Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Sliding Over a Phase Transition[1] ERIO TOSATTI, SISSA, ICTP, CNR-IOM-Democritos, Trieste, Italy, ANDREA BENASSI, CNR-IOM-Democritos, Trieste, Italy, ANDREA VANOSSI, SISSA and CNR-IOM-Democritos, Trieste, Italy, GIUSEPPE E. SANTORO, SISSA, ICTP, CNR-IOM-Democritos, Trieste, Italy — The frictional response experienced by a stick-slip slider when a phase transition occurs in the underlying solid substrate is a potentially exciting, poorly explored problem. We show, based on 2-dimensional simulations modeling the sliding of a nanotip, that indeed friction may be heavily affected by a continuous structural transition. First, friction turns nonmonotonic as temperature crosses the transition, peaking at the critical temperature T_c where fluctuations are strongest. Second, below Tc friction depends upon order parameter directions, and is much larger for those where the frictional slip can cause a local flip. This may open a route towards control of atomic scale friction by switching the order parameter direction by an external field or strain, with possible application to e.g., displacive ferroelectrics such as $BaTiO_3$, as well as ferro- and antiferro-distortive materials.

[1]Supported by project ESF FANAS/AFRI sponsored by the Italian Research Council (CNR).

Erio Tosatti
SISSA, ICTP. CNR-Democritos, Trieste, Italy

Date submitted: 17 Nov 2010 Electronic form version 1.4