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# Voltage-induced switching of an antiferromagnetically ordered topological Dirac semimetal

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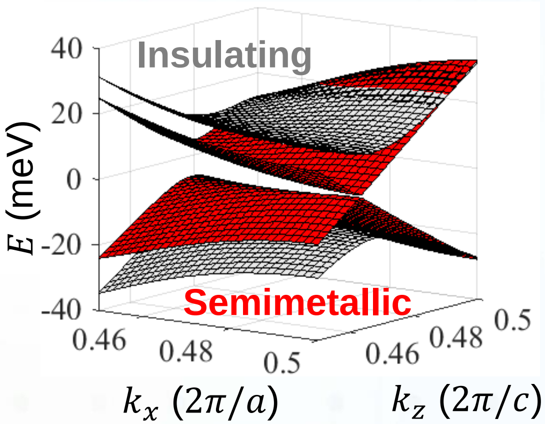
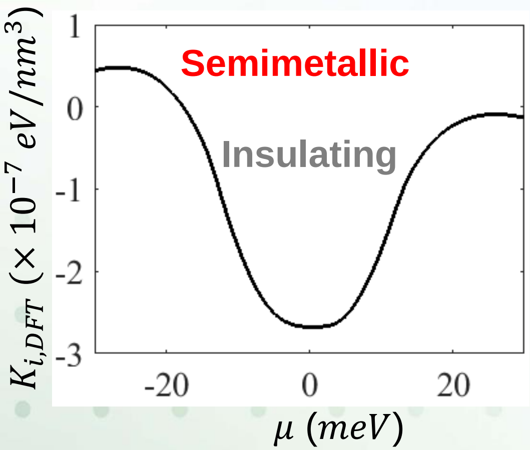
Antiferromagnetic materials have been identified as promising candidates for next generation logic/memory devices, as they show superior characteristics such as a fast switching speed and immunity to external magnetic field interference. An antiferromagnetic semimetal (AFS) exhibits the (semi)metal-insulator transition, which provides a wide range of resistance choices, an important prerequisite for a high-density device integration.

One of the major challenges of the AFS is finding a suitable switching mechanism. The Illinois MRSEC investigated a possible voltage-induced switching mechanism in AFS and provided the theoretical and numerical analysis. The results demonstrated that the proposed switching mechanism is realizable by using realistic material parameters. In addition, the assumptions and limits of the model were discussed, to address possible obstacles in realizing practical devices.




*The calculated semi-metallic and insulating phases of CuMnAs*




*The calculated switching from insulating to semimetallic phase of the material as a function of the chemical potential.*

Y. Kim et al, Physical Review B, 97, 134414 (2018)