

BP 28: Posters - Cell Migration & Contraction

Time: Tuesday 14:00–16:00

Location: P2-EG

BP 28.1 Tue 14:00 P2-EG

Connecting cell jamming with adhesion, contractility and cell stiffness — •JÜRGEN LIPPOLDT, PAUL HEINE, STEFFEN GROSSER, LINDA OSWALD, and JOSEF KÄS — Soft Matter Physics, University of Leipzig, Germany

Our collaborators, Lisa Manning and Cristina Marchetti have developed a coarse grained model of cell jamming in elastic tissues. The constitutive equation has a harmonic term for the cell area, which promotes volume conservation due to cell stiffness and osmotic pressure, and one for the cell perimeter, which expresses the interplay between cell adhesion and cell contractility. In simulations with self-propelled cells and Voronoi tessellation a phase transition between a jammed and an unjammed phase was observed.

We examine this model with cancer cell lines, which undergo the epithelial-mesenchymal transition. To determine, whether the cell layers are jammed, we use glassy metrics like the mean-square displacement, Bayes statistics of individual tracks and an analysis of the neighbourhood change. The shape of the cells can be determined by image analysis of phase contrast or actin labelled fluorescence images.

This framework is well suited to explore changes in collective cell migration for different cell types, varying conditions and the use of drugs. Changing physical properties of the cells will lead to a different target shape parameter and should change their motility. This will provide insights in how cells can change their collective behaviour by altering their individual properties and how observed collective phenomena like cellular streaming emerge.