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Imaging atoms from resonance fluorescence spectrum beyond the diffraction limit[1] ZEYANG LIAO, Institute for Quantum Science and Engineering and Department of Physics and Astronomy, Texas A&M University, College Station, TX 77843-4242, USA, MOHAMMAD AL-AMRI, The National Center for Mathematics and Physics, KACST, P.O.Box 6086, Riyadh 11442, Saudi Arabia, M. SUHAIL ZUBAIRY, Institute for Quantum Science and Engineering and Department of Physics and Astronomy, Texas A&M University, College Station, TX 77843-4242, USA — We calculate the resonance fluorescence spectrum of a linear chain of two-level atoms driven by a gradient coherent laser field. The result shows that we can determine the positions of atoms from the spectrum even when the atoms locate within subwavelength range and the dipole-dipole interaction is significant. This far-field resonance fluorescence localization microscopy method does not require point-by-point scanning and it may be more time-efficient. We also give a possible scheme to extract the position information in an extended region without requiring more peak power of laser. We also briefly discuss how to do a 2D imaging based on our scheme.

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