Critical Casimir forces from the equation of state of quantum critical cold gas  
Adam Rançon, Laboratoire de Physique, Ecole Normale Superieure de Lyon

Thermal fluctuations in classical systems give rise to effective forces reminiscent of the  
paradigmatic Casimir force induced by the fluctuations of the electromagnetic vacuum. These  
forces have been thoroughly studied numerically for varieties of boundary conditions relevant  
for experiments in classical statistical physics, as well as periodic boundary conditions, which  
were a priori theoretical curiosities. Using the well-known correspondence between finite  
temperature quantum statistical systems and classical statistical field theory on a torus, I will  
show that the equation of state of a quantum critical system can be described by the critical  
Casimir force induced by periodic boundary conditions. This universality will be shown to  
hold for a variety of systems, using different numerical approaches, and I will comment on  
possible experimental realizations.