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Progress towards broadband Raman quantum memory in Bose-Einstein condensates ERHAN SAGLAMYUREK, TARAS HRUSHEVSKYI, BENJAMIN SMITH, LINDSAY LEBLANC, Department of Physics, University of Alberta — Optical quantum memories are building blocks for quantum information technologies. Efficient and long-lived storage in combination with high-speed (broadband) operation are key features required for practical applications. While the realization has been a great challenge, Raman memory in Bose-Einstein condensates (BECs) is a promising approach, due to negligible decoherence from diffusion and collisions that leads to seconds-scale memory times [2], high efficiency due to large atomic density [3], the possibility for atom-chip integration with micro photonics [4], and the suitability of the far off-resonant Raman approach with storage of broadband photons (over GHz) [5]. Here we report our progress towards Raman memory in a BEC. We describe our apparatus recently built for producing BEC with ^{87}Rb atoms, and present the observation of nearly pure BEC with 5x10^5 atoms at 40 nK. After showing our initial characterizations, we discuss the suitability of our system for Raman-based light storage in our BEC. [1] R. Zhang et al. Phys. Rev. Lett. 103, 233602 (2009). [2] S. Riedl et al. Phys. Rev. A 85, 022318 (2012). [3] Y. Colombe et al. Nature 450, 272-276 (2007). [4] K. F. Reim et al. Nat. Photonics 4, 218 - 221 (2010).

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