

International Scientific Conference on

LASERS, OPTICS, PHOTONICS AND SENSORS



Femtosecond Conical Emission in BK-7 Glass and the Influence of the Transient Kerr Nonlinear Index

The angle of Conical Emission (CE) was measured using a 50 fs 800 nm laser in BK-7 glass. The result covers a long-range emission range of +9000 to -2000 cm^{-1} . This span encompasses both degenerate Anti-Stokes and Stokes emission, as well as non-degenerate angular emission at the source wavelength. The resulting angle is compared to three different mathematical models of CE. In all three emission windows the Alfano-Shapiro model from 1970 outperforms both the X-Wave model as well as the Luther Four Wave Mixing model. Following the Alfano-Shapiro model the measured non-degenerate emission is directly related to the Kerr nonlinear index. The presented fitting result confirms that for a 50 fs pulse the Kerr index has transition into its pure electronic state, as incorporating the slower material components breaks the agreement with the model. The near perfect fit between the Alfano-Shapiro model and the experimental results suggests that the method outlined here could be used as a new easy way to measure the Kerr nonlinear index.

Henry J. Meyer and Robert R. Alfano

Institute for Ultrafast Spectroscopy and Lasers,
Department of Physics, The City College of the New York, United States

STUDENTS