

Furukawa LAB.

[Nonlinear and nonequilibrium phenomena in complex fluids]

Department of Fundamental Engineering

Physics of Complex Fluids

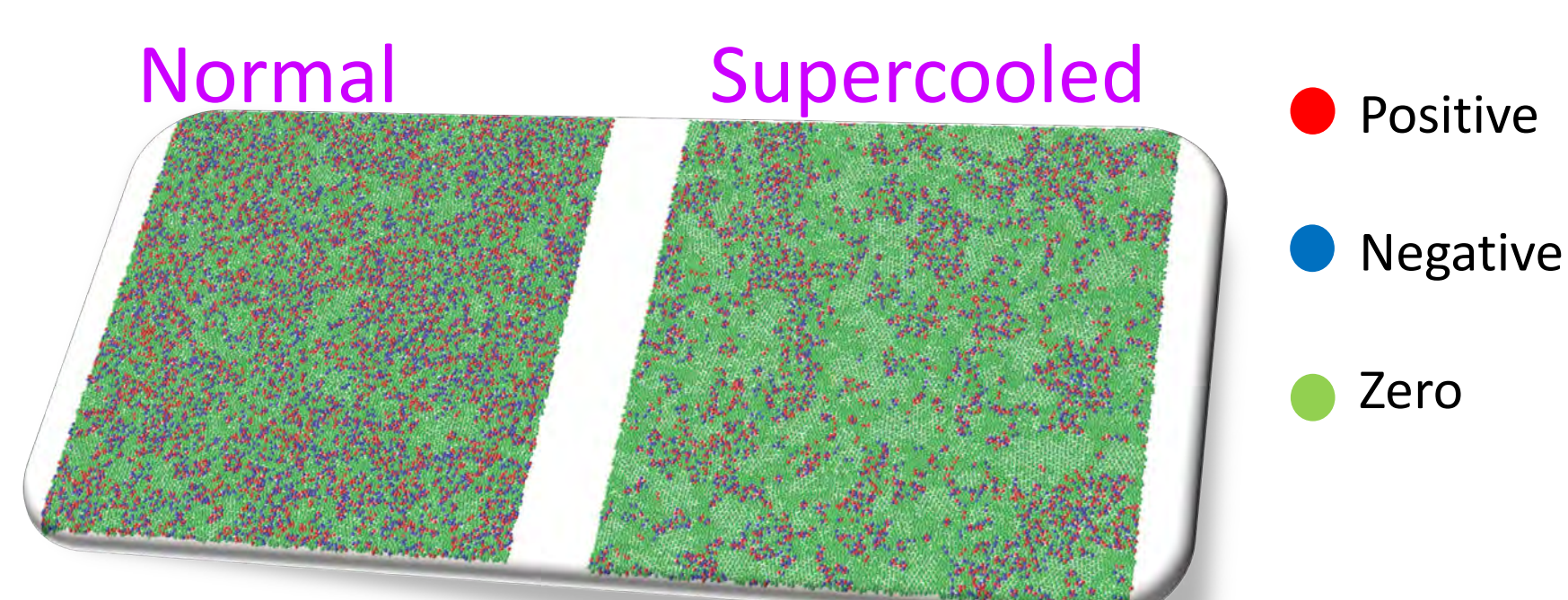
Department of Applied Physics

<http://www.complexfluid.iis.u-tokyo.ac.jp>

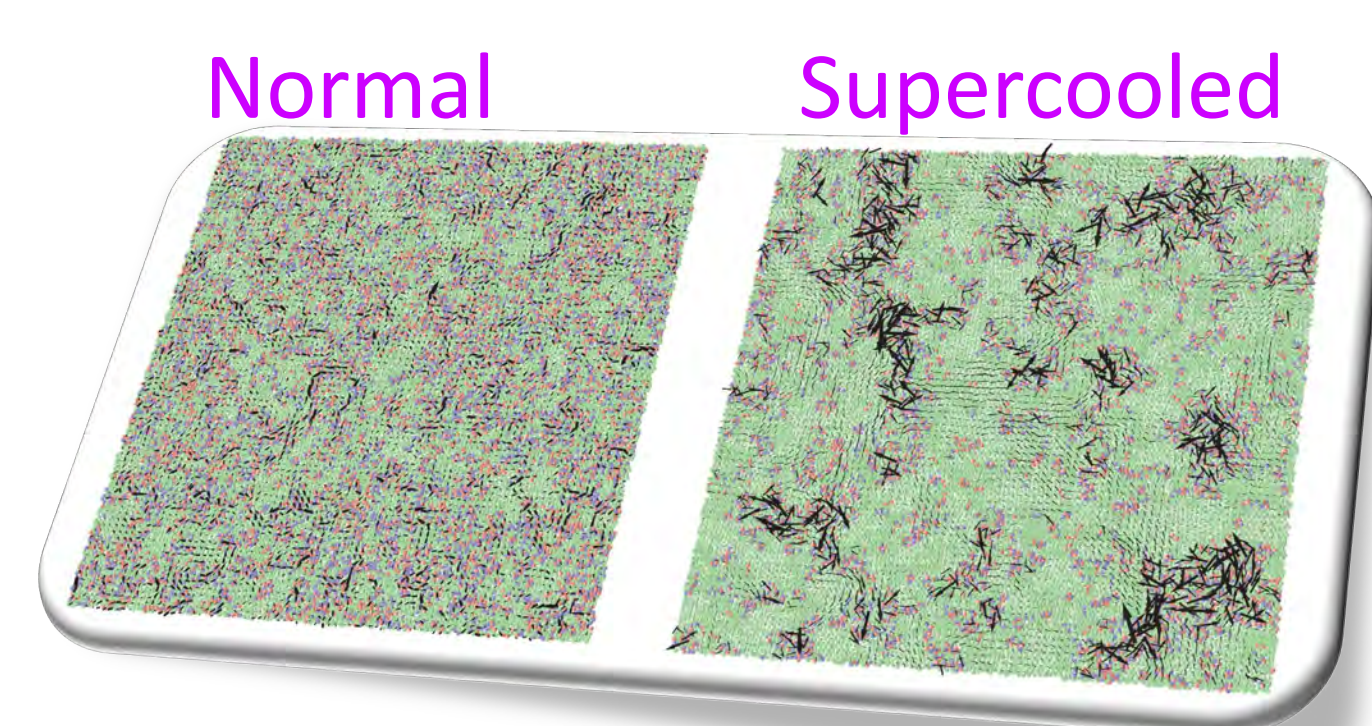
We theoretically investigate non-linear and non-equilibrium phenomena in various soft materials and complex fluids, from glasses, colloids and granular systems to bacteria.

In recent years, we have primarily focused on the following problems:

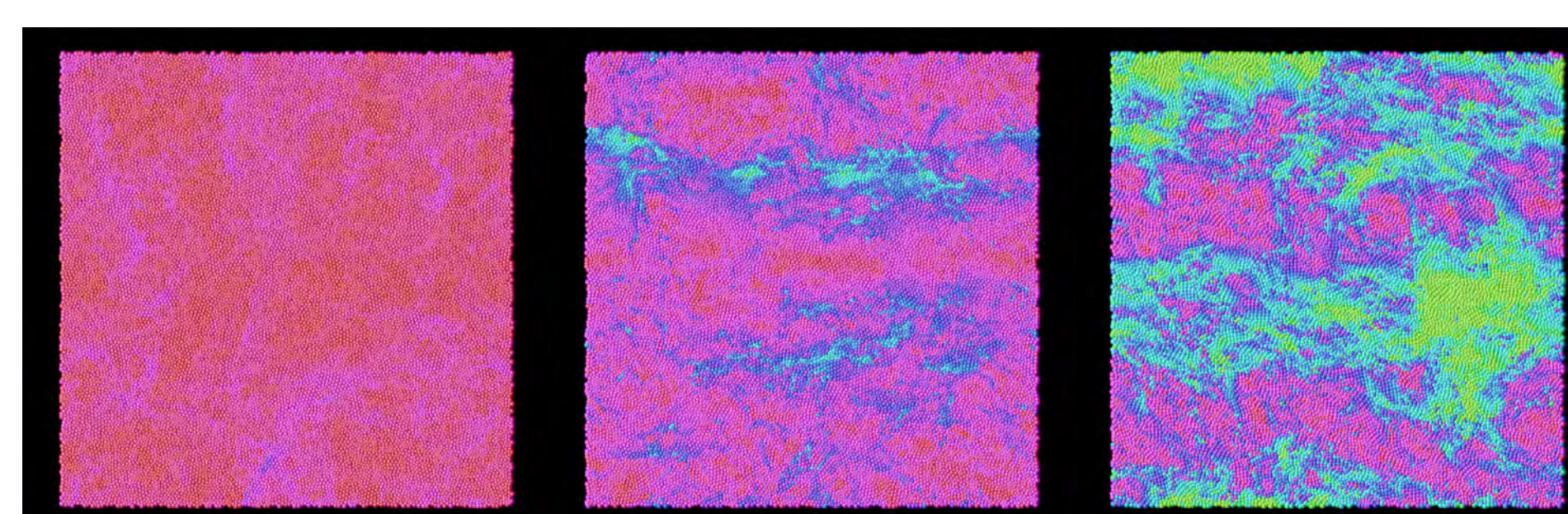
- (1) The origin and role of spatial correlations of anomalous hydrodynamic transport in supercooled liquids
- (2) Non-Newtonian rheology of glassy and granular materials (shear-thinning, shear-thickening, fracture, etc.)
- (3) The effects of (near-field) hydrodynamic interactions on the collective dynamics of bacterial suspensions.



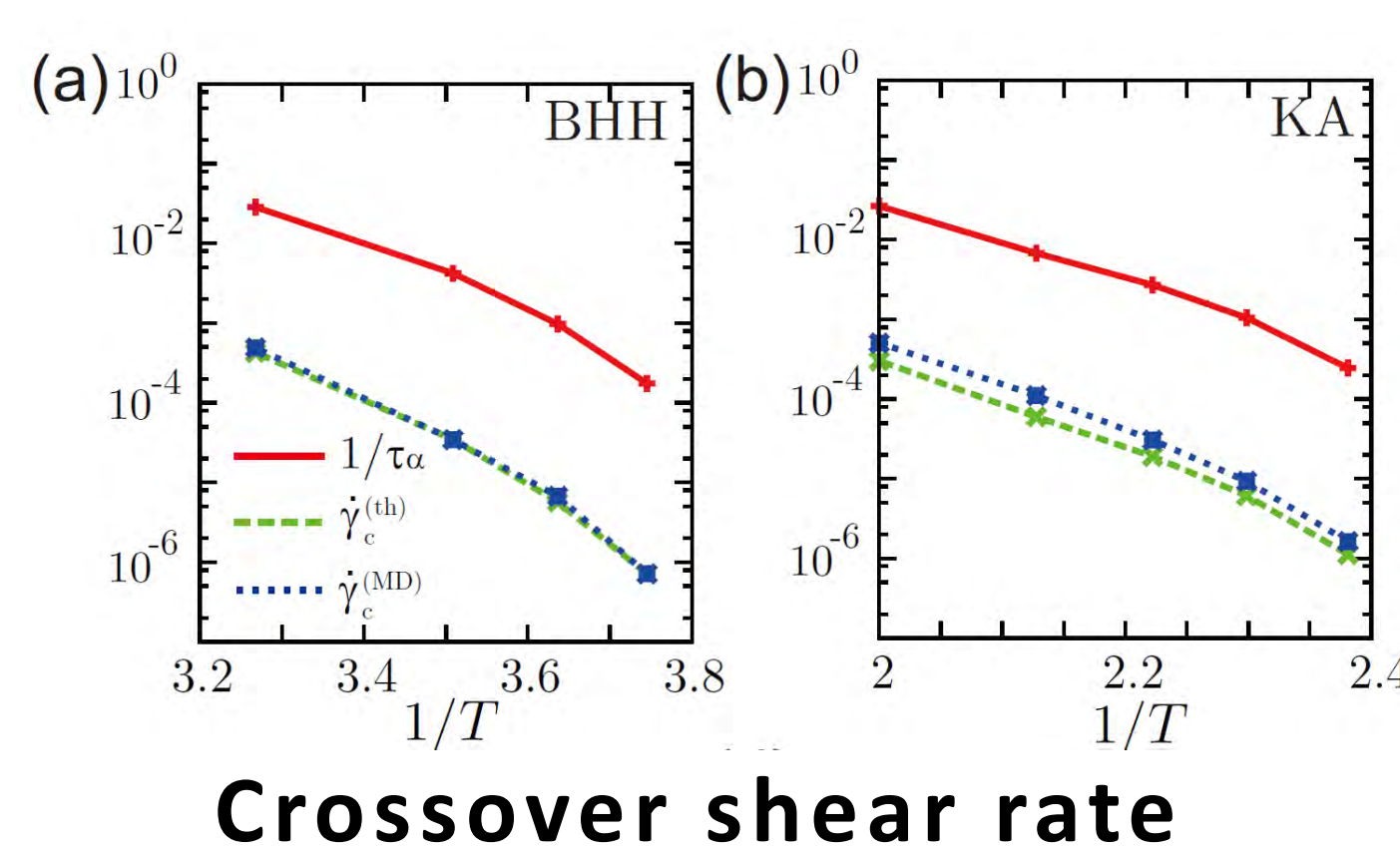
Spatial pattern of the exchange event for τ_α



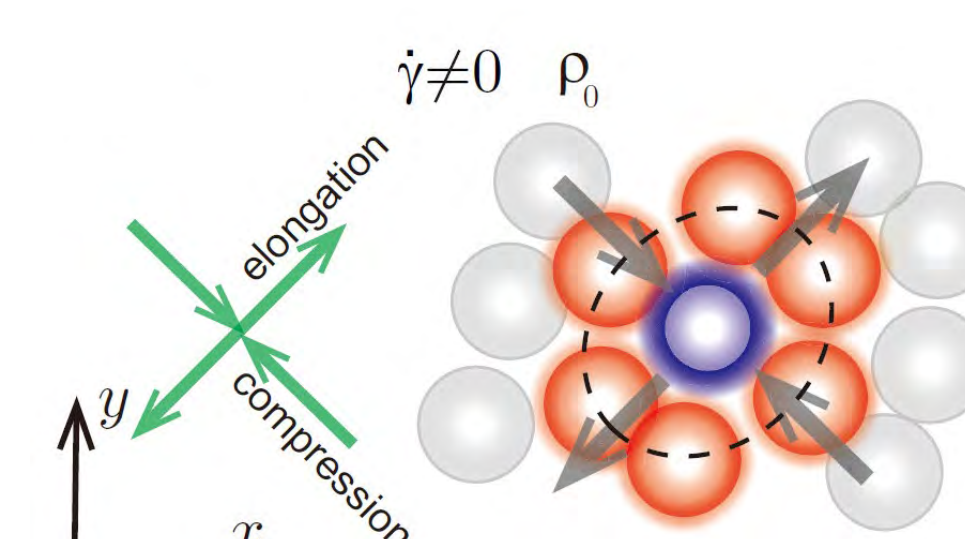
Displacement vector field



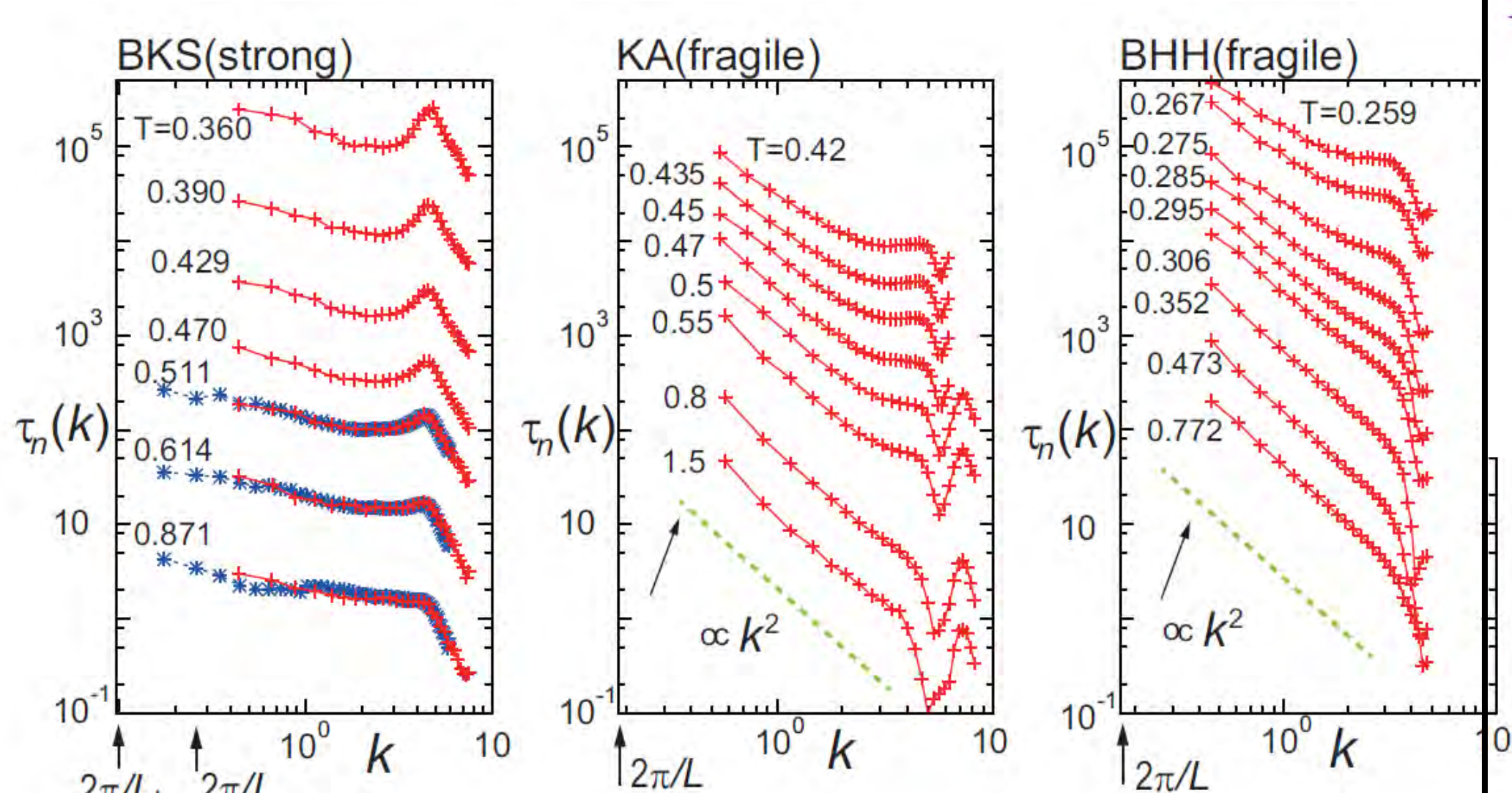
Shear band formation in supercooled liquids



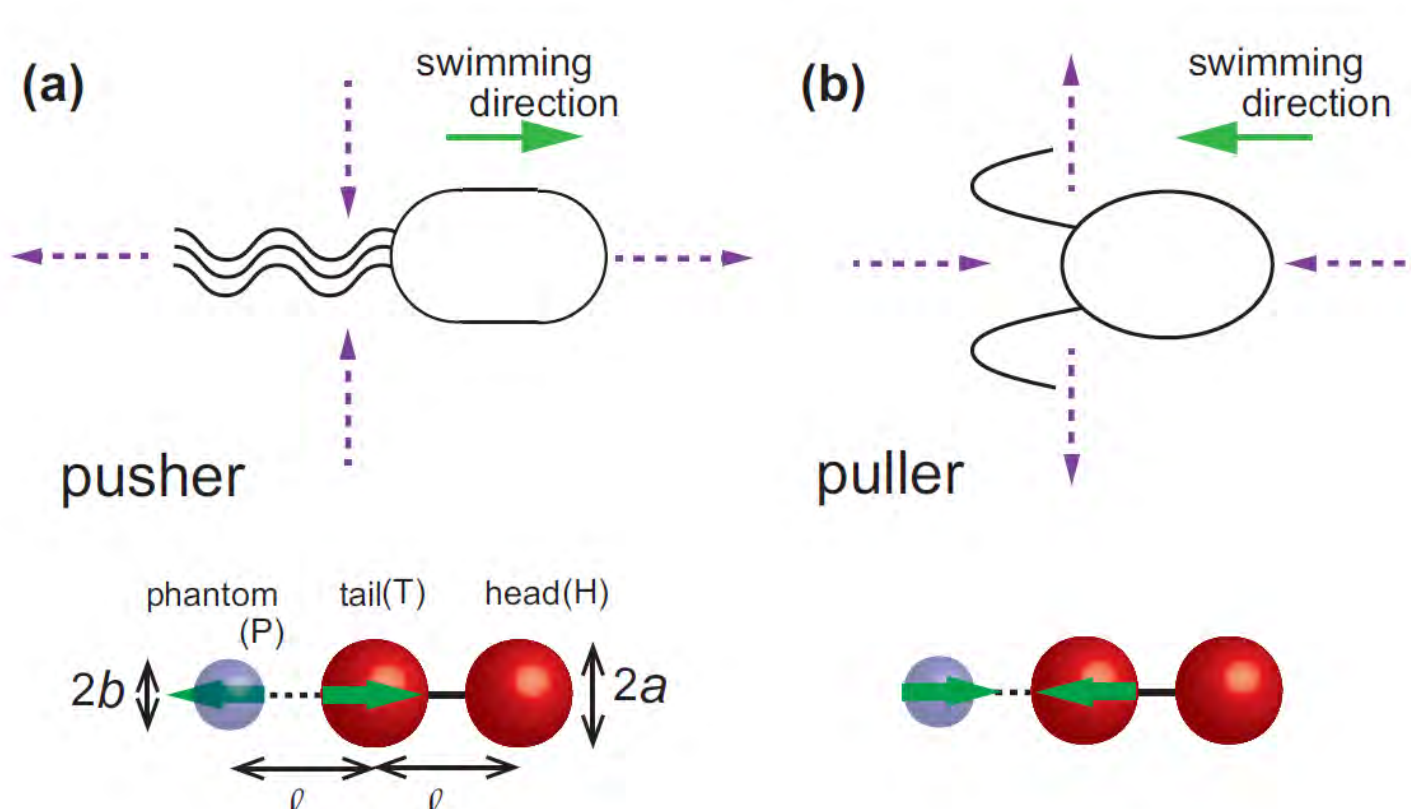
Crossover shear rate



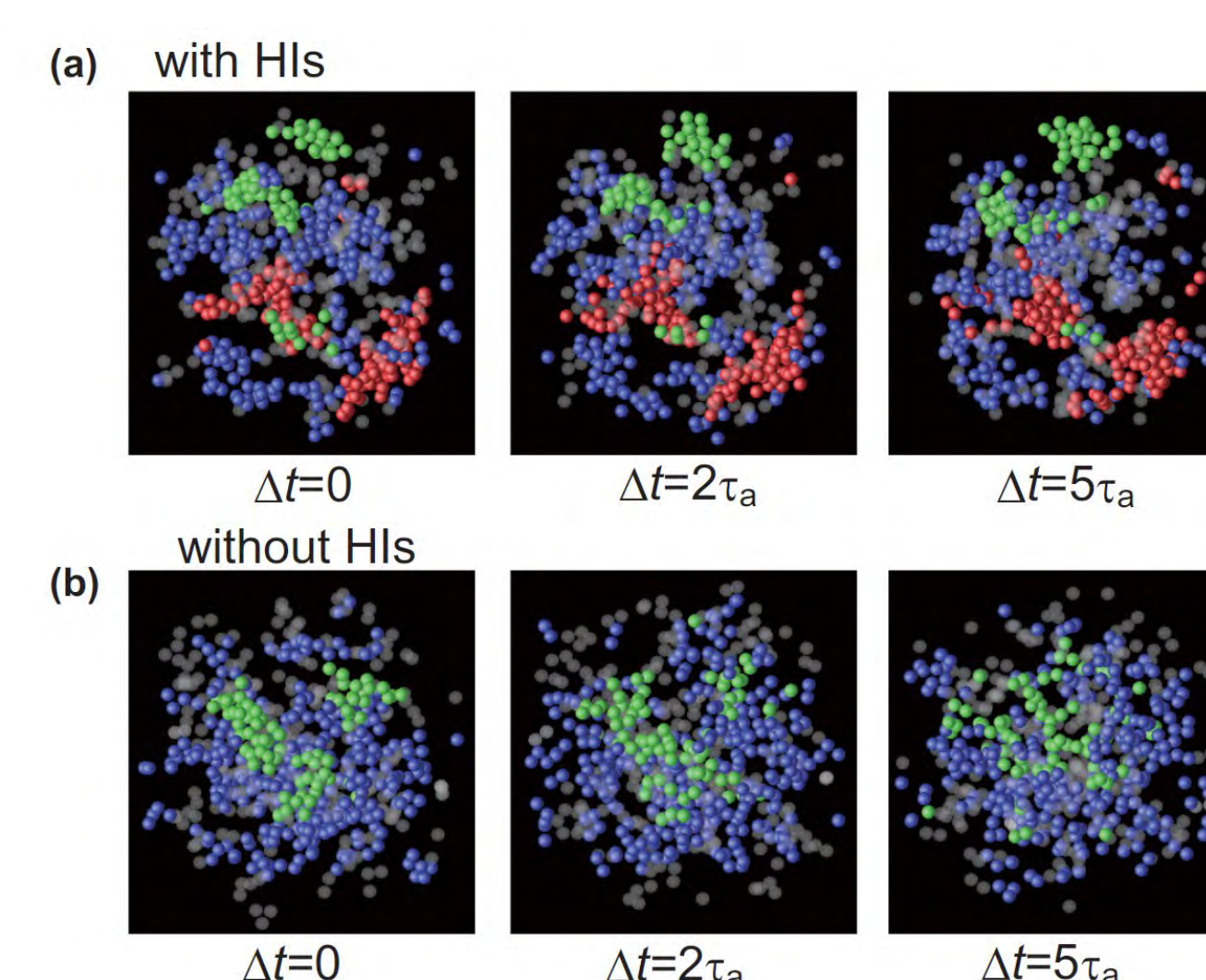
Particle configuration under shear flow



Relaxation time of density fluctuations



Minimal microorganism model



Hydrodynamic effect on the collective dynamics of bacterial suspensions