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A buffer gas source of YbF molecules SARAH SKOFF, NICK BULLEID, DIDIER NOHLMANS, RICHARD HENDRICKS, DANIEL SEGAL, BEN SAUER, ED HINDS, MIKE TARBUTT, Imperial College — Using a cryogenic buffer gas source, with both continuous and pulsed helium flow, we have produced cold, slow beams of YbF molecules. The flux exceeds 10ˆ10 ground state molecules per shot per steradian, the translational and rotational temperatures are 4K, and the speed is between 130m/s and 320m/s depending on the flow regime. We use absorption imaging to follow the dynamics inside the cell [1], we observe the onset of turbulence in the cell, and we relate this to the beam extraction efficiency. We have injected this beam into an electric decelerator, we plan to use the beam to improve the measurement of the electron's electric dipole moment [2] and are currently starting experiments to trap the molecules using permanent magnets.

[1] S.M. Skoff et al., Phys. Rev. A 83, 023418 (2011)
[2] J. J. Hudson, D. M. Kara, I. J. Smallman, B. E. Sauer, M. R. Tarbutt and E. A. Hinds, Nature 473, 493 (2011)

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