

Coherent cancellation of measurement back-action-noise in hybrid atom-optomechanics

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Continuous position of force measurements of massive systems are subject to measurement back-action resulting in the standard quantum limit of measurement sensitivity. Current experiments with optomechanical systems reached the regime where measurement sensitivity is limited by back-action-noise. I will discuss an approach towards surpassing the standard quantum limit by coherent cancellation of back noise using an auxiliary system exhibiting an effective negative mass. The auxiliary system is a spin polarized atomic ensemble. This method of back action cancellation was recently demonstrated in the lab of Eugene Polzik (Copenhagen).