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Classical oscillator model for time-dependent opacity in an ultracold atom gas JONATHAN GILBERT, JACOB ROBERTS, Colorado State University — In many ultracold gases, the absorption length of light can be made to be much smaller than the spatial dimensions of the gas. Light incident from outside the gas in such a situation would in general be strongly absorbed. For light near resonance, however, the atoms have a response time on the order of an excited state lifetime. For short enough light pulses the gas is transparent, despite being opaque in steady-state. We have developed a classical model that can quantitatively predict the dynamical response of such a gas for experimentally achievable dilute ultracold gas conditions by modeling the atoms as classical oscillators. Comparison of these model predictions to measurements can be used to quantify the importance of quantum effects. We present scaling considerations with regard to computational requirements for realistic systems.

Jacob Roberts
Colorado State University

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