THE UNIVERSITY
of NORTH CAROLINA
at CHAPEL HILL

Online Undergraduate Analysis and PDE Seminar

October 14, 2022
1:30 - 2:30 p.m.
Zoom

Mean field limits for classical dynamics with M-body forces

Professor Gigliola Staffilani (MIT)
Zach Hunsucker

Abstract. Most systems we encounter in everyday life can be visualized as a large number of interacting particles, ranging from the air we breathe to the motion within crowds of people. To handle these sorts of systems, we approximate them via a continuous model using partial differential equations. We use the mean field scaling to keep the total mass of fixed order as we send the number of particles to infinity. Then, we study the statistics of the system and the emergent macroscopic phenomena (that notably do not appear at the microscopic level). While most systems we study are two-body forces, such as gravity and the electrostatic force, we also investigate the mean field convergence for systems of up to M-body forces, such as the strong nuclear force of quantum chromodynamics.