

Debye length in very large magneto-optical traps

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Abstract :

Study of very large magneto-optical traps (VLMOT) (containing up to $\sim 10^{11}$ atoms) has been for a long time set aside because multiple scattering of photons prevented to reach high densities (needed for instance to obtain a condensate). However, some recent studies took advantage of VLMOTs to study the transport of light, or opto-mechanical instabilities. The “standard model” to describe VLMOTs includes an effective Colombian-like force between two level atoms, due to multiple scattering of photons. According to this picture, VLMOTs thus share similarities with a one component plasma, where the Debye length is known to be a signature of correlations between particles. Signature of a Debye length would be a strong experimental verification of the standard model of VLMOT. After an introduction, I will talk about the different strategies considered to observe and measure the equivalent of the Debye length in a VLMOT. I will also present the theoretical expectations supported by numerical simulation and the preliminary experimental results.

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