Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Local structure as a mechanism for dynamical arrest: tackling the lengthscale conundrum PADDY ROYALL, ANDREW DUNLEAVY, KAROLINE WIESNER, University of Bristol, RYOICHI YAMAMOTO, Kyoto University, THOMAS SPECK, Johannes Gutenberg-Universitat Mainz, STEPHEN WILLIAMS, Australian National University — Among the key challenges to our understanding of the process by which supercooled liquids transform into solid glasses is that it is accompanied by little apparent change in structure. Recently geometric motifs representing locally favoured structures have been identified in supercooled liquids, but a causal link between these locally favoured structures (LFS) and solidification remains elusive. One "smoking gun" for such a link would be coincidence of dynamic lengthscales which reflect solidification and lengthscales associated with structural features. However, this coincidence remains elusive, at least in the dynamical regime accessible to numerical simulations and colloidal experiments. Here we re-evaluate the lack of coincidence of dynamic and static lengthscales in the regime accessible to simulation. We consider the isoconfigurational ensemble, in which any spatial heterogeneity in dynamics is encoded in the structure. Using an information theoretic method we extract a new dynamic lengthscale which is matched very closely by structural length-scales associated with geometric motifs. This provides a possible resolution of the discrepancy in dynamic and structural lengthscales found in conventional studies.

Paddy Royall
University of Bristol

Date submitted: 09 Nov 2014 Electronic form version 1.4