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**Nonequilibrium transport through a spinful quantum dot with superconducting leads** JENS PAASKE, BRIAN MOELLER ANDERSEN, KARSTEN FLENSBERG, Niels Bohr Institute, University of Copenhagen, VERENA KOERTING, NBIA, Niels Bohr Institute, University of Copenhagen — We study the nonlinear cotunneling current through a spinful quantum dot contacted by two superconducting leads. Applying a general nonequilibrium Green function formalism to an effective Kondo model, we study the rich variation in the IV-characteristics with varying asymmetry in the tunnel coupling to source and drain electrodes. The current is found to be carried respectively by multiple Andreev reflections in the symmetric limit, and by spin-induced Yu-Shiba-Rusinov bound states in the strongly asymmetric limit. The interplay between these two mechanisms leads to qualitatively different IV-characteristics in the cross-over regime of intermediate symmetry, consistent with recent experimental observations of negative differential conductance and re-positioned conductance peaks in sub-gap cotunneling spectroscopy.

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