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Single atom array to form a Rydberg ring¹ MINGSHENG ZHAN, PENG XU, XIAODONG HE, MIN LIU, JIN WANG, Wuhan Institute of Physics and Mathematics, Chinese Academy of Sciences — Single atom arrays are ideal quantum systems for studying few-body quantum simulation and quantum computation [1]. Towards realizing a fully controllable array we did a lot of experimental efforts, which include rotating single atoms in a ring optical lattice generated by a spatial light modulator [2], high efficient loading of two atoms into a microscopic optical trap by dynamically reshaping the trap with a spatial light modulator [3], and trapping a single atom in a blue detuned optical bottle beam trap [4]. Recently, we succeeded in trapping up to 6 atoms in a ring optical lattice with one atom in each site. Further laser cooling the array and manipulation of the inner states will provide chance to form Rydberg rings for quantum simulation.

[1] M. Saffman et al., Rev. Mod. Phys. 82, 2313 (2010)

[2] X.D. He et al., Opt. Express 17, 21014 (2009)

[3] X.D. He et al., Opt. Express 18, 13586 (2010)

[4] P. Xu et al., Opt. Lett. 35, 2164 (2010)

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