



## 复旦大学物理系物质科学报告

### **Single molecule spin resonance spectroscopy and imaging by diamond-sensor**

### **Physics Department Colloquium**

**Prof. 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 have 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], realized atomic-scale structure analysis of single nuclear-spin clusters in diamond [3], detected nuclear magnetic resonance spectroscopy with single spin sensitivity [4], and succeeded in detection of (5nm)<sup>3</sup> hydrogen

nuclear spin magnetic resonance spectroscopy [5]. Moreover, we have tried to improve the quantum control technique and succeed to achieve fault-tolerant universal quantum gates [6]. 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 Communication,6, 6631 (2015)
- [3] Fazhan Shi, et al., Nature Physics, 10, 21 (2014)
- [4] C. Mueller, et al., 5:4703 (2014)
- [5] Tobias Staudacher, et al., Science, 339, 561 (2013)
- [6] Xing Rong, et al., Nature Communications, In press (2015)

**Time: 2:00pm, Tuesday, 2016.04.05**

**Location: Physics Building, Room 221B**

**(Cookies and coffee are served from 1:30 pm)**