Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

**Magnetic Field Assisted sub-THz Quantum Cascade Lasers** A. WADE, Y. KIM, D. SMIRNOV, National High Magnetic Field Laboratory, S. KUMAR, Q. HU, Massachusetts Institute of Technology, B.S. WILLIAMS, University of California, Los Angeles, J. RENO, Sandia National Labs — In THz QCLs radiative transitions take place between closely-spaced 2D electronic subbands (1THz $\sim$ 4meV) of a multi-QW semiconductor system. THz quantum cascade lasers now cover the frequency range from 1.2 THz to 5 THz, though cryogenic cooling is still required. Further progress towards the realization of devices emitting at longer wavelengths (sub-THz QCLs) and higher temperatures may be realized in a system with additional lateral confinement. Here we use strong magnetic fields to achieve quasi-0D confinement in THz QCL based on the resonance phonon design. We studied two designs: (a) 2-well injector/2 well active region, emitting at 3 THz at B=0; and (b) 1-well injector/3-well active region, emitting at 2 THz at B=0 T. By applying the appropriate electrical bias and strong magnetic fields, we achieved laser emission at 0.8-0.9 THz at B>16 T [1], and 0.6 THz at B$\sim$17 T, from devices a and b respectively. The ability to achieve sub-THz lasing is due to magnetic field enhanced population inversion in a quasi-0D QCL. [1] Wade, A et. al., *Magnetic field assisted Terahertz quantum cascade laser operating up to 225K,* **Accepted for publication Nature Photonics** (2009)

A. Wade
National High Magnetic Field Laboratory

Date submitted: 21 Nov 2008 Electronic form version 1.4