Department of Physical Sciences (DPS)

Minimum Eligibility criteria:

Applications are invited from candidates having Masters degree with at least 60% aggregate marks in any field of Physical Sciences for the Doctor of Philosophy (PhD) program. Final year post-graduate students who are yet to obtain their degree may also apply, however, they must complete the MSc/MS degree at the time of admission with the requisite 60% aggregate marks.

Selection of the candidates will be as per the GoI norms. Candidates belonging to the respective reserved category need to submit relevant certificates and documents.

Channel 1: Self Funded category

For candidates in the self-funded category, apart from satisfying minimal eligibility criteria all candidates must have their own PhD fellowships, such as, UGC/CSIR-NET JRF, INSPIRE or any other equivalent fellowships. Please note that people who have INSPIRE FELLOWSHIP, should only apply if they have the "Provisional Offer of Research Studentship under INSPIRE Fellowship".

Theoretical/Computational: Following is the list of broad research areas [and some specific topics] in theoretical and/or computational physics where DPS is willing to take PhD students:

Non-linear Dynamics - Biological Physics - Statistical Physics - Non-equilibrium Dynamics - Soft Condensed Matter Physics

a.1. Stochastic gene regulation

a.2. Quantum Chaos and Random Matrix Theory

b. To develop theoretical and computational models to understand the collective dynamics of active, out of equilibrium systems by using the tools from statistical physics, nonlinear dynamics, and soft condensed matter physics

c. Theoretical polymer physics

d. Phase separation in active matter systems

Gravitational Physics and Astrophysics

a. Numerical modelling of radiation from astrophysical plasma

Theoretical Condensed Matter physics

a. Electronic, Optical, and Magnetic structure of 2D and 3D-strongly correlated systems by Density Functional Theory (DFT) approach.

b. Interplay of disorder (including inhomogeneities and frustration), strong interactions and possible topological effects in correlated quantum matter.

Experimental: Following is the list of broad research areas [and some specific topics] in experimental physics where DPS is willing to take PhD students:

Optics/Spectroscopy

a.1. Microbubble lithography: Generating novel mesoscopic architectures using Thermo-optical tweezers based directed self-assembly, and studying their science.
a.2. Photophoretic trapping of absorbing particles in air: Developing 3d optical tweezers for trapping absorbing microparticles and uncovering the physics behind their phenomena.

b.1. Probing optoelectronic properties of materials by ultrafast time-resolved optical spectroscopy
b.2. Probing carrier and spin-valley dynamics in 2D materials by polarization-resolved and magneto-optical spectroscopy
b.3. Study of nonlinear refraction, two-photon and saturable absorption, and second harmonic generation in materials

c. Terahertz Spectroscopy and Pump Probe Spectroscopy of quantum materials and their heterostructures

d.1. Molecular dynamics in electron collisions with supersonically cold molecules using velocity map imaging technique.

d.2. Absolute dissociative electron attachment cross section measurements of biologically important molecules using time-of-flight mass spectrometers.

Experimental condensed matter physics

a. Experiments on synthetic motile systems

b.1. Electronic and Magnetic structure by synchrotron based X-ray Photoemission spectroscopy (Both Angle-resolved and Angle-integrated).
b.2. Electronic, Optical, Magnetic, and Transport properties of strongly correlated systems and novel nanomaterials.

Channel 2: Institute Funded category

Institute funded positions are available in the following areas/topics:

Condensed Matter [Theoretical] [**Prof. Satyabrata Raj**]

a. Electronic, Optical, and Magnetic structure of 2D and 3D-strongly correlated systems by Density Functional Theory (DFT) approach.

Optics/Spectroscopy [Experimental] [**Dr. Kamaraju Natarajan]**

a. Second Harmonic spectroscopy & Transient pump-probe absorption spectroscopy of 2D quantum materials.

Channel 3: Project Funded category

Project funded positions are available in the following areas/topics:

Optics/Spectroscopy [Experimental] [**Prof. Ayan Banerjee]**

Studies on stochastic micro-engines in complex fluids: This involves design, theoretical analysis and experimental demonstration of a Brownian engine in a viscoelastic fluid using optical tweezers.

DPS Spring 2024 PhD Timeline :

PhD application portal opens: 22.09.2023

- Application portal closes: 19.10.2022
- Publication of shortlist for the Interview: 30.10.2023
- Selection Interview window : November 13 - 17 2023
- Publication of PhD interview results by: 11.12.2023
- Pre-registration portal opens: 18.12.2023
- Pre-registration deadline: 27.12.2023

Orientation: 2 January 2024