Boosted magnetic fluctuations at the onset of superconductivity in UTe_2 beyond 40 T

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The interplay between magnetism and unconventional superconductivity in the heavy-fermion compound UTe_2 was extensively studied in the past few years [1-2]. Multiple superconducting phases were found to be induced in the vicinity of a metamagnetic transition under magnetic field either at ambient pressure or combined with pressure [3-6]. The re-entrant superconducting phase induced for a magnetic field in the magnetization plane (**b**,**c**) requests magnetic fields higher than 40 T which can be only accessed in high magnetic fields facilities [7].

Here we present a study of the electrical resistivity of UTe_2 under a rotating field in the hard magnetization plane (**b**,**c**) which was performed at the LNCMI-Toulouse. The critical temperature of the field-induced superconducting phase is measured for different angles. The quadratic coefficient A, extracted with a Fermi-liquid analysis, is studied in the vicinity of the different superconducting phases. The enhancement of A coincides with the stabilization of superconductivity in the polarized paramagnetic regime beyond the metamagnetic field $\mu_0 H_m \gtrsim 40$ T. It is the signature of a boosted quantum-critical magnetic-fluctuation mode probably in play for the mechanism of this superconducting phase. This result appeals for descriptions of the interplay between magnetic-field-induced superconductivity and quantum critical magnetic properties.

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