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Tunneling Conductance and Magnetoresistance in Ferromagnet/Ferromagnet/d-Wave Superconductor Double Tunnel Junctions

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Abstract: The tunneling conductance and tunneling magnetoresistance (TMR) are investigated in ferromagnet/insulator/ferromagnet/insulator/d-wave superconductor (FM/I/FM/I/d-wave SC) structures by applying an extended Blonder-Tinkham-Klapwijk (BTK) approach. We study the effects of the exchange splitting in the FM, the magnetic impurity scattering in the thin insulator interface of FM/I/FM, and noncollinear magnetizations in adjacent magnetic layers on the TMR. It is shown (1) that the tunneling conductance and TMR exhibit amplitude-varying oscillating behavior with exchange splitting, (2) that with the presence of spin-flip scattering in insulator interface of FM/I/FM, the TMR can be dramatically enhanced, and (3) that the TMR depends strongly on the angle between the magnetization of two FMs.

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Key words: tunneling magnetoresistance, magnetic scattering, spin-flip

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