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Rydberg gases at room temperature - coherent dynamics and interaction ROBERT LOEW, BERNHARD HUBER, ANDREAS KÖLLE, THOMAS BALUKTSIAN, TILMAN PFAU, 5. Physikalisches Institut, University of Stuttgart — Rydberg atoms are of great interest due to their prospects in quantum information. We present our progress on the coherent control and investigation of Rydberg atoms at room temperature. We show that we are able to drive Rabi oscillations on the nanosecond timescale to a Rydberg state by using a pulsed laser excitation and are therefore faster than the coherence time limitation given by the Doppler width [1]. By systematically investigating the dephasing of these oscillations for different atomic densities and Rydberg states we find evidence for van-der Waals interaction in thermal vapor [2]. The strength of the interaction exceeds the energy scale of thermal motion (i.e. the Doppler broadening) and therefore enables strong quantum correlations. Furthermore we present our latest results on the combination of the pulsed Rydberg excitation with a four-wave-mixing scheme and our progress towards the creation of non-classical light.

[1] Huber et al., PRL 107, 243001 (2011)

[2] Baluktsian et al., arXiv:1212.0690

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