

# Physics Department Seminar

NOTE SPECIAL DATE & TIME:

Tuesday April 15<sup>th</sup>, 2008

5:00pm in PhSc 130

## “An Eye-Safe Tunable Cr<sup>4+</sup>:YAG Laser For Lidar Applications”

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### Abstract:

A gain switched tunable Cr<sup>4+</sup>:YAG laser was developed using a Q-switched flash-lamp-pumped Nd:YAG pump laser at 10 Hz. Applying a vacuum spatial filter resulted in a nearly Gaussian-shaped beam profile which enabled safe pumping of the Cr<sup>4+</sup>:YAG crystal with pulse energies in excess of 100 mJ. A maximum output energy of  $\approx 7$  mJ at 1430–1450 nm, corresponding to  $\approx 7$  % conversion efficiency, and a pulse duration of 30–35 ns were obtained with a 25-cm long stable resonator. Tunability in the range 1350–1500 nm and spectral linewidth of  $\approx 200$  GHz were demonstrated using a 3-plate birefringent filter. The laser was multimode with a flat-top profile. The performance and size of the laser are acceptable for use in a laboratory-based non-scanning lidar system if a narrow-band birefringent filter is installed. To employ the laser in a scanning mobile lidar, high pulse repetition rate ( $\geq 100$  Hz) of the pump laser is required. The tunability and spectral purity would permit the improvement of the laser transmitter for water-vapor DIAL measurements at on-line wavelengths of approximately 1459 nm or 1484 nm if injection-seeding is applied.

