

## **Colloquium**

### **Topological spin textures, Berry curvatures, and Hall effects in chiral magnets**

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Skyrmions are topological solitons that were first discussed in quantum field theory in the 1960's. In recent years, through a series of beautiful experimental developments, they have become of great relevance to condensed matter physics, especially in chiral magnets. In addition to their fundamental interest as topological spin textures, magnetic skyrmions are also likely to have interesting applications.

I will begin with a pedagogical introduction to what skyrmions are and how they are stabilised in magnetic materials with broken inversion symmetry and spin-orbit coupling. In the second half of my talk, I will describe recent theoretical progress<sup>[1,2]</sup> on understanding transverse electrical, thermal, and thermoelectric transport in skyrmion materials. This requires us to understand the effects of phase-space berry curvature on electron dynamics, with momentum-space berry curvature of the electronic bands leading to the “anomalous” hall response and real-space berry curvature of spin textures leading to the “topological” hall effect.

#### **References:**

[1] N. Verma, Z. Addison, M. Randeria, Science Advances 8, eabq2765 (2022)

[2] Z. Addison, L. Keyes, M. Randeria, Phys. Rev. B 108, 014419 (2023) and in preparation.

***Tuesday, Mar 26<sup>th</sup> 2024***

***16:00 Hrs (Tea / Coffee 15:45 Hrs)***

***Auditorium, TIFR-H***