

Aleksei Semakin

*Wihuri Physical Laboratory, Physics and Astronomy department, University of
Turku, 20014 Turku, Finland*

Experiments with ultra-low atomic hydrogen.

We designed and constructed of a large magnetic trap for storage and cooling of atomic hydrogen operating in the vacuum space of the dilution refrigerator at temperature of 1.5 K. Aiming on a largest volume of the trap we implemented octupole configuration of linear currents (Ioffe bars) for radial confinement, combined with two axial pinch solenoids and a 3.5 T solenoid for cryogenic H dissociator. The octupole magnet is built from 8 race-track coils - segments which are compressed towards each other with magnetic forces. This provides a mechanically stable and robust construction with a possibility of replacement/repair of each segment. The trap is thermally linked to the 1 K pot of a dilution refrigerator with a special care to avoid highly conductive loops in which the eddy currents could severely limit ramping speed of magnetic field. Maximum trap depth of 0.54 K (0.8 T) was reached corresponding to an effective volume of 0.5 l for hydrogen gas at 200 mK.