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Superconductivity, Magnetism and High T_c

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Maximum T_c in a related group of materials often appears in the vicinity of some kind of quantum critical point. This is particularly clear in the case of heavy Fermion superconductivity. The competition between superconductivity and magnetism in these materials appears as the conflict between local and itinerant f-electrons. The magnetic fluctuation spectrum can be variously the source of antiferromagnetic order or superconductivity, and the low energy part of this fluctuation spectrum is gapped in the superconducting state, providing a mechanism for strengthening pair coupling. We show how this plays out in prototypic $CeCoIn_5$ and related materials, and discuss the relevance to cuprate and other superconducting materials.