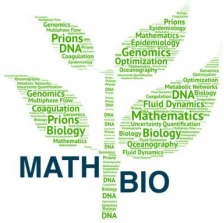
# Mathematical Biology Seminar
# Wednesday, April 7, 2021
# Speaker: Dr. Fabian Jan Schwarzendahl,
## Institut für Theoretische Physik II: Weiche Materie
## Heinrich-Heine-Universität Düsseldorf

## Title: Defects & mixing in growing active nematics

Time: 9am
Zoom Link: https://ucmerced.zoom.us/j/98050375649
Passcode: 172069

**Abstract:** Recent works have shown that packings of cells, both eukaryotic cellular tissues and growing or swarming bacterial colonies, are well-described by a hydrodynamic model of active nematic liquid crystals. A key property of active nematic dynamics is a chaotic self-mixing driven by motile topological defects. For bacterial colonies, chaotic mixing could destroy genetic spatial structure by which different mutants tend to segregate, with important implications for the population's evolution. Here, we study the mixing properties of an agent-based model for a growing colony of non-motile bacteria with emergent active nematic behavior. By studying the defects' mean-square displacement, we find that their motility, and the population's active self-mixing, play only a minor role for active nematics where activity is driven by growth. We compare spatial distance with distance in phylogenetic ancestry for nearby cells as a function of cell aspect ratio, in order to distinguish effects of active nematic order from effects of growth alone, and we also compare to a steady-state population with death balancing growth. We find that, as compared with small aspect ratio cells, the active nematic bacteria exhibit only a slightly enhanced active mixing.

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