1141-65-52 **Wen Yan*** (wyan@flatironinstitute.org), 162 5th Ave, New York, NY 10010. *Numerical experiments of active matter: efficient algorithms for long-range and short-range interactions.*

Active matter systems often show intriguing phenomena in large spatial scales and long time scales, due to various interactions between the building-block particles. The long-range interactions are usually through Stokes flow and electrostatic field, while the steric interaction is usually the dominant effect at short-range. We develop an extension to the Kernel Independent Fast Multipole Method to allow adaptive and flexible treatment of long-range interactions with various boundary conditions. We demonstrate the application of this algorithm with a new Stokeslet image system for half-space Stokes flow. To handle the short-range steric interactions, we propose a new method based on constrained minimization to circumvent the stiffness of pairwise repulsive potential. All the discussed algorithms are parallel and scalable, and we demonstrate the applications with a few active matter systems, including microtubule network and growing and dividing cells. (Received July 10, 2018)