

February 6, 2023 – Speaker: Angus McMullen

Time: 3:30-4:30 PM

Location: Marcus Nanotechnology 1116-1118

Title: A bioinspired approach to assembling complex colloidal matter

Abstract: When building blocks can move and stick to each other, they can self-assemble into new materials with exotic mechanical or optical properties. We can orchestrate colloidal self-assembly through the careful design of an individual building block's geometry and interactions. Typically, the blocks assemble piece-by-piece, like a jigsaw puzzle that assembles itself. This tactic, however, necessitates new orthogonal interactions with every additional building block. We take a different approach: folding a string of colloidal particles into desired geometries, echoing how polypeptides fold into proteins. By imposing a hierarchy of interactions, we find that we can select structures with near-perfect yield even with the most basic interaction sequences. This work presents an entirely new way to assemble colloidal structures and could be used to self-assemble mechanical or optical metamaterials such as a structure with a negative index of refraction.

Bio: Angus McMullen completed his PhD at Brown University in 2015, where he studied the physics of translocation through solid-state nanopores---nanoscale biosensors with applications in DNA sequencing. Switching fields and length scales, Angus moved to NYU for his postdoc, where he now studies the self-assembly and folding of flexible colloidal polymers.



A dark-themed event poster for the School of Physics Colloquium. The poster features the Georgia Tech logo and 'School of Physics' text at the top. The main title is 'A BIOINSPIRED APPROACH TO ASSEMBLING COMPLEX COLLOIDAL MATTER' in yellow. Below it, the date 'MONDAY, FEBRUARY 6, 2023' and time '3:30 TO 4:30 PM' are listed. The location 'MARCUS NANOTECHNOLOGY 1116-1118' is also included. A yellow button at the bottom left says 'COFFEE AND PASTRIES SERVED'. On the right, there is a circular portrait of Angus McMullen with a yellow border, and a yellow caption below it that reads 'DR. ANGUS MCMULLEN NEW YORK UNIVERSITY'. The poster is decorated with yellow diagonal stripes in the top left and white dotted patterns in the top right and bottom left.