A new trap loading mechanism for Hydrogen

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In this talk, we report on our recent advances on a new trap loading mechanism for neutral atoms. The magnetic trap was designed based on our recently published results [1] for chromium spectroscopy of the atoms released from a solid neon matrix at cryogenic temperatures. The trap loading mechanism consists in magnetically capturing the low-energy fraction of these released paramagnetic atoms while the host Ne atoms stick to the walls. We are particularly interested in the simultaneous trapping of H and Li, due to their large mutual elastic cross section [2], for later evaporative cooling. Our main motivation is a simple H trap for comparison with cold antihydrogen atoms being produced by the ALPHA Collaboration [3]. Hydrogen traps have so far relied on the very particular property of the low binding energy of H onto superfluid helium. However, the H traps at Amsterdam, Harvard, and MIT that used a 3He-4He dilution refrigerator were so complex that they have been discontinued. Two different designs are investigated; one with a superconducting magnet producing a trap depth of 3 T and the other one with a magnet switched dynamically that generates a trap depth of about 1 T. The preliminary results are presented.

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[1] R. Lambo et al. Phys. Rev. A **76**, 061401(R) (2007)

[2] R. Côté et al., Phys. Rev. Lett. **84**, 2806 (2000)

[3] G. Andresen et al., Phys. Rev. Lett. **98**, 023402 (2007)