

# UNCONVENTIONAL FORMS OF SUPERCONDUCTIVITY AND QUANTUM CRITICALITY IN HEAVY-ELECTRON METALS

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Some recent observations made on the isostructural compounds  $\text{CeCu}_2\text{Si}_2$  and  $\text{YbRh}_2\text{Si}_2$  are discussed. We first address the interplay of superconductivity in  $\text{CeCu}_2\text{Si}_2$  with both a spin-density-wave-type quantum critical point (QCP) at low pressure [O. Stockert et al., PRL **92**, 136402 (2004)] and a weak valence transition of Ce at high pressure [H. Q. Yuan et al., Science **302**, 2104 (2003)]. We then turn to  $\text{YbRh}_2\text{Si}_2$  displaying a novel type of QCP [J. Custers et al., Nature **424**, 524 (2003); S. Paschen et al., Nature **432**, 881 (2004)], which appears to be detrimental to superconductivity.

Work done in collaboration with:

J. Custers, P. Gegenwart, C. Geibel, F. M. Grosche, R. K uchler, K. Neumaier, S. Paschen, J. Sichelschmidt, G. Sparn, Y. Tokiwa, H. Wilhelm, S. Wirth, H.Q. Yuan, P. Coleman, C. P epin, Q. Si and G. Zwicknagl

13.4 cm

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9.7 cm