Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

A Classical Phase Space Framework For the Description of Supercooled Liquids and an Apparent Universal Viscosity Collapse NICHOLAS WEINGARTNER, CHRIS PUEBLO, Washington University, FLAVIO NOGUEIRA, Institut fur Theoretische Physik, Freie Universitat Berlin, KENNETH KELTON, ZOHAR NUSSINOV, Washington University — A fundamental understanding of the phenomenology of the metastable supercooled liquid state remains elusive. Two of the most pressing questions in this field are how to describe the temperature dependence of the viscosity, and determine whether or not the dynamical behaviors are universal. To address these questions, we have devised a simple first-principles classical phase space description of supercooled liquids that (along with a complementary quantum approach) predicts a unique functional form for the viscosity which relies on only a single parameter. We tested this form for 45 liquids of all types and fragilities, and have demonstrated that it provides a statistically significant fit to all liquids. Additionally, by scaling the viscosity of all studied liquids using the single parameter, we have observed a complete collapse of the data of all 45 liquids to a single scaling curve over 16 decades, suggesting an underlying universality in the dynamics of supercooled liquids. In this talk I will outline the basic approach of our model, as well as demonstrate the quality of the model performance and collapse of the data.

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Date submitted: 11 Nov 2016 Electronic form version 1.4