Extracting the diffusivity ratio from point contact Andreev reflection spectroscopy and upper critical field measurements in MgB2

Abstract

The di®usivity ratio ', which measures the relative intraband scattering in the ¹/₄ and ³/₄ bands in MgB2 has been determined by ⁻tting the Hc2(T) at T » Tc and by Point Contact Andreev Re[°]ection. We ⁻nd a satisfactory agreement between the values for ' obtained by both methods for c-axis orientated MgB2 thin ⁻lms. Point contact Andreev Re[°]ection was then applied to bulk MgB2 containing Mg vacancies. Spectra obtained in zero ⁻eld indicate a distribution of the two gaps $\phi^{3}/_{4}$;¹/₄ but no merging of the values with increased magnesium de⁻ciency. Spectra ⁻tted as a function of ⁻eld are consistent with an increase in ¹/₄ intraband scattering with increasing magnesium de⁻ciency. Measurement of the point contact Andreev re[°]ection spectra as a function of temperature revealed features not immediately expected from current theoretical models.