

# Seminar

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## Institute for Plasma Research

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**Title :** Pressure tuning of material properties: selected examples from the high pressure powder diffraction beamline “Xpress” at Elettra synchrotron radiation facility, Trieste

**Speaker:** Dr. Boby Joseph  
Elettra Synchrotron Radiation Facility, Italy

**Date :** 09th July 2019 (Tuesday)

**Time :** 03.30 PM

**Venue :** Seminar Hall, IPR

### Abstract :

Pressure is a thermodynamic variable, extremely useful in altering the material properties. For condensed matter physicist, tuning of the electronic properties are of utmost important, for chemist, it's the bonding properties and for the material scientist, it's the functional properties: in all such cases, high pressures from few to few tens of GPa are shown to be of great use. We discuss pressure induced structural disruption and peculiar metallic state in FeGa<sub>3</sub>, a strongly correlated electron system [1], pressure tuning of electronic topological transition (ETT) in a thermoelectric AgBiSe<sub>2</sub> [2a], a 2D metal dichalcogenide 1T-TiTe<sub>2</sub> [2b], and a strong spin-orbit coupled TlBiS<sub>2</sub> [2c]. The development of novel hybrid nanosystems using pressure treatment of porous systems [3] would be discussed. Excellent high pressure powder diffraction data were essential in all the above cited examples, which are available thanks to a relatively young Indo-Italian high pressure diffraction beamline facility – Xpress, at the Elettra synchrotron radiation laboratory at Trieste. The salient features of this facility will also be discussed.

### References

1. G. Hearne, et al., Phys. Rev. B 98, 020101 (2018)
  2. V. Rajaji et al., (a) Appl. Phys. Lett. 109, 171903 (2016);  
(b) Phys. Rev. B 97, 085107 (2018);  
(c) Phys. Rev. B 99, 184109 (2019)
  3. F. Alabarse et al., (in-progress)
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