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3D Effect in Determination of Spin Polarization using Andreev Reflection Spectroscopy JESSICA GIFFORD, CHARLES SNIDER, JONNY MARTINEZ, TINGYONG CHEN, Arizona State University — Andreev Reflection Spectroscopy (ARS) has been utilized to measure spin polarization of magnetic materials, as well as the superconducting gap of superconductors. These values are extracted by a modified Blonder-Tinkham-Klapwijk (BTK) model or the more recent Chen-Tesanovic-Chien (CTC) model. Both consider the F/S interface as one dimensional (1D). However, a tip may have a point angle with three dimensional (3D) effects. We present both theoretical and experimental studies of the 3D effects in the determination of spin polarization. We have found that for an ideal interface without interfacial scattering (Z), the 3D ARS spectra are the same as 1D spectra. But for non-ideal interfaces the 3D effect can drastically change the conductance spectra depending on the point angle of the tip. The 3D spectra can be well described by the 1D model with a different interfacial scattering factor and a slightly different inelastic scattering factor. The spin polarization and superconducting gap is the same as the1D model, demonstrating that 1D ARS model can be utilized to determine spin polarization as long as Z is not of any concern. Finally, we apply the both the 1D and the 3D models to a set of ARS data and show that the extracted spin polarization value is the same for both models.

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