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Imaging of nearby NV centers beyond diffraction limit FANG-WEN SUN, JIN-MING CUI, GUANG-CAN GUO, Key Lab of Quantum Information, University of Science and Technology of China, MICRO-CAVITY TEAM — Nitrogen-Vacancy (NV) centers in diamond have been widely applied in physical and biological study. Single NV center has shown its good quality as a single-photon source. More importantly, when two NV centers are close to each other within tens of nanometers, the strong dipole-dipole interaction can be applied in quantum information techniques. Diamond nanocrystal with NV center has been applied for imaging biological processes. Therefore, to image and distinguish two nearby NV centers is becoming more and more important. In experiment, NV centers are usually detected with scanning confocal optical fluorescence microscopy where the single-photon counts of spontaneous emission are measured to describe their optical imaging. Also, the method of stimulated emission depletion fluorescence microscopy was used to distinguish two nearby NV centers. Here, we proposed a new technique based on our home-built confocal scanning microscopy to image two nearby single NV centers. With the new imaging technique, we have experimentally imaged and distinguished two NV centers with the distance about 40nm, which is well beyond the diffraction limit. This imaging technique can, in principle, distinguish particles with any overlapping.

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