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Strong enhancement of s-wave superconductivity near a quantum critical point of $(Ca_{1-x}Sr_x)_3Ir_4Sn_{13}$ and $(Ca_{1-x}Sr_x)_3Rh_4Sn_{13}$[1] ELVEZIO MORENZONI, PABITRA BISWAS, ZURAB GUGUCHIA, RUSTEM KHASANOV, MANUEL CHINOTTI, JONAS KRIEGER, Paul Scherrer Institut, L LI, KEFENG WANG, CEDOMIR PETROVIC, Brookhaven National Laboratory, EKATERINA POMJAKUSHINA, Paul Scherrer Institut — We report microscopic studies by muon spin rotation as a function of pressure of the $(Ca_{1-x}Sr_x)_3Ir_4Sn_{13}$ and $(Ca_{1-x}Sr_x)_3Rh_4Sn_{13}$ cubic compounds, which display superconductivity and a structural phase transition associated with the formation of a charge density wave (CDW)[1]. In $Ca_3Ir_4Sn_{13}$ we find a strong enhancement of the superfluid density and a dramatic increase of the pairing strength above a pressure of ≈ 1.6 GPa giving direct evidence of the presence of a quantum critical point separating a superconducting phase coexisting with CDW from a pure superconducting phase [2]. The superconducting order parameter in both phases has the same s-wave symmetry. Similar behavior is found in the other family. In spite of the conventional phonon-mediated BCS character of these weakly correlated 3-4-13 systems, the dependence of the effective superfluid density on the critical temperature put these compounds in the "Uemura" plot close to unconventional superconductors. These systems exemplify that conventional BCS superconductors can also display characteristics of unconventional superconductors. [1] S.K. Goh et al. Phys. Rev. Lett. 114, 097002 (2015). [2] P.K. Biswas et al., Phys. Rev. B (2015).

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