The numbers for cell motility: Novel approaches for whole cell migration

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In this talk, I will present a novel approach for whole cell tracking based on geometric partial differential equations for the cell surface motion where the physics of the migrating cell is easily encoded. In order to fit to experimental data an optimal control framework using phase-field theory is presented. A highly efficient, adaptive and fast multigrid solver is then employed to allow for realistic 2D and 3D simulations. Numerical examples will be exhibited that show the applicability of the mathematical framework for whole cell migration.