Controlling two-phase superconductivity in CeRh2As2 with pressure

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CeRh2As2 has a unique superconducting phase diagram in which a magnetic field drives a transition between superconducting states, believed to be of even and odd parity. Our understanding of this phenomenon is based on the crystal structure with locally broken inversion symmetry in the Ce layers and two Ce layers related by global inversion symmetry. Even in the case of pure singlet pairing within the layers, an odd-parity superconducting gap function can be reached by a sign change of the gap on the two Ce layers. This way of creating odd-parity superconductivity is different from the traditional one - where odd parity comes from the pairing function itself - and might be a direction of finding more odd-parity superconductors. In order to guide the search for new odd-parity superconductors, we need to understand, which material parameters favor its appearance. Here, I will give an overview on the current knowledge on CeRh2As2 including phase diagrams covering the normal state and angle dependence. I will also show results where we use pressure tuning to induce changes of the normal state and observe the effects on the superconducting states. We find that superconductivity is fostered by correlations in proximity to a quantum critical point. Furthermore, pressure effectively shifts the parity transition to lower fields.