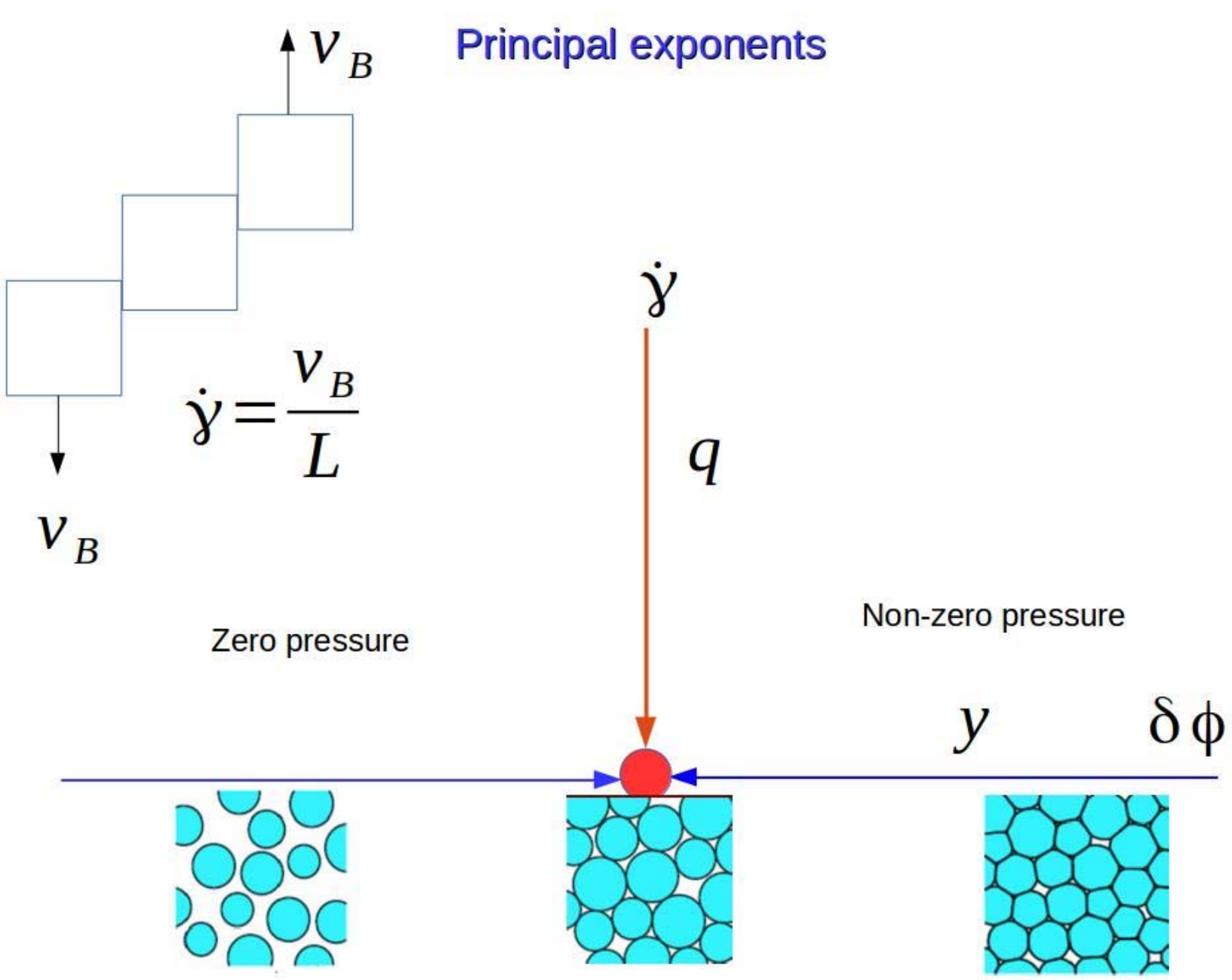
100st MSS-Seminar
Wednesday, August 17th, 15:30
Nägelsbachstr. 49b

Scaling analysis of jamming transition

Dr. rer. nat. Seyed Habibollah Ebrahimnazhad Rahbari

Korea Institute for Advanced Study (KIAS), Seoul, South Korea



When soft materials systems such as foams, gels, emulsions and granular materials are packed ever more densely, they undergo a transition from free flowing to yield stress regime. In the latter regime, the system refuses to flow when a shear force smaller than the yield stress is applied. This crossover, the jamming transition, has been quantitatively described by a scaling ansatz which has been traditionally developed for 2nd order phase transitions. In the standard critical phenomena, phase transitions are classified into different universality classes given by set of different exponents. For instance, in the Ising or Kuramoto models there is no ambiguity about exact values of these set of exponents. However, by looking at the literature for the jamming, one can see a wide range of exponents and a large ambiguity about universalities. Here, by borrowing techniques from other fields of statistical physics, we show why there is such a zoo of different exponents and propose a proper way to calculate the exponents. We believe a consensus about exponents can easily emerge if all different groups re-analyze their data according to our proposed simple technique.