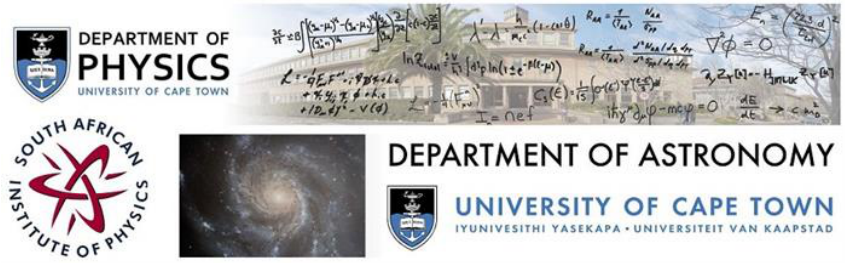

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RF Generation for Ion Trapping Experiments

Wednesday, 6 July 2016 16:10 (1h 50m)

Abstract content
   (Max 300 words)
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Radio frequency (RF) Paul traps have for decades been employed to electrodynamically trap atomic ions for experiments ranging from precision spectroscopy, atomic clock physics, quantum computing and fundamentals of quantum optics. A key technical requirement for ion trapping, is the generation of a narrow band RF signal with amplitude of several hundreds of volts. A common technique for producing such high RF voltages noise-free is to use a helical resonator with sufficiently high Q-factor. However, helical resonators are not trivial to design and experimental implementations invariably require significant empirical optimization. Being geometry-dependent, the Q-factor and resonance frequency of a helical resonator are also not easily tuned once the resonator is done. Here we present the design and implementation of a 15 MHz helical resonator as an integral part of our ion trapping setup. We also propose a novel feedback-based resonator which produces a tunable Q-factor. A transformer element is used to boost the voltage gain for this feedback resonator configuration. We expect the feedback resonator to provide a viable and versatile alternative to standard helical resonators.

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