$Li_2(Pd_{1-x}Pt_x)_3B$ Magnetic Phase Diagram and Superconducting Parameters

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The H–T phase diagram and several superconducting parameters for the noncentrosymmetric superconductor $Li_2(Pd_{1-x}Pt_x)_3B$ have been determined as a function of cation substitution x by measurements of AC susceptometry and specific heat. The zero-temperature coherence length appears to be linear in platinum concentration. Despite the superconducting gap developing nodes and the pairing state appearing to change from singlet to triplet as Pd is replaced by Pt, and in spite of significant changes to the band structure with substitution, the H–T phase diagram shows no systematic evolution. Unusual aspects of the H–T phase diagram's shape will be discussed, along with comparisons to theoretical expectations. The upper critical field $H_{c2}(0)$ is not anomalously high for any Pt content, likely due to low carrier masses. In the absence of heavy Fermions, Pauli depairing may be masked by orbital limiting behaviour, and the value of $H_{c2}(0)$ would not necessarily serve as a probe for novel physics.