

Abstract Submitted  
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**Excitation of a quantum gas to Rydberg states** THIBAUT VOGT, JINGSHAN HAN, RUIXIANG GUO, WENHUI LI, Centre for Quantum Technologies, RYDBERG ATOM GROUP TEAM<sup>1</sup> — Rydberg atoms constitute a paradigmatic system for the study of quantum many-body physics. Very large dipole-dipole interaction between Rydberg atoms leads to the dipole blockade, at the heart of promising proposals for quantum simulation or studies of strongly correlated systems [1-2]. Dipole blockade has already been used to excite spatially organized structures of Rydberg atoms [3], realize single photon sources [4] or implement quantum gates [5]. In this talk, I will present the recent developments of our experimental setup for achieving highly coherent Rydberg excitation. I will also discuss our progress on the detection of Rydberg atoms, with preliminary spectroscopic measurements obtained for the excitation of Rydberg atoms in a nearly degenerate gas of 87Rb atoms.

[1] Weimer, H., et al. Nature Physics 6: 382-388 (2010).

[2] Pupillo, G., et al. PRL 104 223002 (2010).

[3] Schausz, P., et al. Nature 491 87-91 (2012).

[4] Peyronel et al. Nature 488 58-60 (2012).

[5] Isenhower et al. PRL 104 010503 (2010).

<sup>1</sup><http://rydberg.quantumlah.org/>

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