Abstract Submitted
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NMR and ICR for precision measurements XIANG FEI, Central Institute for Precision Study — High-precision comparison of the NMR signals of macroscopic samples and the ion cyclotron resonance (ICR) of charged particles in the Penning traps could yield important information on the fundamental properties of matter. For example, the magnetic moment ratio of the shielded helion to the nuclear magneton could be measured by comparing the helium- 3 NMR frequencies with the proton cyclotron frequencies in the ion cyclotron nuclear magnetic resonance (IC-NMR) scheme[1]. Cylindrical ion traps (or orthorhombic ion traps) with compensation electrodes[2] may be used to contain the NMR measurement probe structure. Vertical and radial asymmetric electrical potentials in longitudinally and azimuthally segmented electrodes can move a charged particle (e.g. a proton) away from the center of a Penning trap for 3D magnetic field gradient measurements approximately over the volume of the NMR probe. Magnetic perturbations due to the experimental setup and environment should be carefully studied[3]. The magnetic effect of the NMR probe structure to its sample inside may be measured by a smaller NMR probe that can be readily inserted into and extracted from the measurement probe. [1]X. Fei, Bull. Am. Phys. Soc. 50, No.2, L1 2 (2005). [2]X. Fei, W.M. Snow, Nucl. Instr. and Meth. A 425, 431 (1999). [3]X. Fei, V.W. Hughes, R. Prigl, Nucl. Instr. and Meth. A 394, 349 (1997).

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