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**Università di Roma Tor Vergata**  
*Dipartimento di Fisica*



## ***Seminar***

Thursday, 21 June 2018 - h. 14:30

*Sala Struttura della Materia (Dipartimento di Fisica)*

### **Prof. Matthäus Bäbler**

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## **“Mechanisms behind overshoots in the evolution of the mean cluster size in aggregation-breakup processes”**

### ***Abstract***

Aggregation and breakup of small particles in turbulently stirred suspensions often shows an overshoot in the time evolution of the mean cluster size: Starting from a suspension of primary particles the mean cluster size first increases before going through a maximum beyond which a slow relaxation sets in. Such behavior was observed in various systems, including polymeric latices, inorganic colloids, asphaltenes, proteins, and in the flocculation of microalgae. As these systems differ widely in their properties it is reasonable to assume that there are several mechanism that cause the observed overshoot. In this work, we will explore a series possible mechanism to explain the overshoot phenomenon using detailed population balance modeling, incorporating refined rate models for aggregation and breakup of small particles in turbulence. Four mechanisms are considered: (1) restructuring, (2) decay of aggregate strength, (3) deposition of large clusters, and (4) primary particle aggregation where only aggregation events between clusters and primary particles are permitted. We show that all four mechanisms can lead to an overshoot in the mean size profile, while in contrast, aggregation and breakup alone lead to a monotonic, "S"-shaped size evolution profile. In order to distinguish between the different mechanisms simple protocols based on variations of the shear rate during the aggregation-breakup process are proposed.

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(P.I. Prof. Luca Biferale)***

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