

Dressing Ultra-Cold Atoms for Matter-Wave Bubbles and Rings

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This talk will start with a basic introduction on how to use "dressed" states to generate traps and waveguides for ultra-cold atoms. With a focus on resulting bubble and ring topologies we will see that the ring systems have potential quantum technology applications to rotation sensing, and that the quantum bubbles are of interest as a system with a topology very different from the usual kind of atom trap. The bubble systems have been a recent target in NASA's BEC experiment in orbit (the Cold Atom Laboratory). The "dressing" of atoms has usually been done with radio-frequency or microwave fields. Recent results will be presented, including theory for a new all-optical dressing approach.

References

- [1] R Veyron, C Métayer, J B Gerent *et al.*, AVS Quantum Sci. **8**, 013203 (2026)

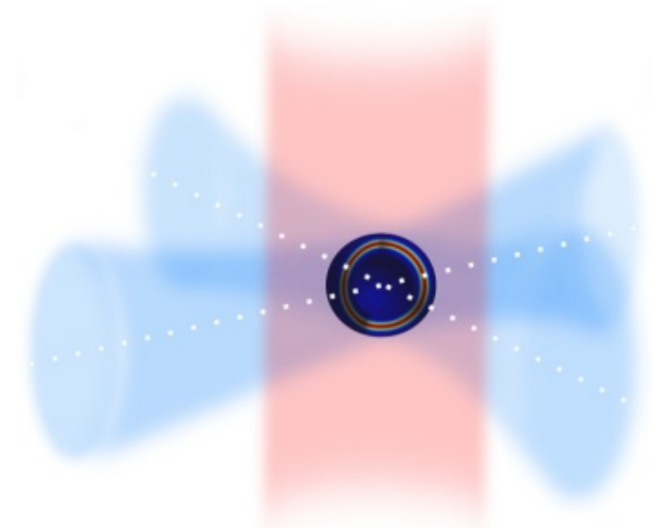


Figure 1: Concept for all-optical shell trap involving the intersection of three laser beams with two wavelengths (image taken from [1])