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A Dzyaloshinskii-Moriya Anisotropy in nanomagnets with in-plane magnetization[1] M. CUBUKCU, J. SAMPAIO, Unite Mixte de Physique, CNRS, Thales, Univ. Paris-Sud, Universite Paris-Saclay, Palaiseau, France, A. V. KHVALKOVSKIY, D. APALKOV, Samsung Electronics, Semiconductor RD Center (Grandis), San Jose, USA, V. CROS, N. REYREN, Unite Mixte de Physique, CNRS, Thales, Univ. Paris-Sud, Universite Paris-Saclay, Palaiseau, France — The Dzyaloshinskii-Moriya interaction (DMI) is known to be a direct manifestation of spin-orbit coupling in systems with broken inversion symmetry. We present a new anisotropy for in-plane-magnetized nanomagnets which is due to the interfacial DMI. This new anisotropy depends on the shape of the magnet, and is perpendicular to the demagnetization shape anisotropy [1]. The DMI anisotropy term that we introduce here results from the DMI energy reduction due to an out-of-plane tilt of the spins at the edges that are oriented perpendicular to the magnetization. For large enough DMI, the reduction of the DMI and anisotropy energies takes over the demagnetization energy cost when magnetization lies along the minor axis of a structure. Our experimental, numerical and analytical results demonstrate this prediction in magnets of elongated shape for small enough volume (and thus quasi-uniform magnetization). Our results also provide the first experimental evidence of the interfacial DMI-induced tilt of the spins at the borders. [1] M. Cubukcu *et al.*, *arXiv:*1508.02961 (2015).

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Murat Cubukcu
Unite mixte de Physique CNRS/Thales

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