On Thursday 28 May at 2:30 pm Venus Rai (JCNS-2) will hold, by digital means, a seminar talk whose title and abstract are given below.

Title: Chiral Anomaly and Anomalous Hall Effect in parent and Fe doped

Hexagonal-$Mn_{3+\delta}Ge$ Weyl semimetals.

Abstract: Topological quantum materials have attracted enormous attention since their discovery due to the observed anomalous transport properties, which originate from the non-zero Berry curvature. $Mn_{3+\delta}Ge$ has gained special attention because of its large anomalous transport effects that persist starting from Néel temperature (365 K) down to 2 K. Due to the presence of very small in-plane ferromagnetic component, chirality of magnetic structure can be controlled easily by applying just a few hundred Oersted (Oe) of magnetic field. Hexagonal - $Mn_{3+\delta}Ge$ stabilizes in the range of $\delta = 0.2 – 0.55$. In order to understand the involved quantum phenomena - Anomalous Hall effect (AHE) - in such materials, it is also important to check the stability of AHE with the variation of δ. Due to specific mirror symmetry of the triangular antiferromagnetic structure, AHE is expected to be observed when magnetic field (B) is applied along *x* or *y* crystallographic axis. AHE has been reported in the lower range of δ (= 0.22, 0.32 [Kiyohara *et al.* (2015)]), however the upper range of δ was still unexplored. We have investigated samples with the upper range of δ (~ 0.55) and AHE with very small Hall - hysteresis (<200 Oe) was observed when the magnetic field was applied along *x* or *y* crystallographic axis. The magnitude of AHE in $Mn_{3+0.55}Ge$ is found to be more than 25% larger than the reported AHE for samples with $\delta = 0.22 – 0.32$ (Kiyohara *et al.* (2015)). In addition to this, Fe doping in $Mn_{3.2}Ge$ has also shown AHE of comparable magnitude as observed in case of $Mn_{3+0.55}Ge$. Despite being considered as a Weyl semimetal, chiral anomaly (signature for the presence of Weyl points) has not been observed in $Mn_{3+\delta}Ge$ yet. To establish the claim for the existence of Weyl points in $Mn_{3+\delta}Ge$, transverse and longitudinal magneto-resistance (MR) measurement was performed with the magnetic field and electric current applied along several combinations of *x, y, z* crystallographic axes. Angle dependent measurements between the direction of current and applied magnetic field has clearly shown the presence of negative longitudinal MR as long as I||B. Negative longitudinal MR is observed over a long range of magnetic field and temperature. However, the monotonic increase in magneto-resistace with angle (θ) between I and B is observed for the intermediate magnetic field range (0.5 T- 2 T). This behavior is the signature of the chiral anomaly, which evidently supports the claim for the presence of Weyl points in $Mn_{3+\delta}Ge$ compounds.