Stretched hollow fiber for pulse compressors

Laser-Laboratorium Göttingen e.V.

Technology

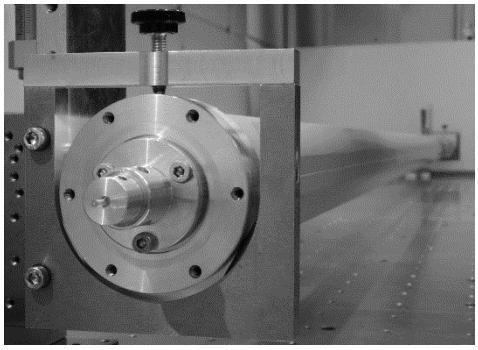
- Well-controlled, strong self-phase modulation (SPM) in noble-gas-filled hollow fibers.
- A patented stretched flexible capillary layout facilitates practically ideal waveguides without restrictions to the length. A key feature of the new design is excellent straightness of the fiber over arbitrary lengths.
- A protection module at the input avoids damage to the capillary even for high energy, high average power input pulses.
- Water cooling implemented

Features

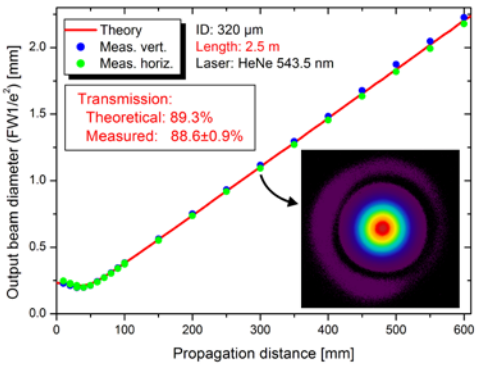
- Ideal post compression device for ultrafast laser systems
- Very strong, spatially homogeneous spectral broadening with high transmission.
- Inherently supports pressure gradient schemes.
- Ideally suited to high energy, high average power laser systems.

Performance

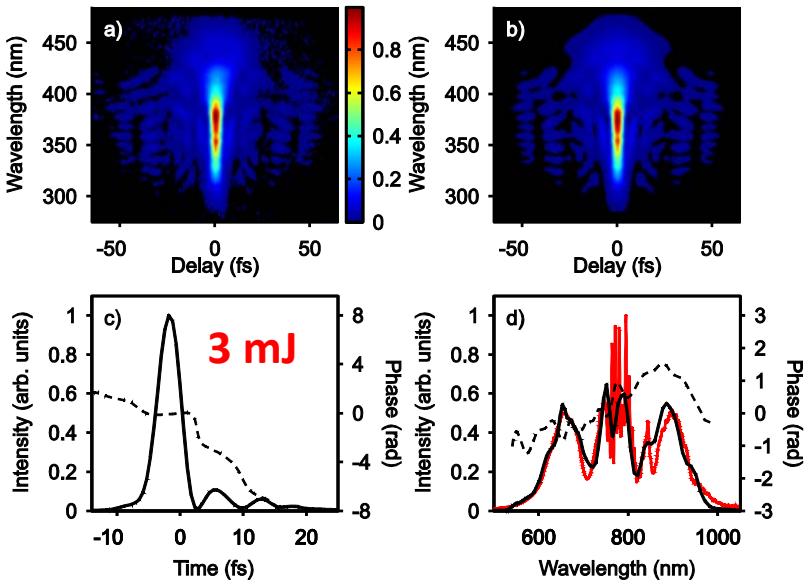
- >20-times spectral broadening of 1.1-mJ, 70-fs pulses with a 3-m long hollow fiber at a transmission of ~60%.
  T. Nagy, V. Pervak, and P. Simon, Opt. Lett. **36**, 4422 (2011)
- 4 fs CEP-stable 3mJ pulses @1kHz demonstrated.
  F. Böhle, M. Kretschmar, A. Jullien, M. Kovacs, M. Miranda, R. Romero, H. Crespo, U. Morgner, P. Simon, R. Lopez-Martens, T. Nagy: Laser Phys. Lett. **11** 095401 (2014)



▲ Stretched flexible hollow fiber assembly



▼ Frog trace of a 4 fs long pulse with an energy of 3 mJ



◀ Wave guiding performance of a 2.5 m long hollow fiber measured with an ideal laser source

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