



Mid-circuit partial measurement on $^{171}\text{Yb}^+$ using the *omg* architecture

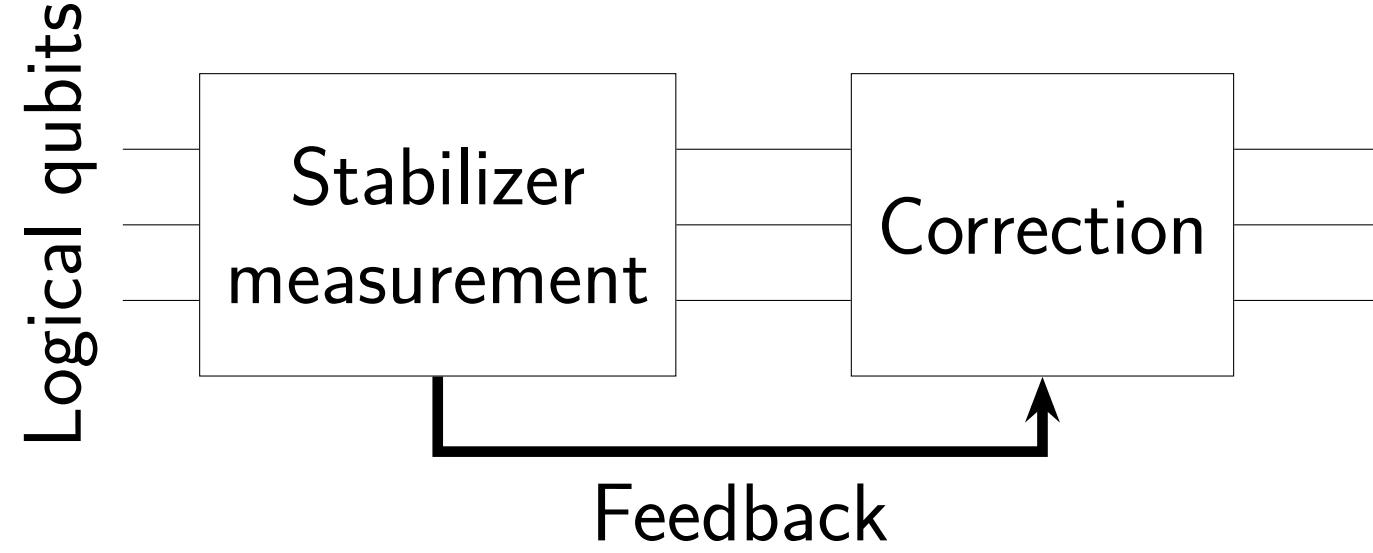
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Mid-circuit measurement and the *omg* architecture

Mid-circuit measurement

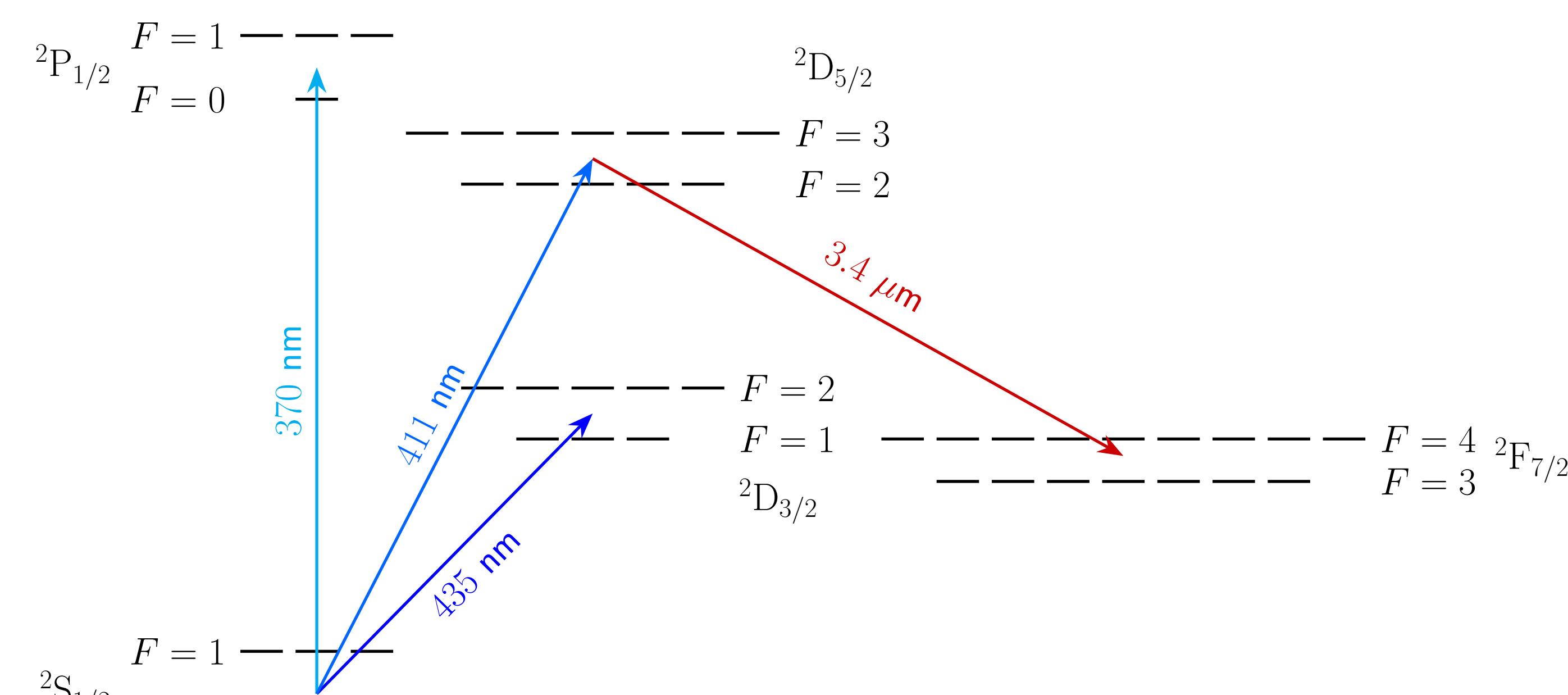
- Required for multiple rounds of error correction
- Partial readout without perturbing the rest of the system



omg architecture

- Combining **O**ptical **M**etastable and **G**round state qubits
- Protecting quantum information by converting between qubit types
- Faster than ion-shuttling

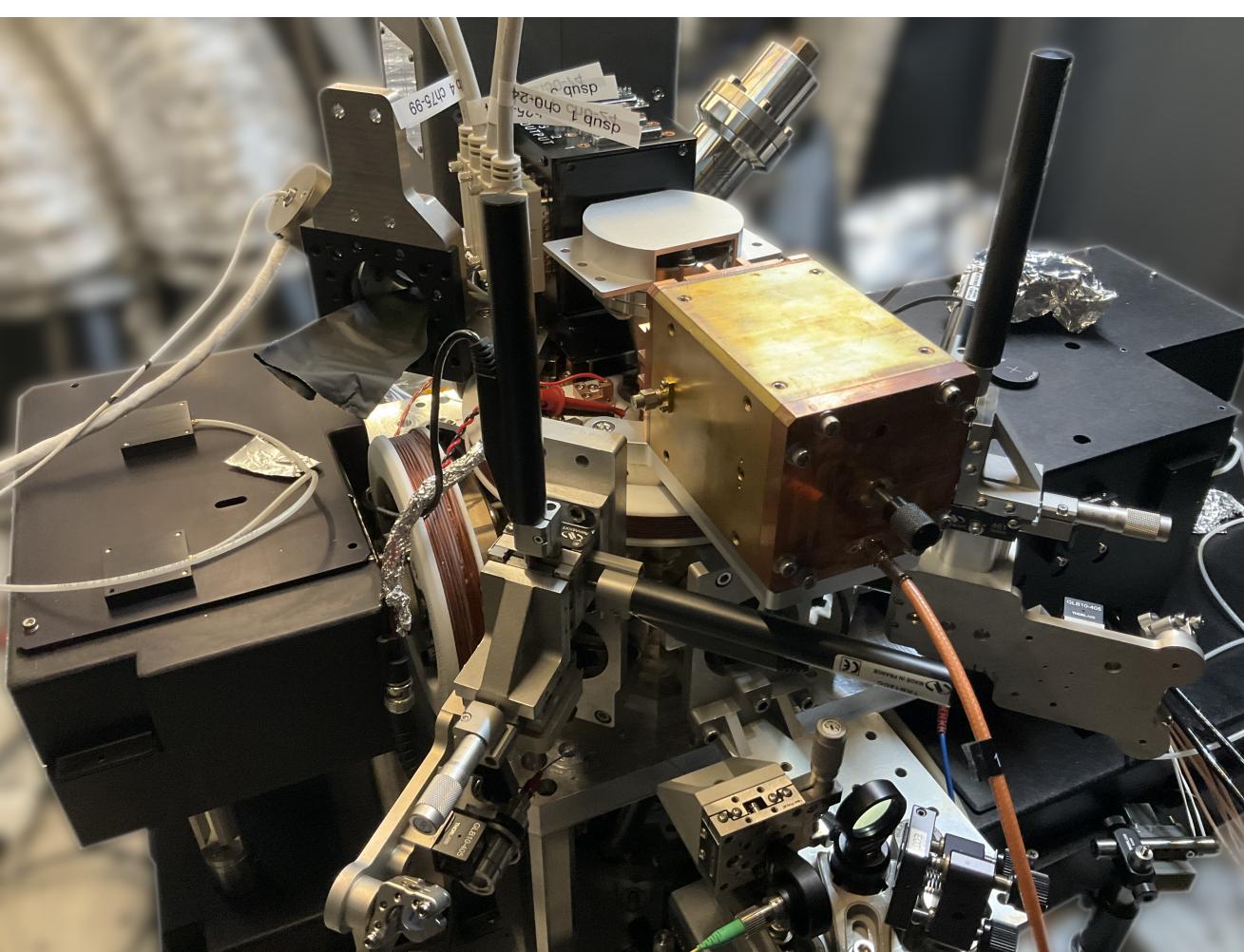
- Yb⁺: D_{3/2} (50 ms), D_{5/2} (7 ms), F_{7/2} (> 1 yr)
- Ba⁺: D_{3/2} (20 s), D_{5/2} (30 s)
- ...



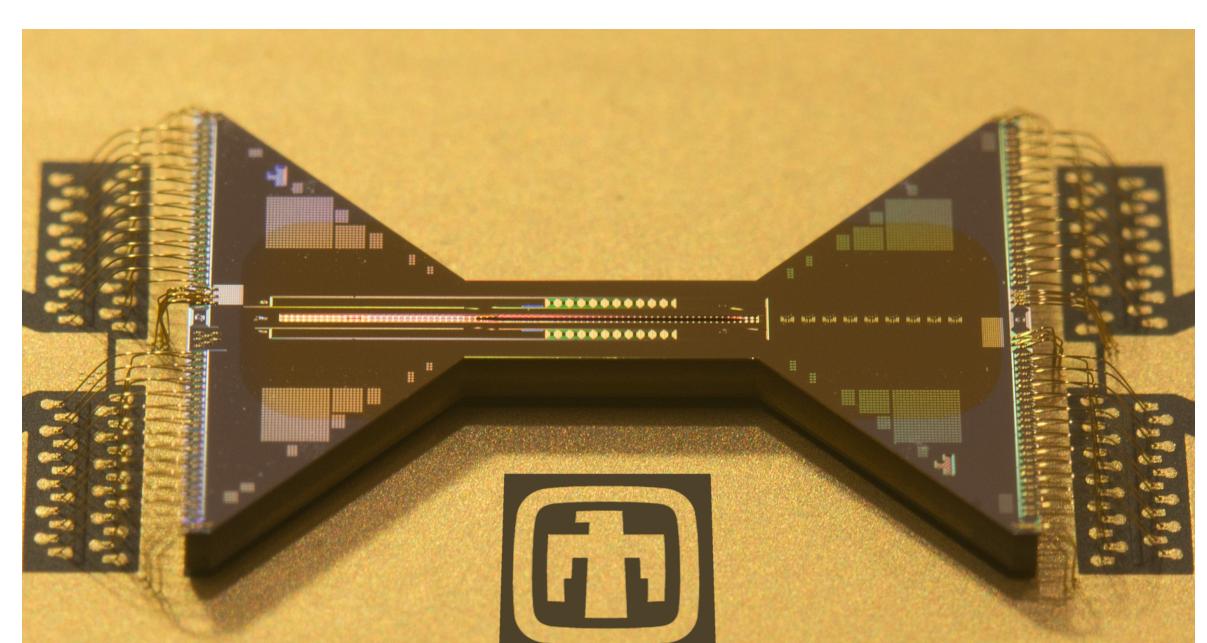
System

Features

- Global state preparation and detection with 370 nm
- Individually addressable Raman with 355 nm
- Global 435 nm for exciting to D_{3/2} states
- (Planned) Global 411 nm and 3.4 μm for accessing D_{5/2} and F_{7/2} states

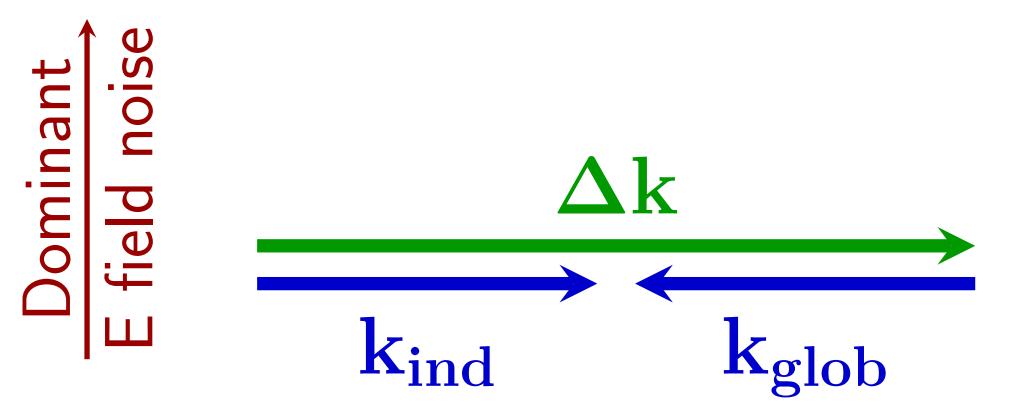


Phoenix Surface Trap



- Separate loading and quantum region
- Fine control of ion position
- Low heating rate

Raman System



Miniaturized 369/399/780/935nm Beam Path