Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Dynamics of excitations in a one-dimensional Bose liquid[1] MAXIM KHODAS, School of Physics and Astronomy, University of Minnesota, Minneapolis, Minnesota 55455, USA, MICHAEL PUSTILNIK, School of Physics, Georgia Institute of Technology, Atlanta, Georgia 30332, USA, ALEX KAMENEV, School of Physics and Astronomy, University of Minnesota, Minneapolis, Minnesota 55455, USA, LEONID I. GLAZMAN, Department of Physics, Yale University, New Haven, Connecticut, USA, 06520 — We studied the dynamical structure factor $S(q,\omega)$ of interacting bosons in one-dimension. The sharp resonant peak $S(q,\omega) \propto \delta(\omega - \epsilon(q))$ as predicted by the Bogolubov theory is transformed into a power law singularity, $S(q,\omega) \propto (\omega - \epsilon(q))^{-\mu(q)}$ due to the strong quantum fluctuations. The corresponding momentum dependent exponent $\mu(q)$ is evaluated using the Lieb-Liniger model. The full momentum dependence $\mu(q)$ has been found in the strongly interaction regime using the Fermi Bose mapping. For the large momentum q the different method allows us to express the exponent through the Luttinger liquid parameters. The two results agree in their common region of applicability.

[1]Research in University of Minnesota is support by DOE (Grant No. DE-FG02-06ER46310) and A. P. Sloan Foundation. Research in Georgia Tech is supported by NSF (Grant No. DMR-0604107).

Maxim Khodas
University Of MInnesota

Date submitted: 27 Nov 2007 Electronic form version 1.4