

Plenary Talk (SKM) PV XIV Wed 9:15 HSZ 01
Emergent Electromagnetism in Solids — ●NAOTO NAGAOSA —
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The electromagnetic responses constitute the essential part of the physical properties of the materials. Recently, it is gradually recognized that the gauge fields analogous to the electromagnetic field exist in condensed matter systems as an *emergent phenomenon* resulting from

restriction of the Hilbert space in the low energy sector. This subspace is usually curved characterized by the connection and curvature corresponding to the vector potential and magnetic field, respectively. Two examples are the U(1) Berry phase analogous to the electromagnetism and the non-Abelian SU(2) gauge field describing the spin-orbit interaction. In this talk, I will try to present a unified view on the gauge structure of the electronic states in solids with several concrete examples of phenomena such as topological Hall effect in Skyrmion crystal state, optical Hall effect, and spin Hall effect.