Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Anomalous scaling at the quantum critical point in itinerant antiferromagnets ARTEM ABANOV, Los Alamos National Laboratory, ANDREY CHUBUKOV — We show that Hertz ϕ^4 theory of quantum criticality is incomplete as it misses anomalous non-local contributions to the interaction vertices. For antiferromagnetic quantum transitions, we found that the theory is renormalizable only if the dynamical exponent $z = 2$. The upper critical dimension is still $d = 4 - z = 2$, however the number of marginal vertices at $d = 2$ is infinite. As a result, the theory has a finite anomalous exponent already at the upper critical dimension. We show that for $d < 2$ the Gaussian fixed point splits into two non-Gaussian fixed points. For both fixed points, the dynamical exponent remains $z = 2$.

Artem Abanov
Los Alamos National Laboratory

Date submitted: 30 Nov 2004 Electronic form version 1.4