



## Physical Sciences Seminar

# Simulating single-shot images of ultracold atoms

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Host: Misha Lemeshko

Ultracold atoms are usually imaged in experiments in single-shot images. These images are a projective measurement of the many-body wavefunction. Such single-shot images thus correspond to drawing a random sample from the probability distribution associated with the wavefunction. This talk will discuss single-shot simulations performed with the MCTDH-X software [0], their effect on the interpretation of computations with MCTDH-X and experimental observations, and give some prospects on how to better extract and understand their information content. MCTDH-X-based single-shot simulations recently helped to characterize the experimentally observed granulation of a Bose-Einstein condensate (BEC) [1] and to identify the fragmentation of a BEC in a cavity [2] as well as a measurement protocol for the crystal state of ultracold dipolar bosons [3]. [0] MCTDH-X: The multiconfigurational time-dependent Hartree for indistinguishable particles software, A. U. J. Lode, M. C. Tsatsos, E. Fasshauer, R. Lin, L. Papariello, P. Molignini, and C. Lvque, <http://ultracold.org> (2018). [1] A. U. J. Lode, G. D. Telles, D. Luo, V. S. Bagnato, and R. G. Hulet, <https://arxiv.org/abs/1707.04055>, arXiv:1707.04055 [cond-mat.quant-gas] (2017). [2] A. U. J. Lode and Christoph Bruder, DOI: <https://doi.org/10.1103/PhysRevLett.118.013603>, Phys. Rev. Lett. 118, 013603 (2017). [3] B. Chatterjee and A. U. J. Lode, <https://arxiv.org/abs/1708.07409>, arXiv:1708.07409 [cond-mat.quant-gas] (2017), accepted in Phys. Rev. A (2018).

**Tuesday, October 23, 2018 11:00am - 12:30pm**

Big Seminar room Ground floor / Office Bldg West (I21.EG.101)



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