunct instructor, Univ. of Mississippi)

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

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

Referee Physical Review & Physical Review Letters Feb 2023 - present

MENTORING

Rickmoy Samanta (postdoc, ISI Kolkata) worked on Publication (1) Sep 2021 - Sep 2022

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

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)