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**Domain wall chirality of ultrathin magnetic films** ANIRBAN KUNDU, SHUFENG ZHANG, Univ of Arizona — In conventional ferromagnetic materials, domain wall structure is determined by three competing magnetic interactions: exchange, anisotropy, and magneto-statics. These interactions do not break the degeneracy of domain wall chirality, i.e., the clockwise and anti-clockwise spin rotations of the domain wall are equally probable. It has been recently shown, however, that ultrathin magnetic films with perpendicular magnetic anisotropy favors one of the chiral patterns.<sup>1</sup> We propose that such chiral symmetry-breaking is due to the interface spin-orbit coupling. By explicitly calculating the effective spin interaction between magnetic ions, mediated by spin-polarized conduction electrons, we find that the resulting indirect exchange interaction is equivalent to the Dzyaloshinskii-Moriya (DM) interaction which is known to be chiral dependent. When we apply the DM interaction along with other magnetic energies to Neel and Bloch domain walls, we are able to map out the preferred domain wall structure with a definitive chirality. An extensive comparison between our theory and the experiment on CoNi thin films is carried out.

<sup>1</sup>Gong Chen et al., Nature Communications 4, 2671(2013)

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