Electrons at Surfaces Taking an Unexpected Turn — •STEFAN BLÜGEL — Institut für Festkörperforschung, Forschungszentrum Jülich, D-52425 Jülich, Germany

Electrons in the vicinity of surfaces are in a space asymmetric environment. This causes a number of interesting phenomena, like the Rashba spin-orbit effect [1], spin-depending scattering [2] and spin-polarized electrons [3] at non-magnetic surfaces, which little attention had been paid to in the past. For electrons at magnetic surfaces, thin films and nanostructures also time-inversion symmetry is broken. This can give rise to an unidirectional exchange interaction, known as Dzyaloshinsky-Moriya (DM) interaction. Although this interaction, favoring spatially rotating spin structures, is known for nearly 50 years, its consequences for the magnetic structure in low-dimensional magnets remained basically unexplored. We show by ab initio calculations that the DM interaction can cause homochiral magnetic phases at achiral surfaces — phases, which had been overlooked during the past 20 years — but have been observed recently in terms of a left rotating cycloidal spiral for Mn on W(110) [4]. Theoretical models [5] display a rich phase diagram of possible magnetic phases. At the end, I will present arguments motivating the search for the existence of a lattice of nano-skyrmions.