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Creating a Simple Open Source Matlab Program Used to Control Adaptive Optics

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Oral Presentation O8.1

CREATING A SIMPLE OPEN SOURCE MATLAB PROGRAM USED TO CONTROL ADAPTIVE OPTICS

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Our goal is to contribute to the development of **self-assembling** structures that will allow for a whole new class of smart materials. To create sophisticated structures of this sort, the goal is to engineer each specific type of **microparticle** to be included in the mix, so as to constrain the ways in which it can bind to other micro/nano components in solution. Towards this end, we need to *measure* the interactions between particles at the individual component level. We are developing an optical trapping system that is optimized for this purpose. The use of acousto-optic deflectors (AODs) with digital frequency synthesizers allows, in theory, *very* precise position control over optical traps. However so as to generate these optical traps at the lowest laser power levels possible (to avoid unintended heating effects) we need to correct for significant optical aberrations introduced by the acoustic deflectors. My talk will explain our progress in correcting for these aberrations, related specifically to the MATLAB code I have developed. The larger goal of this work is to allow us to measure the forces and interactions of these microparticles to pico-Newton resolution (femto-Newton resolution may be possible).