

**Abstract for GR-TR Conference on Statistical Mechanics
and Dynamical Systems**

Plenary Invited

Invited Talk

**Phase transitions in an open aggregation - fragmentation
system**

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Motivated by the phenomenology of transport of vesicles through the Golgi apparatus in the cell, we have studied a multispecies model with injection of one species at one end and outflow at the other. Our model incorporates both single particle and stack motion, and includes aggregation upon contact, chipping or the breaking off of a single particle, and interconversion between species. This model exhibits interesting phase transitions. In the absence of stack hopping, the system can enter a phase in which the mass grows indefinitely in one spatial region, coexisting with a region with a steady value of the mean mass. On the other hand, in the absence of interconversion, there is a phase transition as the injection rate is increased: the system passes from a phase with normal fluctuations, to one in which the total mass shows very large fluctuations. These fluctuations are of the order of the total mass itself, and their time dependence shows signatures of intermittency, as in a turbulent system. We investigate the phases with both diffusive and directed transport in the bulk and with different boundary conditions.

* Work done together with Himani Sachdeva (TIFR) and Madan Rao (RRI and NCBS-TIFR, Bangalore)