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Development of neutral atom traps based on a microfabricated waveguide YUAN-YU JAU, JONGMIN LEE, GRANT BIEDERMANN, ALEEM SIDDIQUI, MATT EICHENFIELD, ERICA DOUGLA, Sandia National Labs — Implementation of trapping neutral atoms in the evanescent fields generated by a nano-structure, such as a nanofiber or a microfabricated nano-waveguide, will naturally enable strong atom-photon interactions, which serve the key mechanisms for different type of quantum controls. At Sandia National Labs, we are aiming to develop a platform based on this concept to eventually trap cesium atoms with a microfabricated waveguide. Although, neutral atom traps using optical nanofiber has been demonstrated, there are several key issues that need to be resolved to realize trapping atoms with microfabricated structure. The subjects include the material for making the waveguide, optical power handling capability, surface adsorption of alkali-metal atoms, surface roughness of the nano-structure, cold-atom source for loading the atoms into the evanescent-field traps, etc. We will discuss our studies on these related subjects and report our latest progress.

Yuan-Yu Jau
Sandia National Labs

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