Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Classical decoherence in a nanomechanical resonator OLIVIER MAILLET, ANDREW FEFFERMAN, RASUL GAZIZULIN, HENRI GODFRIN, OLIVIER BOURGEOIS, EDDY COLLIN, CNRS/Neel Inst, ULT GRENOBLE TEAM — Decoherence can be viewed either in its quantum picture, where it stands for the loss of phase coherence of a superposition state, or as its classical equivalent, where the phase of an oscillating signal is smeared due to frequency fluctuations. Little is known about quantum coherence of mechanical systems, as opposed to electromagnetic degrees of freedom. Indeed the bridge between quantum and classical physics is under intense investigation, using in particular classical nanomechanical analogues of quantum phenomena. Here we report on a model experiment in which the coherence of a high quality silicon-nitride mechanical resonator is defined in the classical picture. Its intrinsic properties are characterized over an unprecedentedly large dynamic range. By engineering frequency fluctuations, we can create artificial pure dephasing and study its effects on the dynamics of the system. Finally, we develop the methods to characterize pure dephasing that can be applied to a wide range of mechanical devices.

Olivier Maillet
CNRS/Neel Inst

Date submitted: 05 Nov 2015 Electronic form version 1.4