Cooling of potassium atoms on the MAIUS-B atom chip

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The Einstein equivalence principle can directly be tested by comparing the free fall acceleration of two test objects with different internal composition and mass. Atom interferometers are an ideal test tool due to their high controllability, atom species purity and the possibility to overlap two different atom clouds for differential measurements. The sensitivity of atom interferometers can be enhanced significantly by increasing the free evolution time between the light pulses. For this purpose, space missions are currently of large interest due to their long microgravity time and their low vibrational noise. After the successful launch of the MAIUS-1 sounding rocket mission and the first observation of Bose-Einstein condensation in space [1], we aim for the demonstration of a dual species atom interferometer based on Raman double diffraction [2] of Rb-87 and K-41 Bose-Einstein condensates. The poster shows the experimental setup of our high-flux cold atom source using a $2D^+$- and 3D-MOT supported by ultraviolet light induced atomic desorption (LIAD). The current status of the cooling of rubidium and potassium atoms on our ground based atom chip setup is presented. A major focus will lie on the implementation and comparison of different sub-doppler cooling techniques for K-39 and K-41.

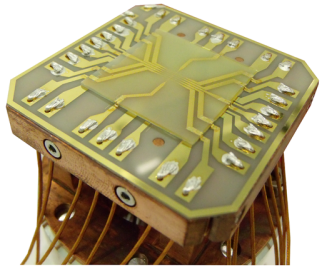

Figure 1: The MAIUS-B atom chip which is used to trap Rb-87 and K-41 atoms simultaneously.

Keywords: ATOMCHIP, BOSE-EINSTEIN-CONDENSATION, ATOM INTERFEROMETRY, MICROGRAVITY

References

[1] Press release, DLR (2017), accessed: 08 Jun 2018

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