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Contribution ID: **3101** Type: **Poster Competition (Graduate Student) / Compétition affiches (Étudiant(e) 2e ou 3e cycle)**

(G*) (POS-1) Femtosecond Pulse Compression Using Liquid Alcohols

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Ultrafast science is a branch of photonics with far reaching applications in and out- side the realm of physics. Ultrashort laser pulses on the order of femtoseconds (1 fs = 1×10^{-15} s) are widely used for ultrafast science. Many lasers can produce pulses on the order of 100 fs, with state of the art, high end lasers being capable of producing pulses around 30 fs. However, many experiments require pulses around 10 fs or shorter. Few-femtosecond pulses are typically generated using spectral broadening via self-phase modulation, followed by dispersion compensation. The most common spectral broadening technique exploits the nonlinear interaction of intense pulses focused into gas-filled hollow-core fibres. More recently, multiple crystal plates have been used to broaden the spectrum while using a self-focusing relay to maintain the beam quality. We have researched substituting solids and gases with liquid alcohols. By using a series of 1 cm cuvettes filled with 1-decanol, we have compressed a pulse from 83.6 fs down to 31.3 fs with a spectrum capable of supporting 25 fs pulses, all whilst avoiding filamentation. Liquids have proven to be useful due to the ease in which they can be set up and achieve broad spectra as well as their ability to remain intact when exposed to high intensities. In contrast with gases, alcohols provide an inexpensive material for spectral broadening, providing a compact and easy to use setup unhindered by the length of hollow-core fibres. We have shown that alcohols provide a compact, inexpensive alternative to solids and gases for pulse compression that is not susceptible to permanent damage.

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