Tousik Samui

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Curriculum Vitae

Positions	Post-doctoral Fellow (November 2021 – Present) Indian Institute of Science Education and Research Kolkata (IISER-K), Mo- hanpur, India.		
	Post-doctoral Fellow (September 2018 – November 2021) Harish-Chandra Research Institute (HRI), Prayagraj, India.		
Academic Background	Ph.D. in Physics (2018) Tata Institute of Fundamental Research (TIFR), Mumbai, India.		
	M.Sc. in Physics (2012) Indian Institute of Technology Kanpur (IITK), Kanpur, India.		
	B.Sc. (Honours) in Physics (2010) University of Calcutta (CU), Kolkata, India.		
Special Achievements	 Notable Ranks in National Exams All India Ranked 5th, Joint Admission test for Masters (JAM) in Physics (2010). 		
	• All India Ranked 3 rd , National Eligibility Test (NET) in Physical Sciences (December 2013).		
	Fellowships		
	• Dr. Shyama Prasad Mukherjee Fellowship in Physical Sciences, awarded by the Council of Scientific and Industrial Research, Government of India. (2013)		
	• Junior Research Fellowship in Mathematical Sciences, awarded by the Council of Scientific and Industrial Research, Government of India. (2013)		
	• Inspire Scholarship, awarded by the Department of Science and Technol- ogy, Government of India. (2007 – 2012)		
	Awards		
	• DPS day 2023 Best Poster, awarded by the Department of Physical Sciences, IISER-K, India. (March 2023)		
	• Academic Excellence in the M.Sc. (2-year) Programme in Physics, awarded by the Indian Institute of Technology Kanpur, Kanpur, India. (2011)		

Research Interests	Physics Beyond the Standard Model, Electroweak Interactions, Collider Phy Jet and Jet Substructure at Colliders, Dark Matter, Neutrino, Machine Le ing in Particle Physics.		
Research Skills	BSM model building and phenomenology.Studies of collider signatures for SM and BSM searches.		
	• Jet and jet substructure based studies.		
	• Development of modules/algorithm for collider studies.		
	• Machine learning and handling of HEP packages.		
Research Summary	My research is focused on High Energy Physics Phenomenology, and I am in- terested in understanding the interaction of elementary particles. I am particu- larly interested in addressing some of the big questions in particle physics, like dark matter, neutrino masses and mixing, and flavour structure of the Stan- dard Model. In my Ph.D. years, I started by studying some unique signs of extra-dimensional models at high-energy particle colliders. During my postdoc periods, I followed up by building models beyond the Standard Model (BSM) that could shed light on the observation of dark matter, neutrinos masses and mixing, and flavour anomaly. Parallelly, I have worked on the jets and jet substructures, which I generated my interest during my visit to Les Houches. Some important contributions in direction include the development of a dy- namic radius jet clustering algorithm, quark/gluon discrimination based heavy dijet resonance study, polarization study of boosted hadronic W boson.		
	In addition to the model building and phenomenological study, at present, I am extending my research in understanding and developing machine learning methods to improve upon the current collider study. For example, we are trying to use machine learning, namely Self Organizing Map (SOM), to extract the signatures of the rare decay processes which can be lurking in the background in the collider. Additionally, I am actively working on the implementation of the hadronization for heavy, long-lived coloured particles (such as R-hadrons) within the Pythia8. I am using more machine learning techniques in the jet, jet substructure, and jet tagging-based studies.		
	On the technical front, I am proficient in managing software and packages within Linux-based operating systems. In particular, I have a very good understanding of the important HEP packages, including Bash scripting, C++-based tools like Fastjet3, Pythia8, root6, Delphes3, Python-based packages such as Madgraph5, pylhe, pyslha, flavio. I am also well-versed in Mathematica-based packages like FeynRules, SARAH, SSP, etc. Some of my published and ongoing work includes implementations of necessary plugins/modules to Fastjet3, Pythia8, and Delphes3 libraries. Over the last six months, I have taken on the system administrator role for the Department of Physical Sciences' computing cluster at IISER Kolkata, ensuring its smooth operation and upkeep.		
Computer Skills	Computer languages: Fortran, C, C++, Python, PHP, HTML.		

	Packages in hep-ph: CalcHEP, FastJet, FeynRules, Delphes, MadGraph5, MicrOmegas, Pythia8, Root, SARAH, Spheno, SSP.		
Academic Activities	Invited/Contributed Talks (selected)		
	• Dynamic Radius Jet Clustering Algorithm, talk presented at International Meeting on High Energy Physics II (IMHEP-II), IOP, Bhubaneswar, In- dia. (February 22, 2023)		
	• Jetography: Revolutionizing Collider Era, talk presented at Gluon – The Physics Journal Club, IISER-K, Mohanpur, India. (June 17, 2022)		
	• Jet Substructure and Multivariate Analysis Aid in Polarization Study of Boosted, Hadronic W at the LHC, online talk presented at Anomalies 2021, IITH, Hyderabad, India. (November 11, 2021)		
	• Improving Heavy Dijet Resonance Searches Using Jet Substructure at the LHC, online talk presented at Anomalies 2020, IITH, Hyderabad, India. (September 12, 2020)		
	• Mixed Higgs-Radion States at the LHC, talk presented at LPT, Orsay, France. (June 27, 2017)		
	 Missing energy in tt production at e⁺e⁻ Collider as a probe of Large Ex- tra Dimensions, talk presented at XXI DAE-BRNS High Energy Physics Symposium, IIT Guwahati, India. (December 9, 2014) 		
	 Conferences/Workshops Attended (selected) Statistical Methods and Machine Learning in High Energy Physics (ML4HEP), International Centre for Theoretical Sciences, Bengaluru, India. (August-September 2023) 		
	• International Meeting on High Energy Physics II (IMHEP-II), Institute of Physics, Bhubaneswar, India. (February 2023)		
	• HSF-India Research Software Networks in Physics, S. N. Bose National Centre for Basic Sciences, Kolkata, India. (January 2023)		
	• 15th Workshop on High Energy Physics Phenomenology, Indian Institute of Science Education and Research Bhopal, Bhopal, India. (December 2017)		
	• 25th International Conference on Supersymmetry and Unification of Fun- damental Interactions (SUSY 17), Tata Institute of Fundamental Re- search, Mumbai, India. (December 2017)		
	• Physics at TeV colliders, Les Houches, France. (June 2017)		
	• 9th International Workshop on the CKM Unitarity Triangle, Tata Insti- tute of Fundamental Research, Mumbai, India. (December 2016)		
	• Indo-French LIA THEP and CEFIPRA INFRE-HEPNET Kick-Off Meet- ing, Indian Institute of Science, Bangalore, India. (May 2016)		
	Academic Visits		

• Indian Institute of Science, Bengaluru, India. (September 2023)

	• Harish-Chandra I	Research Institute, Prayagraj, India. (March 2022)	
	• Laboratoire de Physique Théorique d'Orsay, Orsay, France. (June 2017)		
	• Scuola Normale Superiore, Pisa, Italy. (June 2017)		
	• Laboratoire de Physique Subatomique and Cosmologie, Grenoble, France. (June 2017)		
	• Harish-Chandra 2018)	Research Institute, Prayagraj, India. (March – May	
	Teaching Activities		
	• Lecture series on India. (Septembe	<i>Linear Representations of Groups</i> , IISER-K, Mohanpur, r 2022 – October 2022).	
	• Teaching Assistantumn 2022)	ntship: Mechanics I, IISER-K, Mohanpur, India. (Au-	
	• Teaching Assistar tumn 2015)	ntship: <i>Electrodynamics II</i> , TIFR, Mumbai, India. (Au-	
	• Teaching Assistar (Spring 2015)	ntship: Quantum Field Theory I, TIFR, Mumbai, India.	
	• Teaching Assistant tumn 2013)	ntship: <i>Classical Mechanics</i> , TIFR, Mumbai, India. (Au-	
Other Involvements	• Active participation in the maintenance and upkeep of the department's computing cluster Kepler.		
	• Organizing member of Weekly High Energy Physics Journal club Discussion (every Thursday).		
	• Designed (and m running jobs in H (Link: http://ww	aaintaining) a webpage which shows the live status of IRI-HPC cluster. (January 2020 – Present) w.hri.res.in/cluster/clusterStatus/cluster.php)	
	• Coordinator and Volunteer Teacher in Harsha School (a welfare activity managed by students and post-docs of HRI). (April 2019 – November 2021)		
	• Elected as Canteen Secretary of TIFR Students' Society (Student body of TIFR). (April 2014 – May 2015)		
Personal	Date of Birth:	February 02, 1990.	
Details	Place of Birth:	Gobindapur, West Bengal, India.	
	Nationality:	Indian.	
	Gender:	Male.	
	Languages Speak:	English, Bengali (mother tongue), Hindi.	
	Present Employment:	Postdoctoral Fellow at IISER Kolkata.	

ReferencesProf. Sreerup Raychaudhuri (Ph.D. thesis supervisor)Department of Theoretical Physics,
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Dr. Ritesh K. Singh

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