

The ODMR Measurement Cycle

Optically Detected Magnetic Resonance in NV⁻ Centers

1

Initialization

Green laser pulse (532 nm)

Spin polarized to $|0\rangle$

via intersystem crossing

Bright fluorescence

2

MW Control

Microwave pulse applied

Frequency ≈ 2.87 GHz

If resonant: $|0\rangle \rightarrow |\pm 1\rangle$

Coherent spin rotation

3

Sensing

Spin evolves freely

Accumulates phase from:

B-field, temperature,

strain, electric field

4

Readout

Second green laser pulse

$|0\rangle \rightarrow$ Bright (more photons)

$|\pm 1\rangle \rightarrow$ Dim (fewer photons)

Fluorescence = spin state