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Towards Entangled Atom Interferometry KISHOR KAPALE, Western Illinois Univ — Atom interferometry is an indispensable tool for ultra-precise metrology of electric, magnetic, and gravitational fields. The resolution available in the standard atom interferometric schemes is dictated by the standard quantum limit and it scales as $1/\sqrt{N}$, where N is the total number of atoms passing through the interferometer. One can, in principle, increase this resolution by a factor of $\sqrt{N}$ if one is able to employ entangled atoms as opposed to uncorrelated atoms to achieve a resolution that scales as $1/N$. This domain of interferometry is popularly known as Heisenberg-limited interferometry (HLI). There have been a tremendous amount of efforts carried out in the last decade or so towards attaining Heisenberg-limited interferometry with photons. It is natural to think about parallels for interferometry with entangled states of atoms. It is, however, extremely difficult to obtain entangled states of atoms suitable for atom interferometry. In this presentation, I intend to discuss the challenges and possible routes to developing entangled atom interferometry using tools of quantum optics that allow us precise control over atom-light interaction and possible applications of such schemes.

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