

Superconductivity in the Ferromagnet UGe₂

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Superconductivity and magnetism would be antagonistic because of the competitive nature between the superconducting screening and the internal fields generated by magnetic orderings. It is generally accepted that antiferromagnetism with local moments readily coexists with type II superconductivity. Recent observation of superconductivity in the ferromagnet UGe₂ has renewed our interest on the interplay of magnetism and superconductivity [1].

Figure 1 shows a temperature vs pressure phase diagram of UGe₂. A Curie temperature (T_{FM}) and a characteristic temperature of unknown origin (T_{x}) decrease monotonically with increasing pressure, and collapse to zero at a critical pressure P_{FM} (~ 1.5 GPa) and P_{x} (~ 1.2 GPa), respectively. Superconductivity emerges in the pressure range between ~ 1.0 and ~ 1.5 GPa, with a maximum superconducting transition temperature $T_{\text{SC}} \sim 0.7$ K in the vicinity of P_{x} . We have investigated a superconductivity phase diagram by ac magnetic susceptibility [2] and the ferromagnetism by neutron scattering experiments [3]. We will present our recent results and argue the correlation between ferromagnetism and superconductivity.

[1] S.S. Saxena *et al.*, Nature **406**, 587 (2000).

[2] H. Nakane *et al.*, J. Phys. Soc. Jpn. **74**, 855 (2005).

[3] N. Aso *et al.*, Phys. Rev. B **73**, 054512 (2006).

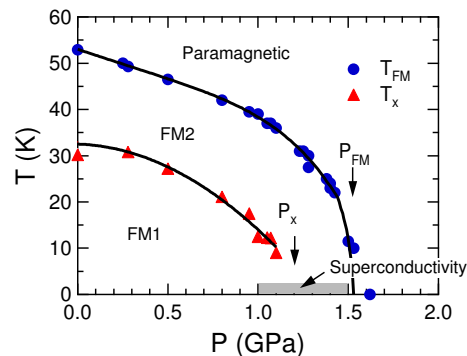


FIG.1: Temperature-pressure phase diagram of UGe₂ [3].

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