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Sub-nanoscale Resolution for Atom Localization, Lithography and Microscopy via Coherent Population Trapping KISHOR T. KAPALE, Department of Physics, Western Illinois University, Macomb, Illinois, 61455-1367, USA, GIRISH S. AGARWAL, Department of Physics, Oklahoma State University, Stillwater, OK 74078, USA — We present a coherent population trapping based scheme to attain sub-nanoscale resolution for atom localization, microscopy and lithography. Our method uses three-level atoms coupled to amplitude modulated probe field and spatially dependent drive field. The modulation of the probe field allows us to tap into the steep dispersion normally associated with electromagnetically induced transparency and offers an avenue to attain sub-nanometer resolution using just optical fields. We illustrate application of the techniques to the area of microscopy and lithography and show how multilevel schemes offer the possibility of improving resolution further.

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