Abstract Submitted
for the DAMOP09 Meeting of
The American Physical Society

Quantum critical point in high-temperature superconductors MIRON AMUSIA, Racah Institute of Physics, the Hebrew University, VASILIY SHAGINYAN, Petersburg Nuclear Physics Institute — Recently, in high-temperature superconductors (HTSC), exciting measurements have been performed revealing their physics in superconducting and pseudogap states and in normal one induced by the application of magnetic field, when the transition from non-Fermi liquid to Landau Fermi liquid behavior occurs (T. Shibauchi, et al., Proc. Natl. Acad. Sci. USA 105, 7120 (2008)). We show that in the pseudogap regime (when the superconductivity vanishes) the pairing of electrons (or the formation of preformed electron pairs) takes place, while the gap continues to follow a simple d-wave form. These observations are in accord with recent facts (H.-B. Yang, et al., Nature 456, 77 (2008)). We employ a theory, based on fermion condensation quantum phase transition which is able to explain facts obtained in the measurements. We also show, that in spite of very different microscopic nature of HTSC, heavy- fermion metals and 2D ^{3}He, the physical properties of these three classes of substances are similar to each other. It follows from our study that there is at least one quantum phase transition inside the superconducting dome, and this transition is the fermion condensation quantum phase transition.

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Date submitted: 27 Jan 2009 Electronic form version 1.4