Abstract Submitted
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A permanent magnet trap for buffer gas cooled atoms and molecules D. NOHLMANS, S.M. SKOFF, R.J. HENDRICKS, D.M. SEGAL, B.E. SAUER, E.A. HINDS, M.R. TARBUTT, Centre for Cold Matter, Blackett Laboratory, Imperial College London, UK — Cold molecules are set to provide a wealth of new science compared to their atomic counterparts [1]. Here we want to present preliminary results for cooling and trapping atoms/molecules in a permanent magnetic trap. By replacing the conventional buffer gas cell [2] with an arrangement of permanent magnets, we will be able to trap a fraction of the molecules right where they are cooled. For this purpose we have designed a quadrupole trap using NdFeB magnets, which has a trap depth of 0.4 K for molecules with a magnetic moment of 1 μ_B. Cold helium gas is pulsed into the trap region by a solenoid valve and the atoms/molecules are subsequently ablated into this and cooled via elastic collisions, leaving a fraction of them trapped. This new set-up is currently being tested with lithium atoms as they are easier to make. After having optimised the trapping and detection processes, we will use the same trap for YbF molecules.

[1] L.D. Carr, D. DeMille, R.V. Krems and J. Ye, *New J. Phys.* 11, 055049 (2009)
[2] S. M. Skoff, R. J. Hendricks, C. D. J. Sinclair, J. J. Hudson, D. M. Segal, B. E. Sauer, E. A. Hinds and M. R. Tarbutt, *Phys. Rev. A* 83, 023418 (2011)

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