3.7 Picosecond Travelling Wave Optical Parametric Generator with $KNbO_3$

(C. Solcia and D. Fluck)

Parametric generation offers the unique possibility of generating widely tuneable radiation starting from a source at a fixed wavelength. A Travelling-wave Optical Parametric Generator (TOPG) is simply a parametric amplifier driven at very high gain, where the spontaneous parametric superfluorescence is amplified to intensities comparable to that of the pump in a few passes through a non-linear crystal. This approach has proved to be very efficient in the conversion of high power ultra short pulses (from 70 ps down to 100 fs) delivered by amplified mode-locked (ML) lasers. For such a device the choice of the non-linear material is a crucial point: the unique combination of high non-linear optical coefficients, thresholds to optical damage and the broad transparency range (390-4500 nm) make $KNbO_3$ a prime candidate.

The operation of a $KNbO_3$-based TOPG, pumped with the frequency doubled output of an amplified ML Nd:YAG laser, has been demonstrated in our laboratory. Work is in progress in order to improve the performance of this tuneable ps light source. The high intensity and low repetition rate of the generated tuneable radiation would suggest this as the ideal source for time resolved and non-linear optical spectroscopy of organic materials.