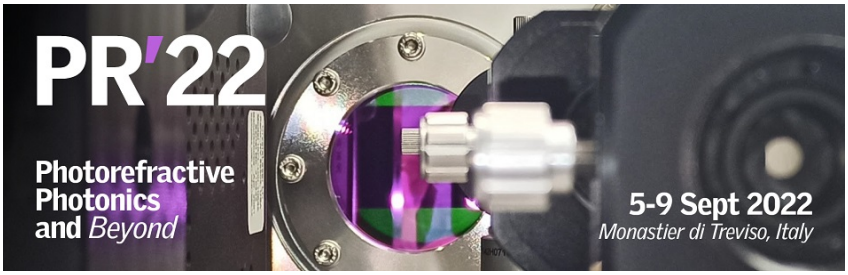

Contribution ID: **52** Type: **Regular Talk**

Time resolved sum-frequency generation in harmonic LiNb1-xTaxO3 (LNT) nanoparticle pellets

Friday 9 September 2022 09:30 (25 minutes)

Harmonic nanoparticles (HNPs) are of wide spread interest in the context of material science applications due to their large nonlinear optical (NLO) tensorial elements and their broad spectral tunability [1]. Regarding the investigation of time-dependent phenomena, however, a detailed knowledge of the pulse propagation in such a strongly scattering medium is required. This has so far only been investigated to a limited extend [2]. In an attempt to close this vacancy, we herein present an experimental investigation of the temporal evolution of ultrashort pulses inside HNPs.

This is enabled by means of nonlinear diffuse fs-pulse reflectometry measurements combined with a pump-probe scheme to monitor the time-resolved sum-frequency generation of two differently coloured, ultrashort pulses inside densely packed HNP pellets [3,4]. Special emphasis is devoted to the comparison of LNT solid solutions in varying compositions. We discuss the effects of different size distributions and NLO properties on the pulse propagation inside the pellets.

In addition, numerical studies on the pulse propagation due to multiple scattering inside the media are performed to consolidate the experimental results, on the one hand, and allow to make predictions with regard to particle size and wavelength dependencies, on the other hand [4].

These results can be utilized for the employment of HNP pellets as a novel tool for fs-pulse characterization (e.g. chirp determination).

Financial support (DPG FOR5044 IM7/12, DFG INST 190/165-1 FUGG) is gratefully acknowledged.

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Session Classification: Nonlinear light-matter interaction and applications

Track Classification: Nonlinear light-matter interaction and applications