

**P-RES** Research project title:

**Single-Shot Supercontinuum Spectral Interferometry for absolute measurement of optical non-linearity in femtosecond pulses**

**TASK:**

Single-Shot Supercontinuum Spectral Interferometry (SSSI) is a state of the art method to measure important nonlinear characteristics of gases. Your task will be to study and understand this method in detail, and describe it to your peers. Attached to this package is a couple of papers by H. Milchberg group. These works should give you a basis to explore SSSI (there is material beyond SSSI, you should concentrate solely on the principle of SSSI). You may want to locate related works for better understanding.

**DELIVERABLE:**

Report in pdf format.

**OPTIONAL EXTENSION A:**

Derive a Fourier based formula for analysis of this kind of experiment. Assume that the reference pulse is a simple Gaussian (in time) with a known spectral phase (i.e. with strong chirp) and that the initially identical probe is temporarily shifted, and experiences weak phase shift due to cross-phase modulation by the pump pulse. Show how you can obtain the phase-shift attained by the probe from the measured interferogram. Note that different approximations (and thus results) are possible here.

**OPTIONAL EXTENSION B:**

As an optional add-on, write a Matlab (or other language) script to extract nonlinear phase shifts from a simulated interferogram.

**OPTIONAL EXTENSION C:**

Describe a concept of a simulation that would aim to mimic an SSSI experiment.