Akash K. Mishra

Curriculum Vitae

PERSONAL DETAILS

Birth	May 20, 1993, India
Affiliation	International Center for Theoretical Science, Bangalore Karnataka, India, 560089
Position	Postdoctoral Researcher
Mobile	+(91) 8780981968, 9512238355
E-Mail(s)	akash.mishra@icts.res.in, mishra.akash677@gmail.com

EDUCATION

B.Sc. Physics 2010-2013

Sambalpur University

Honors: Physics, Major: Mathematics

M.Sc. Physics 2014-2016

Indian Institute of technology Gandhinagar

Special Course Taken: General Relativity, Advanced Quantum Field Theory, Particle Physics. Thesis: 'Aharnov-Bohm effect and topological aspects of QFT'(Supervisor: Prof Sudipta Sarkar), CPI Secured: 8.5/10

Ph.D. Physics 2016-2021

Indian Institute of Technology Gandhinagar

Thesis: 'Some Novel Studies of Black holes in General Relativity and Modified Theories'(Supervisor: Prof Sudipta Sarkar)

Postdoc 2021-Present

ICTS-TIFR Bangalore

AWARDS AND HONORS

Gold Medal, M.Sc. 2016

*Awarded the **Institute Gold Medal** from Indian Institute of technology Gandhinagar for securing highest CPI in the Physics discipline and being the topper of the batch.*

Overseas Research Fellowship 2019

*Awarded the **Institute Overseas Research Fellowship** from Indian Institute of technology Gandhinagar for conducting research at Arizona State University, USA.*

Gold Medal for Outstanding Research in PhD 2022

*Awarded the **Gold Medal for Outstanding Research in PhD** from Indian Institute of technology Gandhinagar among all the graduating students.*

National Postdoctoral Fellowship 2022 - 2024

*Awarded the **National Postdoctoral Fellowship (NPDF)** from the Science and Engineering Research Board, Govt. of India to carryout postdoc research at ICTS-TIFR Bangalore in the field of Gravitational waves and numerical relativity.*

RESEARCH INTERESTS

- Black hole Physics.
- Modified Gravity Theories.
- Gravitational Waves and Numerical Relativity.
- Black hole shadow and quasi-normal modes.
- Observational tests of general relativity using Gravitational wave (LIGO) and black hole shadow (EHT) observations.

RESEARCH EXPERIENCE

Research Project 2015-2016

As my M.Sc thesis I worked with Prof Sudipta Sarkar on 'Aharnov-Bohm effect and topological aspects of QFT' for one year at IIT Gandhinagar.

Ph.D. Scholar 2016-2021

Obtained PhD in physics from IIT Gandhinagar under the supervision of Prof. Sudipta Sarkar.
***Research Areas**: Black hole Thermodynamics, Modified theory of Gravity.*

Postdoctoral Researcher 2021-Present

Currently working as a Postdoctoral researcher at the department of astrophysics, ICTS-TIFR Bangalore.
***Research Areas**: Gravitational wave data analysis, Numerical Relativity, Test of general relativity and modified theories.*

VISITING POSITIONS

IACS, Kolkata (Visiting Fellow) June 2018

Worked on dynamical evolution of photon sphere and black holes in the context of various accreting black hole solutions.

IACS, Kolkata (Visiting Fellow) June 2019

Worked on the problem of strong cosmic censorship in higher curvature gravity. Understanding the effects of higher curvature terms on the violation of strong cosmic censorship conjecture was the key motivation.

Arizona State University (Visiting Fellow) Aug-Dec 2019
Worked on thermodynamics of timelike surfaces in generic curved spacetimes. The motivation of the work is :To understand whether timelike surfaces posses thermodynamic properties just as null surfaces.

IACS, Kolkata (Visiting Fellow) Feb 2020
Worked on black hole quasi-normal modes and setting constraints on the tidal charge parameter of rotating braneworld black hole using gravitational wave observation.

CURRENT AND FUTURE RESEARCH

- **Testing predictions of general relativity and validity of several alternative theories using gravitational wave and EHT observations.**
- **Black hole stability, quasinormal modes and echoes in higher curvature theories.**
- **Modelling gravitational waveforms in beyond GR theories.**
- **Effects of gravitational micro-lensing in parameter estimations.**

TEACHING EXPERIENCE

- Worked as Teaching Assistant to Prof. Sudipta Sarkar in the 'Introduction to General Relativity course for Ph.D. and M.Sc. students during the fall semester 2016-17 at IIT Gandhinagar.
- Worked as Teaching Assistant to Prof. R. R. Puri in the 'Mathematical Physics' course for Ph.D. and M.Sc. students during spring semester 2017-18 at IIT Gandhinagar.
- Worked as Teaching Assistant to Prof. Rupak Banerjee in the 'X-Ray Scattering' course for Ph.D., M.Sc. and M.Tech. students during fall semester 2017-18 at IIT Gandhinagar.
- Worked as a Teaching Assistant to Prof. Sudipta Sarkar and Prof. Baradhwaj Coleppa in the 'Introduction to Electrodynamics and Quantum Mechanics' course for B.Tech. students at IIT Gandhinagar.

PUBLICATION LIST

- *Black hole topology in $f(R)$ gravity*, **Akash K Mishra**, Mostafizur Rahman, Sudipta Sarkar, **Classical and Quantum Gravity**, Volume 35, Number 14.
- *On the physical process first law for dynamical black holes*, **Akash Mishra**, Sumanta Chakraborty, Avirup Ghosh, Sudipta Sarkar, **JHEP** 1809 (2018) 034.
- *Understanding photon sphere and black hole shadow in dynamically evolving spacetimes*, **Akash K Mishra**, Sumanta Chakraborty, Sudipta Sarkar, **Phys. Rev. D 99, 104080 (2019)**.
- *Overcharging a multi black hole system and cosmic censorship*, **Akash K Mishra** and Sudipta Sarkar, **Phys. Rev. D 100, 024030 (2019)**

- *Constraints on higher curvature gravity from time delay between GW170817 and GRB 170817A*, Avirup Ghosh, Soumya Jana **Akash K Mishra**, Sudipta Sarkar, **Phys. Rev. D 100, 084054 (2019)**.
- *Strong Cosmic Censorship in higher curvature gravity*, **Akash K Mishra**, Sumanta Chakraborty, **Phys.Rev.D 101 (2020) 6, 064041 (2019)**.
- *Quasinormal modes and strong cosmic censorship in the regularised 4D Einstein–Gauss–Bonnet gravity*, **Akash K Mishra**, **Gen.Rel.Grav. 52 (2020) 11, 106**.
- *Constraining extra dimensions using observations of black hole quasi-normal modes*, **Akash K Mishra**, Abhirup Ghosh, Sumanta Chakraborty, **Eur.Phys.J.C 82 (2022) 9, 820** .
- *Overcharging Extremal Black Holes*, Rajes Ghosh, **Akash K Mishra**, Sudipta Sarkar, **Phys.Rev.D 104 (2021) 10, 104043** .
- *Regularized Stable Kerr Black Hole: Cosmic Censorships, Shadow and Quasi-Normal Modes*, Rajes Ghosh, Mostafizur Rahman, **Akash K Mishra**, arxiv 2209.12291.

RESEARCH SCHOOLS AND CONFERENCE ATTENDED

- **Black hole Topology in f(R) gravity**,*at Young Physicist Meet*(Dated: 24th-26th April 2018), Physical Research Laboratory, Ahmedabad , **Oral Presentation.**
- **Dynamics of Photon Sphere and Black hole shadow**,*at Young Physicist Meet*(Dated: 18th-20th March 2019), Physical Research Laboratory, Ahmedabad , **Oral Presentation.**
- **Some Aspects of higher curvature gravity**,*at Arizona State University, United States*(Dated: 14th September 2019), **Invited Talk.**
- **Physical Process First law for dynamical black holes**,*at 30th Meeting of Indian Association for General Relativity and Gravitation*, BITS Pilani, Hyderabad, India. (Dated: 3rd-6th January 2019), **Oral Presentation.**
- Attended the **SERC Main School 2018** held in IISER, Pune, India, Dated: 25th November-15 December, 2018.(***Topics Covered:*** *Dark Matter and Early Universe Cosmology, Conformal Field Theory, Soft Theorems, Electroweak Symmetry breaking and Higgs Mechanism.*)
- Attended the **4th Saha Theory Workshop: Modern Aspects of String Theory** held in SINP, Kolkata, India, Dated: 19th -23rd February, 2018.

LETTER OF REFERENCES

The following may be consulted for Letter of References.

- **Dr. Sudipta Sarkar**(Supervisor)

  Assistant Professor, Department of Physics, Indian Institute of Technology Gandhinagar, Palaj, Gandhinagar-382355, India.

  Email: sudiptas@iitgn.ac.in

- **Dr. Maulik Parikh**

  Associate Professor, Cosmology Initiative, Arizona State University, Tempe, Arizona, 85287, United States.

  Email: maulik.parikh@asu.edu

- **Dr. Sumanta Chakraborty**

  Assistant Professor, School of Physical Sciences, Indian Association for the Cultivation of Science (IACS), Kolkata, 700032, India.

  Email: sumantac.physics@gmail.com

COMPUTER SKILLS

- **Basic:** Java
- **Intermediate:** Matlab, C, C++
- **Advanced:** Mathematica, Python, Latex
- **Experienced in working with PyCBC, Bilby, LALSimulation.**
- **Currently learning the Spectral Einstein Code (SpEC) for binary black hole evolution in numerical relativity.**

OTHER INTERESTS

Playing Musical Instruments(Keyboard), Old Indian Classical Music, Playing Chess, Cricket, Swimming, Travelling.