Spin-dependent sequential transport through an S=1 molecule attached to a carbon nanotube quantum dot

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Transport properties of an S=1 molecule attached to a single-wall carbon nanotube quantum dot, which is coupled to two external ferromagnetic leads, are analyzed in the sequential tunneling regime. The magnetizations of the leads are assumed to form either a parallel or an antiparallel magnetic configuration. The carbon nanotube is modeled by a two-level Anderson model and is exchange-coupled to a molecule of spin S=1 exhibiting uniaxial magnetic anisotropy. The calculations are performed by using the master equation method with tunneling rates given by the Fermi golden rule. It is shown that the presence of the molecule strongly affects the gate and bias voltage dependence of the current and differential conductance in both magnetic configurations, as well as the resulting tunnel magnetoresistance. Various excited spin states of the system are revealed in the voltage dependence of both the conductance and the tunnel magnetoresistance.