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**Metastable multi-domain state in ultra-thin films with Dzyaloshinskii-Moriya Interaction** PARNIKA AGRAWAL, SEONGHOON WOO, GEOFFREY BEACH, MIT — Helical spin structures such as skyrmions and chiral domain walls are stabilized in magnetic films with strong Dzyaloshinskii-Moriya interaction (DMI) [1,2]. The chiral spin state is the ground state when the ratio of the effective DMI field to anisotropy field is greater than  $2/\pi$  [3]. However, even when the DMI is too weak to generate a chiral ground state, such states can be metastable if the uniform state is appropriately perturbed [1,4]. Here, we show that an in-plane applied field reduces the energy barrier for domain wall formation, and provides a simple technique to generate a multidomain state in uniform magnetic films. Further, we identify that the threshold between the stable single-domain state and the metastable multidomain state can be controlled by two parameters—demagnetizing energy and geometrical confinement. We use these parameters to create isolated geometrically confined magnetic bubbles in patterned discs of Pt/Co/GdOx multilayers. These bubbles may provide insight into the mechanism of creation of skyrmions in magnetic thin films with strong DMI.

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- [3] S. Emori, et al., arXiv:1308.1432v2(2013);
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