



**DEPARTMENT OF PHYSICS**

**Swapna Mahapatra**

**Utkal University, Bhubaneswar**





# Department of Physics

## A Brief Profile



PHYSICS

PHYSICS

**Year of Establishment-1967**

Recognised under  
**UGC-SAP, DST-FIST, DST-PURSE**

# Vision

- To take the leadership in setting the standard of Physics Education in terms of Teaching and Research in the State and in the Country.
- To create and sustain the conditions for our students to experience a unique educational training that is intellectually, socially and personally transformative.

# Mission

- 1.To make quality education accessible to talented boys and girls.
2. Strive to maintain high academic standard in teaching and research consistent with global scenario.
3. Reach out to the peripheral sectors and public at large in spreading the culture of scientific education and research.

# Brief History of the Department

- **Instrumental in setting up of Institute of Physics, Bhubaneswar.**
- **Played a pivotal role in Modernizing Physics Education and Research in the State and establishing Odisha Physical Society.**
- **IBM 1130 : beginning of Computer age (1970) in the State.**
- **Initiation of PGDCA programme → Dept. of CSA, UU**
- **Nodal point for the NCERT 'CLASS' project for schools.**

# Programmes offered

- **Post Graduation, M.Phil. and Ph.D. courses.**
  - ❑ **M.Sc. (32+32)**
  - ❑ **M.Phil. (10)**
  - ❑ **Ph.D. (10 - Maximum)**
- **M.Sc. Special papers** **i) Advanced Particle Physics**  
**ii) Advanced Condensed Matter Physics**
- **M.Sc. examinations : Semester and Choice Based Credit System**
- **M. Phil. (2 Semesters) with Dissertation.**
- **Ph.D. Course work (1 Semester)**



# Faculty Profile

Name	Designation	Qualification	Area of research
Swapna Mahapatra	Professor & Head	Ph.D (IOP)	Particle Physics, Gravitation &Cosmology
Shesansu Sekhar Pal	Reader	Ph.D (IOP)	High Energy Physics
Prafulla Kumar Panda	Reader	Ph.D (IOP)	Nuclear Physics & Particle Physics
Pramoda K. Samal	Asst.Prof.	Ph.D (IIT Kanpur)	Cosmology
Jagdish Kumar	Asst.Prof.	Ph.D (IISc, Bangalore)	Nonlinear Dynamics, Biophysics
Bhagaban Kisan	Asst.Prof.	Ph.D Cont. (IIT Guwahati)	Expt. Condensed Matter Physics
Ramakanta Naik	DST-INSPIRE Faculty	Ph.D (IISc, Bangalore)	Expt. Condensed Matter Physics
Durga Prasad Mahapatra	Visiting Professor	Ph.D (IOP)	Condensed Matter Physics and High Energy Physics
Karmadeva Maharana	Visiting Professor	Ph.D (NIT, Rourkela)	Particle Physics, Gravitation &Cosmology
Naresh Ch. Mishra	Visiting Professor	Ph.D (IISc, Bangalore)	Materials Science
Gopal Krushna Pradhan	Visiting Scientist	Ph.D (JNCASR, Bangalore)	Expt. Condensed Matter Physics

# Research Thrust Areas:

Thrust Areas	Funding Agency
<b>High Energy Physics, Gravitation and Cosmology, Materials Science</b>	<b>UGC-DRS-II</b>
<b>Neutrino Physics (INO) (National Collaboration) India based Neutrino Observatory</b>	<b>DST-DAE</b>
<b>Experimental Condensed Matter Physics</b>	<b>DST FIST- II</b>

# Emerging Thrust Areas:

<b>Nuclear-Astro Physics</b>	<b>BRNS</b>
<b>Computational Biology</b>	

# Research Activities in HEP

- Search for CP Violation in B meson decaying to  $\phi\phi K$  mesons at Belle and measurement of direct CP violation in charmless B meson.
- INO: Study of the atmospheric neutrinos and antineutrinos with particular emphasis to determine the neutrino mass hierarchy, precision measurement of atmospheric neutrino mixing parameters at ICAL, how to probe new physics scenarios like CPT violation, presence of magnetic monopoles.
- Accretion of radiation in the radiation dominated era and evaporation rates of rotating and nonrotating Primordial black holes standard cosmology as well as in Brans-Dicke theory of Gravitation.
- Duality symmetry in String theory and computation of the macroscopic and microscopic entropy of a class of black holes including higher order curvature corrections, exploring the connection to topological string theory



- Properties of QGP and dual gravitational description with time dependent background.
- Testing the statistical isotropy of CMBR and various cosmological anomalies present in temperature and polarization data.
- CMB Polarization and Temperature Power Spectra Estimation and the effect of foregrounds on CMB multipole alignment
- Understanding the strongly coupled regime of physics using gauge-gravity duality.
- Study of properties of infinite nuclear matter at zero and finite temperature; quark matter equation of state including strange quarks with gluon condensates; computation of orbital energy loss of the Hulse-Taylor binary by radiation of massless particles; quark meson coupling and properties of compact star.
- Study of the transverse Momentum distribution of the charged hadrons in Heavy Ion Collision at RHIC and LHC implementing the Tsallis q-statistics in the Weibull model of particle production.

# Utkal -KEK Collaboration

- **Asish Satpathy** (1993-1999) (Calorimeter beam test and development )
- **Ajit Mohapatra** (1993-1999) (developed L1 trigger module and simulation for B - Bbar mixing )
- **Prafulla Behera** (1998-2002)(J/Psi production from continuum, muon detector calibration, commissioning, muon efficiency and fake rate study, measurement of CP violation using B -> Psi prime Klong)
- **Subhashree Mohanty** (2013- Continuing) (Through TIFR)
- **Debashis Sahoo** (2016- Continuing) (Through TIFR)
- **Saroj Sahu, Gagan Mohanty, Sanjay Swain, Tapas Sarangi, Seema Bahinipati, Debabrata Mohapatra, Himanshu Bhusan Sahoo, Jyotiprakash Biswal, Nibedita Dash** (Utkal M.Sc. Physics Students)

# Collaborative Research Activities

## International :

- **NIKHEF, University of Utrecht, The Netherlands**
- **IST, Universidade Tecnica de Lisboa, Lisbon, Portugal,**
- **University of New South Wales, Australia**
- **University of Minnesota, USA**
- **Universidade de Coimbra, Portugal**
- **Danish Technical University, Denmark**
- **Universidade Federal de Santa Catarina, Brazil,**
- **Instituto Tecnologico de Aeronáutica, Brazil**
- **University of Kansas, USA**
- **Jet Propulsion Lab (NASA), Caltech, USA**
- **GANIL, France**
- **CNRS, Institute de Astrophysique, France**

# Collaborative Research Activities

## National:

- **INO Collaboration:**  
(TIFR, BARC, IMSc, HRI, IOP, SINP, IIT Madras, IIT Bombay, Delhi Univ., BHU, Lucknow Univ., Calicut Univ.)
- **Institute of Physics, Bhubaneswar**
- **IITs (Kanpur, Indore)**
- **Indian Institute of Science (IISc), Bangalore**
- **Bhabha Atomic Research Centre (BARC), Mumbai**
- **Inter University Accelerator Centre (IUAC), New Delhi**
- **Central University, Tezpur , Assam**
- **Jawaharlal Nehru University, New Delhi; BHU; NIT, Rourkela**
- **IUCAA, Pune**
- **IISER, Bhopal**
- **Cosmic Ray laboratory, TIFR-Ooty**
- **State Universities of Odisha**



# Achievements of Faculty members

- **Humboldt Fellowship**
- **ICTP (Trieste, Italy) Associate**
- **Max-Planck Institute Fellowship**
- **Visiting scientist, Harvard University**
- **Visiting scientist, CERN**
- **NWO (Govt. of Netherlands) Fellowship**
- **Adjunct Faculty: HRI, Allahabad**
- **Senior Associate : ICTS-TIFR**
- **IUCAA Associate**

# Achievements of Alumni members

- **Bhatnagar Awardee (3)**
- **Humboldt, Marie-Curie, Swarnajayanti & Ramanujan Fellowships, ICTP (Italy) Associateship**
- **More than 500 alumni have taken up research as their career**
- **Faculty in National Institutions like TIFR, IISc, IITs, SINP, IMSc, IOP, NISER, IISERs, NITs, CUs, NPL, PRL**
- **Scientists in National Institutions like BARC, RRCAT, IGCAR, ISRO, NPL**

# Special Lectures by Eminent Scientists:

- **Prof. Ashoke Sen (HRI) [Dirac Medalist, Fund. Phys. Prize winner]**
- **Prof. Jogesh Chandra Pati (Stanford) [Dirac Medalist]**
- **Prof. K. Nishijima, Prof. K. Abe (Japan)**
- **Prof. G.'t Hooft (Nobel laureate)**
- **Prof. Bala Iyer (ICTS-TIFR) [Chair IndIGO Consortium, LIGO India]**
- **Prof. Rohini Godbole (IISc, Bangalore) [Chairperson, Women in Sc.]**
- **Prof. Rajaram Nityananda (Former Director, NCRA)**
- **Prof. Ajoy Kumar Ghatak (Former Professor, IIT Delhi)**
- **Prof. Sunil Mukhi (IISER, Pune)**
- **Prof Ashok Das (University of Rochester)**
- **Prof. Asoka Das (Vice-Chancellor, Utkal University)**
- **Prof. D. P. Roy (HBCSE-TIFR) [INSA Senior Scientist]**
- **Prof. Bedangadas Mohanty (NISER) [Bhatnagar Awardee]**
- **Prof. Sandip Trivedi (Director, TIFR)**
- **Prof. Deepak Mathur , Prof. Deepak Dhar (TIFR)**
- **Prof. Sunil Kumar Gupta (TIFR)**
- **Prof. A. K. Mohanty (Director, SINP)**
- **Prof. S. Panda (Director, IOP)**
- **Prof. J. Maharana (IOP)**

# Future Plans

- Establishment of **Centre of Excellence** in High Energy Physics, Material Science
- Contribution to India based Neutrino Observatory (**INO**)
- Revive direct Collaboration in **KEK-B** project and **BELLE** experiments at Japan
- Collaboration in Large Hadron Collider Experiment, **CERN**
- Collaboration with Cosmic Ray Laboratory (**GRAPES 3 Expt**)  
TIFR-Ooty



*Thank You*