

# A Dormant Giant Awakens: the New Era of Antiferromagnets

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Antiferromagnets and ferromagnets represent two fundamental forms of magnetism with antiferromagnets being the more abundant of the two. However, it has been notoriously difficult to manipulate and detect antiferromagnetic order by any practical means due to the compensated magnetic moment. This has left antiferromagnets over their hundred-year history virtually unexploited and only poorly explored, in striking contrast to the thousands of years of fascination and utility of ferromagnets. This has changed with the proposal and subsequent discovery of a new relativistic spin-torque phenomenon that allow us to efficiently control by electrical currents the antiferromagnetic moments and by this to unlock a multitude of known and newly identified unique features of this “dormant-giant” class of materials. In addition, we have found that these material supports Weyl and Dirac fermions which can be tuned electrically. Hence merging two of the most active researched areas of condensed matter physics in new ways, giving rise to the new field of field of Topological Antiferromagnetic Spin-orbitronics. In addition, these materials have their natural excitations are in the THz – addressing the THz communication gap program – and have properties amenable to neuromorphic analog computing architectures, opening additional avenues of research.

