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Abstract for an Invited Paper
for the DAMOP16 Meeting of
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**Atom by atom control of light and matter using neutral atom arrays**

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We will describe our efforts to create a scalable quantum many-body system assembled atom by atom. Our approach makes use of deterministically prepared regular arrays of individually controlled, ultra cold neutral atoms loaded in dipole traps. Techniques to engineer interactions between the trapped atoms using optical photons, nanophotonic devices and Rydberg excitations will be described.