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Probing the Kondo State using Terahertz Radiation CHRISTOPH WETLI, Department of Materials, ETH Zurich, JOHANN KROHA, Institute of Physics, Bonn University, CORNELIUS KRELLNER, KRISTIN KLIEMT, Institute of Physics, Goethe University Frankfurt, OLIVER STOCKERT, MPI for Chemical Physics of Solids, Dresden, HILBERT V. LOEHNEYSEN, Institute of Solid State Physics, Karlsruhe Institute of Technology, MANFRED FIEBIG, Department of Materials, ETH Zurich — The appearance of quantum critical phase transitions is boosting the interest in the field of Kondo-lattice systems. After intense research over the last decades, experimental insights have been mainly gained by measuring the specific heat capacity or the magnetic susceptibility and relating them to the increase of the effective mass. Lately, it has been demonstrated that ARPES experiments allow direct access to the electrons contributing to the Kondo-lattice effect, but with some experimental restrictions. We will show that THz radiation is a powerful and highly accurate alternative for investigating the approach to the coherent Kondo-state of heavy-fermion systems. Photons in the THz range directly couple to the electronic heavy quasiparticles causing the Kondo-singlet behavior. Additionally, this technique allows studying Kondo-state dynamics on the picosecond time scale. We report lifetime measurements of excited Kondo singlets for the two crystalline rare earth heavy-fermion systems $CeCu_6$ and $YbRh_2Si_2$, where the lifetimes scale inversely proportional to the Kondo-temperature. THz spectroscopy thus gives a very different perspective towards the Kondo-lattice effect, with the unique ability to combine temporal resolution and possible measurements in magnetic field.

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