

Abstract Submitted  
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**BECCAL - Atom Optics with BECs on the ISS<sup>1</sup>** DENNIS BECKER, KAI FRYE, CHRISTIAN SCHUBERT, ERNST MARIA RASEL, Institute of Quantum Optics Hanover, BECCAL COLLABORATION — The NASA-DLR Bose-Einstein condensate and Cold Atom Laboratory - called BECCAL - is a joint multi-user, multi-purpose facility to exploit the unique microgravity conditions on the International Space Station (ISS) for complementary experiments with ultra-cold and condensed Rb and K atoms in regimes inaccessible on ground. In microgravity, no gravitational sag acts on an atomic ensemble, and it stays at rest with respect to its environment. This enables an extended time of flight in free fall at the order of seconds to tens of seconds, beyond the possibilities on earth. These two aspects are essential for the various experiments enabled by BECCAL. The system will be based on the drop tower and sounding rocket experiments QUANTUS and MAIUS including an atom chip for efficient evaporation and excellent control of the quantum degenerate atomic clouds. The setup will provide a variety of trapping potentials including static and RF-dressed magnetic as well as red- and blue-detuned optical potentials. It will serve as a platform to realize experiments in atom optics, physics of quantum degenerate gases, their mixtures, and atom interferometry. Here, we present an insight on some of the proposed experiments and the current design of the apparatus.

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