Criticality in dynamic arrest: Correspondence between glasses and traffic DANIEL MIEDEMA, ASTRID DE WIJN, BERNARD NIENHUIS, PETER SCHALL, University of Amsterdam — Dynamic arrest is a general phenomenon across a wide range of dynamic systems including glasses, traffic flow, and dynamics in cells, but the universality of dynamic arrest phenomena remains unclear. We connect the emergence of traffic jams in traffic flow to the dynamic slow down in glasses. A direct correspondence is established by identifying a simple traffic model as a kinetically constrained model. In kinetically constrained models, the formation of glass becomes a (singular) phase transition in the zero temperature limit. Similarly, using the Nagel-Schreckenberg model to simulate traffic flow, we show that the emergence of jammed traffic acquires the signature of a sharp transition in the deterministic limit, corresponding to overcautious driving. We identify a true dynamical critical point marking the onset of coexistence between free flowing and jammed traffic, and demonstrate its analogy to the kinetically constrained glass models.

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