Abstract for an Invited Paper
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Measuring correlation functions in interacting systems of cold atoms[1]

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I will discuss two approaches to measuring correlation functions in experiments with cold atoms. The first approach is based on analyzing atom shot noise in the time of flight experiments. I will compare this approach to Hanburry-Brown-Twiss experiments and show that it can be used to probe novel quantum states of cold atoms including paired states of fermions and magnetically ordered states in optical lattices. The second approach relies on interference experiments between extended condensates. I will show that the interference pattern contains information about correlation functions within individual condensates and that the full distribution of the fringe contrast provides information about high order correlation functions. I will discuss possible applications of this method to study Luttinger liquid behavior in one dimensional systems and probe Kosterlitz-Thouless transition in two dimensional condensates.

[1]Work done in collaboration with E. Altman, M. Lukin, A. Polkovnikov