From topology to devices: two examples

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I will discuss two types of problem:

1) Conversion between spin and charge currents by topological 2DEGs at surfaces or interfaces: After an introduction to the physical mechanisms of these conversions, I will focus on recent developments on the way to logic or memory devices based on the exploitation of surface/interface states of $SrTi0_3$ [1] and Dirac semimetal alpha-Sn [2].

2) The second part of the talk will be on the perspective with bidimensional (2D) van der Waals materials and I will discuss the following topics: a) Chiral interactions and skyrmions in 2D van der Waals magnets [3-4] b) Prospects with multiferroic 2D materials.

References

[1] Lesne *et al*, Nature Materials, **15**, 1261, 2016. Noël e*t al*, Nature **380**, 483, 2020
[2] Rojas-Sanchez *et al*, PRL **116**, 096602, 2016. Ding *et al*, Adv. Mater. 2021, 2005909
[3] Liang *et al,* PR B **101**, 1844, 2019.
[4] Park *et al PR B **103,** 104410,* 2021.

Figures

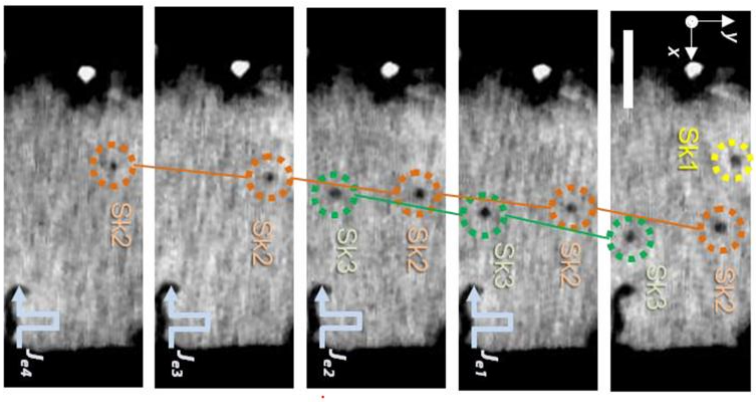

Fig. 1: Current-induced motion of skyrmions in the 2D magnet Fe_3GeTe_2 [4].