Ultrasound evidence for a two-component superconducting order parameter in Sr2RuO4

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Contrary to the known high Tc superconductors cuprates, the normal state of the quasi-two-dimensional Sr_2RuO_4 is rather a standard metal, well described by Fermi liquid theory. Below the critical temperature Tc =1.5 K, it hosts unconventional superconductivity. Over several years, it has been a challenge for researchers to find a common consensus about the symmetry of the superconducting state's order parameter in Sr_2RuO_4 [1]. Recently, ultrasounds techniques (echo-pulse and resonant spectroscopy) [2,3] revealed new insights concerning the symmetry of the order parameter. In this talk, I will discuss the echo-pulse ultrasounds measurements, where we tracked the variations of the elastic constants in the superconducting state. Particularly in the transversal mode c66, a sharp jump at Tc was observed. In the context of Ginzburg-Landau theory and symmetry arguments, this jump implies that the order parameter has two components [4,5]. Combining ultrasounds measurements with the other observed properties on Sr_2RuO_4 favour the two order parameter {dxz,dyz} as the most likely candidate [2].

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