Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Single molecule spin resonance spectroscopy and imaging by diamond-sensor JIANGFENG DU, University of Science and Technology of China — Single-molecule magnetic resonance spectroscopy and imaging is one of the ultimate goals in magnetic resonance and will has great applications in a broad range of scientific areas, from life science to physics and chemistry. The spin of a single nitrogen vacancy (NV) center in diamond is a highly sensitive magnetic-field sensor, which has been proposed for detection of single molecules or nanoscale targets. We and co-workers have successfully obtained the first single-protein spin resonance spectroscopy under ambient conditions [1], high-resolution vector microwave imaging [2], and realized atomic-scale structure analysis of single nuclear-spin clusters in diamond [3]. Moreover, we have tried to improve the quantum control technique and succeed to achieve fault-tolerant universal quantum gates [4]. As the last part, I will briefly introduce our most recently work on single protein imaging in situ in cell. References: [1] Fazhan Shi, et al., Science, 347, 1135 (2015) [2] Pengfei Wang, et al., Nature Commu.,6, 6631 (2015) [3] Fazhan Shi, et al., Nature Physics, 10, 21 (2014) [4] Xing Rong, et al., Nature Commu., In press (2015)

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Date submitted: 05 Nov 2015 Electronic form version 1.4