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Theoretical study of electrical transport across 1D ferromagnet-insulator-ferromagnet junction

We theoretically studied the tunneling magnetoresistance of a heterostructure ferromagnetic metal-insulator-ferromagnetic metal junction. By modifying the theoretical model used by Slonczewski with the inclusion of a small external magnetic field, we theoretically consider the impact of the barrier potential, or the band gap and the thickness of the insulating layer. We found that higher insulating barrier potential and thicker barrier can each boost the magnetoresistance. The magnetoresistance is increased with the applied magnetic field and reaches its maximum value at a particular magnetic field strength that depends on the thickness of insulating layer.

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