



universität  
**uulm**

**Physikalisches Kolloquium**  
Einladung

**Physics Colloquium**  
Invitation

**Monday, 02 June 2025**

Lecture Hall N24/H13, at 16:15

Coffee and cookies will be served in front of the lecture hall from 16:00

## **Ultracold Bubbles in Space: Atomic Physics Aboard the International Space Station**

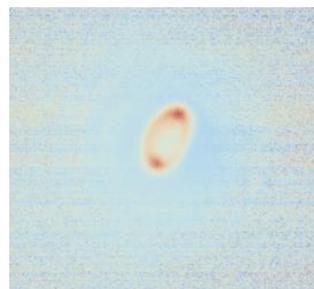
**Prof. Dr. Nathan E. Lundblad**  
Bates College, Department of Physics and  
Astronomy, Lewiston, USA

 <https://www.bates.edu/faculty/profile/nathan-e-lundblad/>



Exploring the effects of geometry, topology, dimensionality, and interactions on ultracold atomic ensembles has been a continually fruitful line of inquiry in the decades since the first observation of Bose-Einstein condensation (BEC). One previously unexplored configuration for ultracold ensembles is that of a bubble or shell, where trapped atoms are confined in the vicinity of a spherical or ellipsoidal surface. Such a quantum system could offer new collective modes, topologically-sensitive behavior of quantized vortices, self-interference and shell collapse, as well as the exploration of trapped ultracold systems with mm-scale spatial extent.

With the construction of the NASA Cold Atom Lab (CAL) facility and its subsequent delivery in 2018 to the International Space Station (ISS) and commissioning as an orbital BEC user facility, experimental atomic physics schemes that require a sustained microgravity environment are now possible. I will review CAL observations of trapped bubbles of ultracold atoms, including a variety of bubble-trap configurations that are possible with this apparatus. I will also discuss the thermodynamics of ultracold bubbles and review open questions being explored in the ongoing science run of CAL aboard ISS.



Host: Prof. Dr. Wolfgang Schleich, Institute of Quantum Physics

Organisation: Prof. Dr. Jens Michaelis, Institute of Biophysics, [jens.michaelis@uni-ulm.de](mailto:jens.michaelis@uni-ulm.de), +49-731-50-23050