149th MSS-Seminar
Wednesday, July 13th, 15:30 hrs,
Seminar room (00.156),
Cauerstraße 3, Erlangen.

Force networks in particulate systems

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Force networks spontaneously form in particulate-based systems. These networks, most commonly known as `force chains' in granular systems, are weighted, dynamic structures, which are by now known to be of fundamental importance for the purpose of revealing the underlying physical causes of a number of physical phenomena. The presentation will focus on applications of persistent homology (PH) to analysis of such networks found in both simulations and experiments (the figure shows an experimental example). PH allows for a simplified representation of complex interaction field in both two and three spatial dimensions in terms of persistent diagrams (Pds) that are essentially point clouds. These point clouds could be compared in a meaningful manner, meaning that they allow for the analysis of both static and dynamic properties of the underlying systems. In the second part of the talk, we will focus on few case studies: interaction networks in suspensions, and in dry granular systems experiencing stick-slip, intermittent type of dynamics. In the case of suspensions, we will show that the interaction networks are closely related to the rheology, and in the context of stick-slip dynamics, we will discuss potential of the considered approach to explain and possibly even predict system's behavior. If time allows, we will also discuss an ongoing project focusing on computing persistence from experimental data.