

# University and PG College MSc Teachers' Training Program in PHYSICS

7<sup>th</sup> June to 27<sup>th</sup> June 2018 (21 days)



Center of Excellence in Science and  
Mathematics Education

**Indian Institute of Science**

at its

Challakere Campus, Chitradurga  
under

Pandit Madan Mohan Malaviya National Mission  
on Teachers and Training  
(PMMMNTT, MHRD, Govt. of India)



The IISc at Challakere Campus offers a great opportunity for the university and PG college faculties teaching MSc physics. This is a three weeks (21 days)

residential training program equivalent to UGC refresher courses approved by the MHRD, Govt. of India.

**Course Specialization: Quantum Physics and Solid State Physics.** A unique feature of this training is learning solid state Physics by doing experiment and learning Quantum Physics by doing calculations from **Density Functional Theory** with open source Quantum Espresso program.

Contact hours of the program will be more than 180 hrs.

- 80 hrs of lectures (8.0 am - 12.0pm).
- 100 hrs of experiments (~1pm- 6.30 pm).
- 3-5 Experiments per day

Lectures will be delivered by IISc Faculty members. Training program consists of three parts-

### **Part 1: Orientation to general physics**

Basic electronics, Mathematical physics, *Computer education, Unix OS, functions and plots*, (4 days).

**Part 2: Quantum Physics-** Basics of quantum Physics, Exact solution for hydrogen atom, hydrogenic orbitals, introduction to Density Functional Theory (DFT), Use of Quantum Espresso to obtain electronic energy levels of atoms, ions, molecules, crystal structure determination of solids, band structure calculation of **metals and semiconductors**; Confirmation of energies by Photoelectron spectroscopy.

**Part 3: Solid State Physics and Spectroscopy-** Crystal growth, Crystal binding and structure, Band theory in solids, magnetic properties of materials, Semiconductors. We also have designed experiments to understand theory mentioned above which includes- Thin film preparation by ion sputtering and evaporation, electrochemical method, spin coating; X-ray diffraction- intensity analysis, Rietveld refinement of powder x-ray profile; Understanding and analysis of IR, UV spectra of solids; Introduction to NMR spectroscopy of solids and liquids; Introduction to photoelectron spectroscopy and analysis of its spectra.

In addition to above, teachers will be trained in experiments including: Data acquisition; Graph simulation and plotting; Low temperature down to 10 K measurement techniques; R vs T measurements for metals, semiconductors and alloys; Transport properties (I-V characteristics) for solids and thin films; Vapor pressure measurement and determination of critical point; Diffraction due to Helical structure and double helical structure

*Applications are invited from any Indian who teaches M.Sc. physics. Those who have attended two UGC refresher courses earlier can apply. **Contract and guest lecturers can also apply.***

No holiday/break in 21 days. Only one Sunday afternoon will be left free.

***Send your application in the prescribed format available in the TDC website [tdc.iisc.ac.in](http://tdc.iisc.ac.in)***

**Last date to receive application:  
May 20, 2018**

Send your application to  
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