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# Planar trap for quantum information processing with atomic ions interacting via MAGIC

We designed a micro-segmented planar ion trap for trapping atomic ions in a 2-dimensional array by electrodynamic fields. The electrode structures allow for varying the ion-surface separation. Additionally, the trap chip has resonant structures incorporated to enhance microwave-frequency magnetic fields, which will be used for all coherent operations on the hyperfine manifold of $^{171}Yb^{+}$ ions. The ions interact via magnetic gradient induced coupling (MAGIC) [1]. Reducing the magnetic field noise at the ions' location plays an important role in this experiment. In order to reduce the effect of the chamber on ambient magnetic fields and protect the hyperfine states from magnetic field noise, we employ a custom aluminum vacuum chamber and placed a mu-metal shield inside this chamber. Furthermore, for reduction of electric field noise due to electrodes surface contamination, the experimental setup includes an $Ar^{+}$ ion gun for in situ cleaning.
Initial characterization of the current experimental setup has been carried out. Also, coherence properties of magnetic sensitive states, which are used for quantum information processing via MAGIC have been studied and are presented here.

[1] Ch. Piltz, Th. Sriarunothai, S. Ivanov, S. Wölk, Ch. Wunderlich, Science Advances **2**, e1600093 (2016).

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