

Quantum Bubbles and Rings with Ultra-Cold Atoms

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The technique of radio-frequency dressing [1] allows the possibility of generating new types of traps for ultra-cold atoms. This can include different dimensionalities and different topologies such as rings, shells and toroidal surfaces. We will discuss the production and properties of these types of traps using the RF dressing technique. The full exploration of a large shell to produce a bubble of matter-waves, or BEC, has to be performed in free-fall, *i.e.* in space or a drop-tower. We will show how NASA's BEC experiment in orbit (the Cold Atom laboratory [2,3]) can be enhanced. Diagnostic information is analysed with the free-expansion of shells, and we also discuss applications to ring structures.

References

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