Abstract Submitted
for the DAMOP08 Meeting of
The American Physical Society

**A Pumped Atom Laser** JOHN CLOSE, NICK ROBINS, CRISTINA FIGL, MATTHEW JEPPESEN, GRAHAM DENNIS, Australian National University — We have experimentally demonstrated simultaneous pumping and out-coupling of an atom laser via Bose enhanced (by the condensate) spontaneous photon emission. Source atoms in the |F = 2, $M_F$= 0> hyperfine state of $^{87}$Rb are coupled by a light field to the |F ' = 1, $M_F$ = 0> excited state and are then stimulated to emit a photon by atoms already in the |F = 1, $M_F$= -1> lasing (condensate) mode. The source atoms enter the |F = 1, $M_F$= -1> condensate, pumping the laser mode. Atoms are simultaneously RF out-coupled from the |F = 1, $M_F$= -1> condensate to produce an atom laser beam. The pumping process is stimulated, preserving the phase of the lasing mode, is irreversible and is compatible with an atom delivery system to replenish the source atoms. Many of the properties that make *optical* lasers useful are gained through simultaneous out-coupling and pumping producing a narrow line-width continuous beam. The same can be expected for an atom laser. We present the data from the pumping experiment, and compare it with a rate equation model.

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Date submitted: 17 Jan 2008 Electronic form version 1.4