Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

1.9 THz Quantum Cascade Lasers in very high magnetic fields up to 27 T GIACOMO SCALARI, LORENZO SIRIGU, CHRISTOPH WALTHER, JÉRÔME FAIST, Inst. of Physics, Univ. of Neuchâtel, Switzerland, MARCIN SADOWSKI, GHMFL, Grenoble, France, HARVEY BEERE, DAVID RITCHIE, Cavendish Laboratory, Univ. of Cambridge, UK, EDMUND LINFIELD, GILES DAVIES, School of Electronic and Electrical Engineering, Univ. of Leeds, UK — Terahertz quantum cascade lasers operating at $\lambda = 159$ μm [1] and exploiting the in-plane confinement arising from perpendicular magnetic field are investigated in the regime of very strong magnetic confinement, with field intensities up to 27 T, corresponding to a ratio $\frac{\hbar\omega_c(27\ T)}{h\nu} = 5.8$ of cyclotron energy $\hbar\omega_c$ over photon energy $h\nu$. Device show laser action in magnetic field starting from 2.7 T and reaches operating temperatures of 65 K in pulsed mode. As the magnetic field is increased up to 27 T, the laser intensity exhibits modulations due to the interplay between inter Landau-level scattering and e-e scattering. A strong increase of the output power is observed at the highest field values. Strong reduction of the waveguide losses and an increase in the gain attributed to carrier localization leads to a decrease of the threshold current density down to 0.6 A/cm^2 at B=27 T. A detailed spectral analysis, showing a progressive redshift of the spectrum in the 3-27 T magnetic field range, will also be discussed. [1] G.Scalari, S.Blaser, J.Faist, H.Beere, E.Linfield, D.Ritchie, G.Davies, Phys. Rev. Lett., in press (2004)

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Date submitted: 06 Dec 2004 Electronic form version 1.4