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Peculiarities of the coherency of superconductivity fluctuations in a two-band model with Hubbard interaction

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Multi-component superconductivity models include rather varied physics. In connection with the presence of interacting order parameters the superconducting ordering, kinetics and fluctuation properties of the multi-band systems are quite different from the corresponding characteristics in one-band superconductors. The examination of theses peculiarities has been an object of growing interest.

In the present contribution we study the coherency of the superconducting ordering of a two-band (two-orbital) system with the Hubbard correlation between the carriers. One can distinguish here two characteristic length scales in the spatial correlation of superconducting fluctuations. One of these lengths as a function of temperature behaves critically diverging at the phase transition point. The other one remains finite and its temperature dependence is weaker. The formation of these length scales is caused by the interband interaction mixing the superconducting order parameters of initially non-interacting bands. As a result the critical and non-critical coherence lengths associate with critical and non-critical fluctuations which appear as the certain linear combinations of the deviations from the equilibrium band superconducting orders, see e.g. [1]. The dependencies of the correlation lengths on intra- and interband couplings are analyzed. We also compare the results obtained with the coherence lengths found in a two-band model without the Hubbard interaction [2].

[1] T. Örd, K. Rägo, A. Vargunin, J. Supercond. Novel Magn. **22**, 85, (2009).

[2] T. Örd, K. Rägo, A. Vargunin, will be submitted to J. Supercond. Novel Magn.