Spin-orbit coupling and spin transport: from condensed matter to cold atoms

Prof. Rembert Duine
(Universität Utrecht, Niederland)

Abstract:
Spin-orbit coupling, one of the few relativistic effects that survives in the solid state, is gaining importance and is giving rise to the nascent field of “spin orbitronics”. This latter field seeks to manipulate the electron spin via spin-orbit coupling with applications, e.g. in magnetic memories, as the ultimate goal. In this talk I will review some of the consequences of spin-orbit coupling for transport properties of materials, such as the spin and anomalous Hall effects, and spin-orbit torques. In addition, I will discuss similar physics in cold-atom systems subject to synthetic spin-orbit coupling.