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**Interplay of Dzyaloshinskii-Moriya and magnetic field in a one dimensional spin- $\frac{1}{2}$  Heisenberg antiferromagnetic chain** JIANMIN SUN, SUHAS GANGADHARAIAH, OLEG STARYKH, University of Utah — We study a one dimensional spin-1/2 Heisenberg antiferromagnetic chain in the presence of a magnetic field and a Dzyaloshinskii-Moriya (DM) interaction term. The case of a staggered DM term and a magnetic field perpendicular to it has been considered previously in Ref.[1]. It was shown that in both weak and strong magnetic field, DM term is a strongly relevant operator leading to the opening of a gap. The spin ordering takes place along a direction perpendicular to both the DM vector and the magnetic field. We consider the case of a uniform DM term, perpendicular to the magnetic field. In the limit of a strong magnetic field, the uniform DM term generates a marginally relevant operator that opens up a gap which scales as a power law with the DM term. The spin ordering takes place along the DM vector. In the limit of weak magnetic field, in comparison with the DM term, no relevant terms are generated, and the spin chain remains gapless.

[1] I. Affleck and M. Oshikawa, Phys. Rev. B 60, 1038 (1999).

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