Controlling two-phase superconductivity in CeRh2As2

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CeRh2As2 is the only compound in which a magnetic field is believed to induce a transition between superconducting states of even and odd parity. Our understanding of this phenomenon is based on the crystal structure with locally broken inversion symmetry at the Ce site and two Ce sites in different layers related by inversion symmetry. Even in the case of pure singlet pairing 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 candidate materials of odd-parity superconductivity. In order to guide the search for new materials, we need to understand, which material parameters favour is appearance.

Here, I will give an overview on the current knowledge on CeRh2as2 including phase diagrams covering the normal state and angle dependence. In the end, I will show results where we use pressure tuning to induce changes of the normal state in CeRh2As2 and observe changes on the superconducting states. We find that the behavior of Tc is similar to other heavy fermion compounds in which superconductivity evolves in a dome-like shape around a quantum critical point.