

Title: *Myxococcus xanthus* Cluster Dynamics

Authors: **Cameron Harvey**, Dale Kaiser, Amy Buchmann and Mark Alber

Abstract:

Many bacteria species can colonize surfaces by coordinating movement between individual cells. How cells coordinate such collective motion is an active area of study. *Myxococcus xanthus* is a common soil bacteria that is studied in part for the social coordination observed when cells are grown on different surfaces. Individual cells are flexible rods covered by a viscous polysaccharide capsule that creates an adhesive interaction between cells. *M. xanthus* cells regularly reverse direction of their motion and organize into single layers of small clusters and large rafts of cells at the edge of a spreading population. We describe in this talk simulations of the *M. xanthus* swarm using a Subcellular Element Model (SCE), developed and implemented by our group on a GPU computer cluster, to study how individual cell properties give rise to the clustering patterns seen in experimental movies. Coupled simulations and experimental bacteria tracking demonstrated how the flexibility, adhesion between cells and cell reversals impacted the dynamics of cell clusters resulting in better understanding of how these bacteria effectively colonize surfaces.