



## Physical Sciences Seminar

# Quantum gas in a box

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Host: Misha Lemeshko

For the past two decades ultracold Bose and Fermi atomic gases have been used with great success to study fundamental many-body physics. While traditionally they were produced in harmonic electromagnetic traps, it recently also became possible to create them in the uniform potential of an optical box trap [1]. This has opened even more possibilities for fundamental studies, allowing closer connections with other many-body systems and the theories that rely on the translational symmetry of the system. Research topics for which the homogeneous, box-trapped quantum gases offer distinct advantages include critical phenomena near phase transitions [2], quantum turbulence [3], and strongly interacting gases [4,5]. I will give an overview of our recent experiments on these systems.[1] Bose-Einstein Condensation of Atoms in a Uniform Potential, A. L. Gaunt, T. F. Schmidutz, I. Gotlibovych, R. P. Smith, and Z. Hadzibabic, Phys. Rev. Lett. 110, 200406 (2013).[2] Critical dynamics of spontaneous symmetry breaking in a homogeneous Bose gas, N. Navon, A. L. Gaunt, R. P. Smith and Z. Hadzibabic, Science 347, 167 (2015).[3] Emergence of a turbulent cascade in a quantum gas, N. Navon, A. L. Gaunt, R. P. Smith, and Z. Hadzibabic, Nature 539, 72 (2016).[4] Quantum Depletion of a Homogeneous Bose-Einstein Condensate, R. Lopes, C. Eigen, N. Navon, D. Clément, R. P. Smith, and Z. Hadzibabic, Phys. Rev. Lett. 119, 190404 (2017).

**Friday, April 20, 2018 11:00am - 12:30pm**

Mondi Seminar Room 2, Central Building



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