Hall effect in CoO$_2$ Layer with Hexagonal Structure

WATARU KOSHIBAE, Institute for Materials Research, Tohoku University, AKIRA OGURI, Department of Material Science, Osaka City University, SADAMICHI MAEKAWA, Institute for Materials Research, Tohoku University — The Hall effect in layered cobalt oxides with hexagonal structure is examined. We have pointed out that the large thermopower in the cobalt oxides is caused by the degeneracy of $t_{2g}$ orbitals in Co ions. Here, we show that the orbital degeneracy brings about a Kagomé lattice electronic structure hidden in the CoO$_2$ triangular crystal lattice. This is because the electron hopping occurs between Co ions via neighboring oxygens by exchanging the orbitals in the triangular lattice. The importance of $t_{2g}$ orbital degeneracy on the transport properties of the cobalt oxides under the magnetic field at high temperatures is discussed in light of the theory.