Alok Kumar Pan

Associate Professor, Department of Physics

Office Room No. 23 (Second floor), Department of Chemistry; Institute Email: akp@phy.iith.ac.in

Major Areas of Research:

- Quantum Information, Quantum Communication and Cryptography, Quantum Metrology
- Major sponsored projects:
- DST-ICPS mission mode project, MEiTY-Amazon
- Qcal project , SERB Core research grant <u>Major Research Facilities in the Group:</u>

Mathematical and Theoretical expertise required for quantum communication, computation and metrology. <u>Most significant Publications:</u>

Discriminating mirror symmetric states with restricted contextual advantage"

S. Mukherjee, S. Naonit and A. K. Pan, Phys. Rev. A, 106, 012216 (2022). "Generalized non-n-locality inequality in quantum network"

S. Munshi and <u>A. K. Pan</u>, **Phys. Rev. A**, 104, 042217 (2021). Revealing universal quantum contextuality through communication game"

A.K. Pan, Scientific Reports, 9, 1-8 (2019).





భారతీయ సాంకేతిక విజ్ఞాన పంస్థ హైదరాబాద్ भारतीय प्रौद्योगिकी संस्थान हैदराबाद Indian Institute of Technology Hyderabad



Anjan Kumar Giri

Professor, Department of Physics

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Major Areas of Research/Up to 3 major sponsored projects:

I am working in the area of Flavour Physics and CP violation, B Physics, Neutrino Physics and to decipher the signals of Physics beyond the Standard Model

Major Research Facilities in the Group:

Primarily I deal with Phenomenology, also a member of Belle and NOvA using analytical and computational methods



Technology/Product Developed/Up to 3 most significant Publications

1. Exploring nonstandard interactions effects in DUNE and T2HK, B. Brahma and A. Giri, Euro. Phys. J. C 82, 1145 (2022)

2. Inplications of light Z' on the semileptonic B(Bs) decays at large recoil, M. Mohapatra and A. Giri, Phys. Rev. D 104, 095012 (2021)



భారతీయ సాంకేతిక విజ్ఞాన సంస్థ హైదరాబాద్ भारतीय प्रौद्योगिकी संस्थान हैदराबाद Indian Institute of Technology Hyderabad

Anupam Gupta

Assistant Professor, Department of Physics

B-312; Office Phone No. (040)2301-6719; agupta@phys.iith.ac.in

Major Areas of Research/Up to 3 major sponsored projects

- 1) Mathematical modelling of complex systems such as Tissue Growth and Morphogenesis.
- 2) Agent based modelling of chemotactic agents in turbulent environment.
- 3) Bacterial and polymeric turbulence.
- Major Research Facilities in the Group
- 1) Agent based model for tissue growth.
- 2) Pseudo-Spectral solver for Navier-Stokes Equation, Viscoelastic flows, two-phase flow, mass transport.
- 3) Vertex model for the tissue growth.
- 4) Continuum model for the tissue growth.

Technology/Product Developed/Up to 3 most significant Publications

- 1) Matrix viscoelasticity controls spatio-temporal tissue organization. A. Elosegui-Artola*, A. Gupta*, <u>et.al</u>., Nature Materials (2022).
- 2) Rectified random cell motility as a mechanism for embryo elongation. I. Regev*, K. Guevorkian*, A. Gupta*, O. Pourqui, and L. Mahadevan.(* Equal contribution.) Development, 149(6), 199423 (2022).
- 3) Flocking of Active Particles in a Turbulent Flow. A. Gupta A. Roy, Arnab Saha, and S. S. Ray. Phys. Rev. F (Rapid), 5, 052601 (2020).





Tissue Growth

Anurag Tripathi, Associate Professor QCD group, Physics

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Major Areas of Research/Up to 3 major sponsored projects

Theoretical High Energy Physics Perturbative Quantum Chromodynamics Infrared structure of Gauge Theories

Major Research Facilities in the Group

<u>Technology/Product Developed/Up to 3 most significant</u> <u>Publications</u>

N. Agarwal, S. Pal, A. Srivastav and A. Tripathi, Deciphering colour building blocks of massive multiparton amplitudes at 4-loops and beyond, JHEP 02 (2023) 258 [2212.06610]

N. Agarwal, S. Pal, A. Srivastav and A. Tripathi, Building blocks of Cwebs in multi- parton scattering amplitudes, JHEP 06 (2022) JHEP 06 (2022) 020 [2204.05936]







Microwave Magnetics Laboratory, Department of Physics Office:B409; Ph:04023016717; Email: arabinda@phy.iith.ac.in; webpage: iith.ac.in/~arabinda/

Major Areas of Research/Up to 3 major sponsored projects

Magnetic thin films, Nanomagnetism, Spintronics, Magnonics, Microwave magnetics, Nanofabrication Major Research Facilities in the Group

Ferromagnetic resonance, Magnetoresistance, Inverse spin Hall effect, Brillouin light scattering

Associate Professor, Magnonics and

Arabinda Haldar

Technology/Product Developed/Up to 3 most significant Publications

<u>A. Haldar</u>*, "*Functional nanostructures for bias-magnet-free and reconfigurable microwave magnetic devices*", Materials Today Electronics 2, 100008 (2022). (**Review article**)

<u>A. Haldar</u>* and A. O. Adeyeye, "*Functional Magnetic Waveguides for Magnonics*", Appl. Phys. Lett. 119, 060501 (2021). (**Perspective article**)

B. Paikaray, M. Kuchibhotla, C. Murapaka and <u>A. Haldar</u>*, *"Skyrmion dynamics in concentric and eccentric nano-ring structures"*, IEEE Trans. Magn. 58, 4300406 (2021).







భారతీయ సాంకేతిక విజ్ఞాన సంస్థ హైదరాబాద్ भारतीय प्रौद्योगिकी संस्थान हैदराबाद Indian Institute of Technology Hyderabad

Archak Purkayastha

Assistant Professor, Department of Physics

Office Room,Office Phone No. coming soon; Email: archak.p@phy.iith.ac.in; Webpage Link: coming soon

Major Areas of Research

Quantum Statistical Physics, Quantum transport Quantum thermodynamics

Major Research Facilities in the Group

Tensor network and sparse matrix techniques, Quantum master equation, Quantum Langevin equation

Technology/Product Developed

Numerical and analytical techniques for quantum technology.

1. Periodically refreshed baths to simulate open quantum many-body dynamics, Archak Purkayastha, Giacomo Guarnieri, Steve Campbell, Javier Prior, John Goold, Phys. Rev. B 104, 045417 (2021).







భారతీయ సాంకేతిక విజ్ఞాన సంస్థ హైదరాబాద్ भारतीय प्रौद्योगिकी संस्थान हैवराबाद Indian Institute of Technology Hyderabad Atanu Kajak **Assistant Professor** Lab: Non-equilibrium many-body physics **Department of Physics**

Office: C-Block, 208F ; Institute Email: atanu@phy.iith.ac.in; Google scholar:https://scholar.google.co.in/citations?user=RJhUov4AAAAJ&hl=en

<u>Major Areas of Research/Up to 3 major sponsored projects</u>

Thermalization and quantum chaos in driven interacting many-body systems Disordered systems, quantum annealing and com Topological phases in static or driven systems Major Research Facilities in the Group

Departmental cluster

Powerful workstation with 128 GB RAM and 32 cores

Analytical and numerical expertise in statistical and

condensed matter systems echnology/Product Developed/Up to 3 most significant Publications

A. Rajak, S. Suzuki, A. Dutta, and B. K. Chakrabarti, Quantum annealing: An overview, Philos. Trans. R. Soc. A 381, 20210417 (2023)

A. Rajak, I. Dana, and E. G. Dalla Torre, Characterizations of prethermal states in periodically driven many-body systems with unbounded chaotic diffusion, Phys. Rev. B 100, 100302(R) (2019)

A. Rajak and A. Dutta, Survival probability of an edge Majorana in a one-dimensional p-wave superconducting chain under sudden quenching of parameters Phys. Rev. E 89, 042125 (2014)









Bhuvanesh Ramakrishna

Associate Professor, High energy Laser, Department of Physics

B318.; 6712.; 8106847958 (optional); bhuvan@phy.iith.ac.in; https://bhuvaneshr.wordpress.com/

- Major Areas of Research/Up to 3 major sponsored projects
- # Laser plasma interaction
- # Proton beam therapy.
- # Plasma astrophysics
- Major Research Facilities in the Group
- # Terawatt femtosecond Laser
- # Ion spectrometer.



#Photon emission enhancement studies from the interaction of ultraintense laser pulses with shaped targets. Physical Review E, **Volume** 105, **Year** 2022

Ion source perturbation and control in intense laser plasma interaction Matter and Radiation at Extremes, Volume 5, Year 2020





भारतीय प्रौद्योगिकी संस्थान हैदराबाद Indian Institute of Technology Hyderabad

Jyoti Ranjan Mohanty Associate Professor, Nanomagnetism and Microscopy lab, Department of Physics

B-216.; Office Phone No.040-; 23016709; jmohanty@phy.iith.ac.in; NML IITH

Major Areas of Research/Up to 3 major sponsored projects

- Magnetic spin texture for data storage application (DST- Nanomission)
- Advanced magnetic material for field sensing (DRDO-NRB)
- Anisotropy engineered magnetic material for application (SERB)
- Magnetic microscopy of functional material and devices
- Length and time dynamics in magnetic system

Major Research Facilities in the Group

- DC/RF sputtering system, CVD system
- Multi-chamber thin film deposition system (upcoming)
- Scanning Probe Microscopy (AFM/MFM/PFM)
- Magneto-optic Kerr magnetometer and microscope
- 3D optical profilometer
- Projection lithography with probe station

Technology/Product Developed/Up to 3 most significant Publications

- Tunable magnetic thin film system for field sensing
- Comprehensive one-stop magnetic microscopy and modeling facility
- Dynamics and inertia of skyrmionics spin texture, Nature Physics, 11(3), 225, 2015
- Dichroic coherent diffractive imaging, PNAS, 108 (33), 13393, 2011 Understanding magnetic microstructure through experiment and machine learning, ACS Applied Materials and Interfaces, 14 (44), 50318, 2022









V. Kanchana

Professor, Materials design and Simulation lab, Department of Physics

Sponsored projects:

1. DRDO; PI; (29.92 lakhs)



Office: A-105; Office No.: (040) 2301 - 6702.; kanchana@phy.iith.ac.in, Web Link: https://people.iith.ac.in/kanchana/

Major Areas of Research/Up to 3 major sponsored projects



- 1. Topological materials
- 2. Advanced magnetic materials 2. BRNS; PI; (27.09 lakhs)
- 3. Energy harvesting materials 3. CSIR ; PI; (24.15 lakhs)

Major Research Facilities in the Group

Workstations and Common facilities





Technology/Product Developed/Up to 3 most significant Publications

- Orbital ordering and quasi-two-dimensional magnetism in AMnF₄ (A=K,Rb): A first-principles study, Anuroopa Behatha, Tulika Maitra, Alexander N. Rudenko, , and V. Kanchana, Phys. Rev. B 106, 024409 (2022)
- 2.Topological phonons and electronic structure of Li₂BaSi class of semimetals, Vineet Kumar Sharma, Birender Singh, Anan Bari Sarkar, Mayanak K Gupta, Ranjan Mittal, Amit Agarwal, Bahadur Singh, V Kanchana, Journal of Physics: Condensed Matter 34 (12), 12550 (2021)
- 3. Electronic structure and physical properties of EuAuAs single crystal, S Malick, J Singh, A Laha, **V Kanchana**, Z Hossain, D Kaczorowski, Physical Review B 105 (4), 045103 (2021)



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Kirit Makwana

Assistant Professor, pLASma Lab, Department of Physics

C-435.; +91 40 2301 6721; kdmakwana@phy.iith.ac.in; https://people.iith.ac.in/kdmakwana/

Major Areas of Research/Up to 3 major sponsored projects

- Theoretical and computational analysis of space, astrophysical, and laboratory plasmas
- SERB-SRG project Kinetic scale current sheets and wave interactions in space plasma turbulence

Major Research Facilities in the Group

- Two workstations with net 56 cores, 256 GB RAM, **30TB** storage space
- Shared computing cluster, using National Supercomputing Mission (NSM) facility, and NSM research grant

Technology/Product Developed/Up to 3 most significant Publications

- Properties of magnetohydrodynamic modes in compressively driven plasma turbulence, K. D. Makwana, and Huirong Yan, Physical Review X 10, Vol. 3, 031021 (2020)
- Study of magnetic reconnection in large-scale magnetic island coalescence via spatially coupled MHD and PIC simulations (Editor's Pick) K. D. Makwana, R. Keppens, and G. Lapenta, Phys. Plasmas 25, భారతీయ సాంకేతిక విజ్నాన సంస్థ హైదరాబాద్ 082904 (2018) भारतीय प्रौद्योगिकी संस्थान हैदराबाद Indian Institute of Technology Hyderabad







Mahesh Peddigari

Assistant Professor, Functional Ceramics and Device Lab, Department of Physic

C-208/F; Office Phone No. 040-23016726; mahesh.p@phy.iith.ac.in; Maheshpeddigari

Major Areas of Research/Up to 3 major sponsored projects

- 1. Multifunctional ferro/piezoelectrics
- 2. Energy storage and electrocaloric materials
- 3. Flexible energy harvesters and sensors
- 4. Artificial relaxor ferroelectrics

Major Research Facilities in the Group

Will be updated soon



Technology/Product Developed/Up to 3 most significant Publications

- 1. Ultra-magnetic field sensitive magnetoelectric composite with sub-pT detection limit at low frequency enabled by flash photon annealing, *Nano Energy*, 90, 106598, 2021.
- 2. Flexible Self-charging, Ultrafast, High-power density Ceramic Capacitor System, ACS Energy Letters, 6, 1383-1391, 2021.
- 3. A high output magneto-mechano-triboelectric generator enabled by accelerated water-soluble nanobullets for powering a wireless indoor positioning system, Energy & Environmental Science, 12, 666-674, 2019.

Manish Kumar Niranjan

Professor, Department of Physics

C-516; 040-23016705; manish@phy.iith.ac.in; https://iith.ac.in/phy/manish/

Major Areas of Research

Theoretical Nanoscale Physics; Ab-initio electronic structure;

Heterostructures; Surface and Interface Physics; Quantum transport

Major Research Facilities in the Dept.

High performance cluster and workstations

3 most significant Publications

- 1) M. K. Niranjan, Physical Review B, 103 (19), 195437 (2021)
- 2) M. K. Niranjan et al., Applied Physics Letters, 96, 222504 (2010)
- 3) M. K. Niranjan et al., Physical Review Letters 103, 016804 (2009)









Mayukh Pahari

Assistant Professor, Astrophysics Lab, Department of Physics

C546.; 04023016722.; 8207039096; mayukh@phy.iith.ac.in; https://iith.ac.in/phy/mayukh/

Major Areas of Research/Up to 3 major sponsored projects

Black hole Astrophysics

High resolution spectro-timing techniques in

Astronomy and Astrophysics

X-ray and Gamma-ray photon detectors

Major Research Facilities in the Group

High end computation facilities

Telescopes

Access to Major space satellites around the world like AstroSat, Chandra, XMM-Newton

Corrent Cor

Technology/Product Developed/Up to 3 most significant Publications

'A persistent ultraviolet outflow from an accreting neutron star binary transient': 202: Nature, Volume 603, Issue 7899, p.52-57

'X-Ray Spectral State Evolution in IGR J17091-3624 and Comparison of its Heartbeat Oscillation Properties with those of GRS 1915+105' : 2014, The Astrophysical Journal, Volume 783, Issue 2, article id. 141, 21 pp.

'Large area high temperature hard X-ray spectroscopy detectors for space experiments': 2010, Nuclear Instruments and Methods in

Physics Research Section A, Volume 621, Issue 1-3, p. 364-37

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Narendra Sahu

Professor, High Energy Physics, Department of Physics

C-402; Office Phone No: 04023016706; Mob: 9494425086; Email: nsahu@phy.iith.ac.in; Narendra Sahu



Major Areas of Research/Up to 3 major sponsored projects

- Astroparticle physics (neutrino and dark matter)
- (1) Asymmetric dark matter (DST fast track project)
- (2) Unified theory of DM, neutrino mass and

Baryon asymmetry (DAE-BRNS project)

Major Research Facilities in the Group

Theoretical Physics



Technology/Product Developed/Up to 3 most significant Publications

(1) Asymmetric inelastic inert doublet dark matter from triplet scalar leptogenesis by C. Arina and N. Sahu, Nucl. Phys. B854 (2012), 666-699

(2) Co-genesis of matter and dark matter with vectoe-like fourth generation leptons by C. Arina, R.N. Mohapatra and N. Sahu, Phys.

Lett. B720 (2013), 130-136



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Nithyanandan Kanagaraj

Assistant Professor, Ultrafast Complex Photonics Lab, Department of Physics

Room No.; C-313, Ph. No. 23016723; Email : nithyan@phy.iith.ac.in; Webpage: https://nithyanandan.com

Major Areas of Research/Up to 3 major sponsored projects High Power Lasers for Medical, Manufacturing, and Directed Energy Weapons

Smart Photonics systems: AI-assisted Lasers, Sensors, Frequency Comb Fiber Optics Communication and Optical Signal Processing Machine Learning and advanced computation

Major Research Facilities in the Group

Near IR Fiber Lasers and amplifiers operating Laser-based material processing systems Advanced Laser Characterization facility

Technology/Product Developed/Up to 3 most significant Publications

Spotlighting the Simultaneous Formation of Dissipative Solitons in an Er-Doped Bidirectional Ultrafast Fiber Laser, Phys. Rev. Applied 18, 064096, 2022

Real-time observation of internal motion within ultrafast dissipative optical soliton molecules, Physical Review Letters, 18 (24), 243901, 2017

Optical Soliton molecular complexes in a passively modelocked fibre laser. Nature communications 10 (1), 1-11, 2010







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Prem Pal

Professor, MEMS and Micro/Nanosystems Laboratory, Department of Physics

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Major Areas of Research/Up to 3 major sponsored projects

Silicon wet bulk micromachining, Thin films for MEMS, Silicon surface texturing for MEMS and solar cell applications, Glass wet bulk micromachining

Major Research Facilities in the Group

RF & DC Magnetron Sputtering system, Mask Aligner, Spectroscopic Ellipsometry, 3D Laser Scanning microscope, Reactive Ion Etching System,





Mask Aligner

RF & DC Magnetron Sputtering system <u>Technology/Product Developed/Up to 3 most significant Publications</u>

- Prem Pal, V. Swarnalatha, A. V. Narasimha Rao, A. K. Pandey, H. Tanaka, and K. Sato, "High Speed Silicon Wet Anisotropic Etching for Applications in Bulk Micromachining: A Review", *Micro and Nano Systems Letters*, vol. 9, no.4, pp. 1-59, Feb. 2021.
- Prem Pal and K. Sato, "A comprehensive review on convex and concave corners in silicon bulk micromachining based on anisotropic wet chemical etching", *Micro and Nano Systems Letters*, vol. 3, no.1, pp. 1-42, May 2015.
- A. Ashok and Prem Pal, "Investigation of anodic silicon diox thin films for MEMS applications", Micro & Nano Letters, vol. 9, no. 12, pp. 830-834, Dec. 2014.



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Priyotosh Bandyopadhyay

Associate Professor, Department of Physics (Electroweak Group)

Acad B-506, Phone: +91 040 2301 6716, Email: bpriyo@phy.iith.ac.in, Webpage: people.iith.ac.in/bpriyo/

Major Areas of Research/Up to 3 major sponsored projects

Physics Beyond the Standard Model (BSM) Finite temperature field theory, order of phase transition, gravitational wave **Collider** physics Neutrino physics and dark matter

SERB Sponsored projects: CRG, MATRICS, Karyashala

Major Research Facilities in the Group

5 high-performance workstations sponsored by SERB and RDF.

Technology/Product Developed/Up to 3 most significant Publications

- P. Bandyopadhyay and A. Costantini. Obscure Higgs Bosons at Colliders. Phys.Rev.D 103 (2021) 1, 015025
- P. Bandyopadhyay and R. Mandal. Revisiting Scalar Leptoquark at the LHC. Eur.Phys.J.C 78 (2018) 491

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Obscure Higgs becom at collision

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Right-handed sneutrino dark matter in U(1)' seesaw models and its signatures at the LHC

Priyetosh Bandyopodhyte, Eang Jin Onan and Jong Ond Park.

Kern Britlin Sr. Shenred Shily.

Begins 87, Decadartean-ra, Soud 116-725, Write Final privetosk@itas.rs.br. sydes@itas.rs.br. yopart@itas.rs.br

setteart: We suggest a stall right-hander constraint, N₁, so a good dark native much done is a superconstric 2" model isolitest the second methanism. When the entry mention, 2. Is lefter than 27, the thread home-out of the righ matter and thread to take kinded neutron, No. - NN, drough the t-thread P exchange is down to produce the right duit matter density. It is recented to include the down and house freeze of X. in this process, otherwise N decouples to courfe and thus dark matter is compreduced. At the LDC, the search he the count protinging can be made by observing the signature of $p \rightarrow TT \rightarrow NN + p_{T}$ as T -maller exploring produced from the essentie decises of grainse inpacts, which is complementary to the worth of $pp \rightarrow Z' \rightarrow NX$. This may also open up a pumping new channel of finding the Higgs boson from the deplaced X deeps.

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Sai Santosh Kumar Raavi

Associate Professor, Department of Physics & Department of Climate Change

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Major Areas of Research/Up to 3 major sponsored projects

- Optical time-resolved spectroscopy
- Ultrafast nonlinear optics
- Device Physics of Organic Photovoltaics (OPV)

Major Research Facilities in the Group



- Steady-state and Time-resolved Photoluminescence spectroscopy with time-correlated single photon counting (TCSPC) detection.
- Thin-film preparation with spin-coating technique and vacuum deposition technique
 Fabrication of simple thin-films devices like organic photovoltaic cell, for spectroscopic characterization
- Characterization of solid-state dye-sensitized solar cells, organic bulk-heterojunction solar cells with Solar simulator and external quantum efficiency (EQE) measurement <u>Technology/Product Developed/Up to 3 most significant Publications</u>
- Katta, Venkata Seshaiah, et al. "Plasmonic Au NPs embedded Ytterbium-doped TiO2 nanocomposites photoanodes for efficient indoor photovoltaic devices." Applied Surface Science 611 (2023): 155728.
- Biswas, Chinmoy, et al. "Multistep Electron Injection Dynamics and Optical Nonlinearity Investigations of π -Extended Thioalkyl-Substituted Tetrathiafulvalene Sensitizers." The Journal of Physical Chemistry C 124.44 (2020): 24039-24051.
- Ahmed, Md Soif, et al. "Metalated porphyrin-napthalimide based donoracceptor systems with long-lived triplet states and effective three-photon absorption." Journal of Photochemistry and Photobiology A: Chemistry 435 (2023): 114324.



Saket Asthana Professor, Advanced Functional Materials Lab, Department of Physics Office Room No.; A606 Office Phone No.;23016703 Mobile (optional); Institute Email; asthanas@phy.iith.ac.in Webpage Link: https://www.iith.ac.in/~asthnas/

- Major Areas of Research/Up to 3 major sponsored projects
- Relaxor materials for energy storage density.
- Electric field driven effects on structure-property.
- Ferroic and Multiferroic Materials.

Major Research Facilities in the Group Fumehood, Ball Mill, XRD, SEM





Technology/Product Developed/Up to 3 most significant Publications

https://scholar.google.co.in/citations?user=9GPKaOwAAAJ&hl=en https://www.scopus.com/authid/detail.uri?authorId=7006820783 https://orcid.org/0000-0002-6420-3304



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Saranya Samik Ghosh

Assistant Professor, High Energy Physics, Department of Physics

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- Major Areas of Research/Up to 3 major sponsored projects
- Research on fundamental particles and their interactions in the field of experimental High Energy Physics (HEP), specifically at the Large Hadron Collider (LHC)
- Physics of the Higgs boson, Standard Model (SM) measurements and searching for new physics phenomena beyond the SM
- Research and development of particle physics detectors
- Development of computing algorithms, machine learning techniques for application in High Energy Physics research <u>Major Research Facilities in the Group</u>
- Particle detector laboratory under development <u>Technology/Product Developed/Up to 3 most significant Publ</u>
 CMS Collaboration, "Observation of ttH Production", Phys. Rev. Lett.
- 120, 231801 (2018)
- CMS Collaboration, "MUSiC: a model-unspecific search for new physics in proton-proton collisions at $sqrt(s) = 13 \text{ TeV}^n$, Eur. Phys. J. C (2021) 81: 629
- CMS Collaboration, "Measurements of Higgs boson properties in the diphoton decay channel in proton-proton collisions at భారతీయ సాంకేతిక విజాన సంస హెదరాబాద్ sqrt(s) = 13 TeV", J. High Energ. Phys. (2018) 2018: 185 भारतीय प्रौद्योगिकी संस्थान हैदराबाद Indian Institute of Technology Hyderabad





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Major Areas of Research/Up to 3 major sponsored projects

- 1. Nanophotonics, Metamaterials
- 2. Energy materials
- 3. Photothermal energy harvesting and Photocatalysis

Major Research Facilities in the Group

Will be updated soon...

Technology/Product Developed/Up to 3 most significant Publications

1. T. Goto, S. Ito, <u>S. L. Shinde</u>, R. Ishibiki, Y. Hikita, I. Matsuda, I. Hamada, H. Hosono and T. Kondo, Carbon dioxide adsorption and conversion to methane and ethane on hydrogen boride sheets, Communications Chemistry, 1-10, 2022.

2. <u>S. L Shinde</u>, H. D. Ngo, S. Ishii, and T. Nagao., Solar-active Titanium-based Oxide Photocatalysts Loaded on TiN Array Absorbers for Enhanced Broadband Photocurrent Generation. Journal of Applied Physics, 023103, 2020. 3. <u>S. L. Shinde</u>, S. Ishii, and T. Nagao, Sub-bandgap photodetection from titanium nitride/germanium heterostructure ACS Applied Materials & Interfaces, 21965-21972, 2019.





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Major Areas of Research

- Flavour Physics, Rare B-meson Decays
- Belle (II) Experiment
- High Energy Physics Detector and Instrumentation
- Medical Physics

Major Research Facilities in the Group

Cosmic Muon Detection Setup

Up to 3 most significant Publications

- 1. "Test of lepton flavor universality and search for lepton flavor violation in B \rightarrow Kll decays" (Belle Collab.) JHEP03(2021)105.
- "Measurement of the B+/Bo production ratio in e+e- collisions at the Y(4S) resonance using B→J/ψ(ℓℓ)K decays at Belle" (Belle Collab.), arXiv:2207.01194 accepted in PRD(L)
- "Charged particle identification performance of the TOP counters in Belle II" (Belle II TOP sub-detector group), J. Phys.: Conf. Ser. 2374 012107







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Major Areas of Research/Up to 3 major sponsored projects

- Cosmology and Galaxy Clusters
- Pulsar Timing and Search for nanoHz Gravitational Waves
- Applications of Machine learning and Data mining to Astrophysics
- **Major Research Facilities in the Group**
- National and international telescopes eg.
- Giant Meterwave Radio Telescope
- Dark Energy Camera
- South Pole Telescope
- IceCube neutrino observatory

Technology/Product Developed/Up to 3 most significant Publications

- S. Desai et al, ``Search for Dark Matter WIMPs using Upward Through-Going Muons in Super-Kamiokande", Phys. Rev. D70, 083523 (2004)
- Y. Ashie et al [includes S. Desai] ``A Measurement of Atmospheric neutrino Oscillation Parameters by Super-Kamiokande" Phys. Rev. D71, 112005 (2005)
- B. Abbott et al [includes S. Desai] ``Multi-messenger observation of a Binary Neutron Star Merger" ApJL, 848. L17 (2017)









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Major Areas of Research

- 1. Nonperturbative string/M-theory and field theory (AdS/CFT, (M)atrix Theory)
- Quantum Information approaches to Quantum Gravity
- 3. Quantum Black Holes & Quantum Cosmology
- 4. Holography beyond asymptotically AdS spacetimes

Major Research Facilities in the Group



Technology/Product Developed/Up to 3 most significant Publications

 Holographic representation of bulk fields with spin in AdS/CFT, *Phys.Rev.D* 86 (2012) 026004 (with D.N. Kabat, G. Lifschytz, D. Sarkar)
 Fluids, Anomalies and Chiral Magnetic effect: A Group-Theoretic formulation, *Phys.Rev.D* 86 (2012) 025012 (with V.P. Nair, R. Ray)
 A Grassmann path from AdS_3 to flat space, *JHEP* 03 (2014) 036 (with C. Krishnan, A. Raju)





<u>R. S. Hundi and I. Sethi, Neutrino masses and mixing angles in a model with six</u> <u>Higgs triplets and A 4 symmetry, Phys. Rev. D 102, no.5, 055007 (2020)</u>

Suryanarayana Jammalamadaka

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Major Areas of Research/Up to 3 major sponsored projects

1. Magnetic materials, Device physics, Spintronics, Data storage and Non volatile memory devices

2. Electric field control of exchange bias in FM/AFM multilayers for energy efficient spintronic applications (DST SERB CRG)

Major Research Facilities in the Group

- 1. Vibrating sample magnetometer
- 2. RF Magnetron sputtering/Thermal evaporator
- 3. Closed cycle helium cryostat (10 450 K)
- 4. Semiconductor characterization system (Keithely 4200)

Technology/Product Developed/Up to 3 most significant Publications

1. A.K. Jana, S. Jammalamadaka, "Spin transfer torque Bias (STTB) due to domain wall resistance in an infinitely long ferromagnetic nanowire." *IOP-Nanotechnology*. 1361-6528, (2022)

Dwipak Prasad Sahu, Prabana Jetty and Suryanarayana Jammalamadaka, Graphene oxide based synaptic memristor device for neuromorphic computing, *Nanotechnology* **32** 155701 (2021)
 Dwipak Prasad Sahu & S. Narayana Jammalamadaka Detection of bovine serum albumin using hybrid TiO2 + graphene oxide based Bio – resistive random access memory device *Scientific Reports* **9**, 16141 (2019)

Patents: 1. S. Narayana Jammalamadaka and Dwipak Prasad Sahu Application No: 201941034084; Filing Date: August 23, 2019 (published by Indian Patent Office in the Official Journal No. 09/2021). 2. S. Narayana Jammalamadaka, M. D. Sreeveni and Chandrasekhar Murapaka Patent entitled

Application No: 201941048936; Filing Date: 28th November 2019. Published at Indian patent official journal







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Major Areas of Research

- Ultrashort electron generation
- Mass Spectrometry
- Ultrafast atomic and molecular dynamics
- Nano-/Micro-particle beam Generation
- Phase dependent study using CEO phasemeter

Major Research Facilities in the Group

- 1kHz, 6mJ Femtosecond Laser
- Reaction Microscope Spectrometer (REMI)
- Velocity Map Imaging Spectrometer (VMI)
- Nano-Tip Femtosecond Electron Spectrometer
- Stereo ATI CEO Phasemeter

Technology/Product Developed

- Whole Slide Imaging
- 3D IR Vein Viewer
- Reflectron Mass Spectrometer
- Computer Vision aided Nano Tip Etching
- Aerosol Generator and Aerodynamic Lens







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Major Areas of Research/Up to 3 major sponsored projects

- Ultrafast terahertz quantum photonic devices/ superconductor photonics
 Metamaterial photonic bio-molecular sensors with absolute specificity
- 3) Terahertz /optical pump and terahertz probe measurements of novel materials <u>Major Research Facilities in the Group</u>

Will be updated soon <u>Technology/Product Developed/Up to 3 most</u> <u>significant Publications</u>

- 1) Y. K. Srivastava, et. al. "A superconducting dualchannel photonic switch" Adv. Mater. 2018, 30, 1801257.
- 2) Y. K. Srivastava, et. al., "MoS2 for ultrafast alloptical switching and modulation of THz Fano metaphotonic devices", Adv. Opt. Mater. 2017, 5, 1700762.

3) Y. K. Srivastava, et. al. "The Elusive High-Tc Superinductor" 2022, arXiv:2209.01342, (under review)





