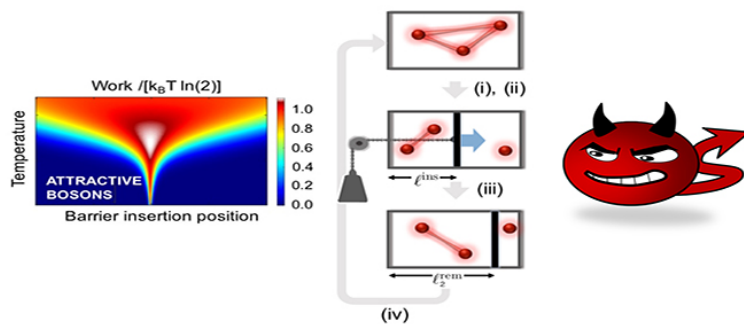


Ultracold atomic quantum gases - exploring novel states of matter from the few- to the many-body regime

Prof. Dr. Stephanie M. Reimann, Mathematical Physics,
Lund University, Sweden



Ultra-cold atomic quantum gases have opened up many new possibilities to design, control and manipulate quantum matter. In Europe as well as worldwide there is presently much interest in new quantum technologies that make use of the unique properties of Bose-Einstein condensates or atomic Fermi gases. The talk will review some of the more recent advances in this exciting research field. Furthermore, an outlook will be given on new ideas to explore the thermodynamic properties of many-particle quantum systems. Quantum heat engines with interacting quantum gases as a working medium open interesting new prospects that will be addressed for the example of a quantum Szilard cycle - a thought experiment where a kind of Maxwell's demon extracts work from the information of the particle distribution. It was recently found that bosons with attractive interactions may enhance the conversion between information and work.

Bosons with attractive interactions were found to enhance the conversion between information and work in a quantum Szilard engine. ​Bild: Bengtsson et al., Phys. Rev. Lett., 2018