Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Casimir effect mechanism of pairing between fermions in the vicinity of a magnetic quantum critical point YAROSLAV KHARKOV, UNSW, Sydney, Australia, OLEG P SUSHKOV TEAM — We consider two spin 1/2 fermions in a two-dimensional magnetic system that is close to the $O(3)$ magnetic quantum critical point (QCP) which separates magnetically ordered and disordered phases. Focusing on the disordered phase in the vicinity of the QCP, we demonstrate that the criticality results in a strong long range attraction between the fermions, with potential $V(r) \propto -1/r^{\alpha}$, $\alpha \approx 0.75$, where r is separation between the fermions. The mechanism of the enhanced attraction is similar to Casimir effect and corresponds to multi-magnon exchange processes between the fermions. While we consider a model system, the problem is originally motivated by recent experimental establishment of magnetic QCP in hole doped cuprates under the superconducting dome at doping of about 10%. We suggest the mechanism of magnetic critical enhancement of pairing in cuprates.

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Date submitted: 05 Nov 2015 Electronic form version 1.4