Biological organisms self-organize into living swarms and patterns over a range of length scales, from fish schools to bacteria colonies and structural protein assemblies. Inspired by such fascinating and robust features, it has been a long standing goal to tame artificial self-propelled colloidal motors to self-organize into programmable swarms and dynamic patterns with arbitrary morphologies, because the collective cooperation of colloidal motor can complete the complex task beyond the individual ability. We have constructed a photocatalysis induced peanut colloidal motor, which can be assembled into colloidal belt along the radial direction in collision. These colloidal belts move towards the center of the spot under the gradient light field, showing a positive phototaxis, and form a "sunflower" dynamic assembly in the center of the spot. They feel each other through the interaction of fluid field, which reveals that under certain conditions, the collision on the individual level of colloidal motor is enough to form an orderly dynamic assembly and realize collective directional motion. They can be used as a model of collective behavior between self-driving motors to simulate the group behavior of organisms in nature, and also to design new active materials and nanomachines moving in groups.

Thursday, July 18th, 2019 at 2:15 pm

MPIDS, Prandtl lecture hall,
Am Faßberg 17, Göttingen