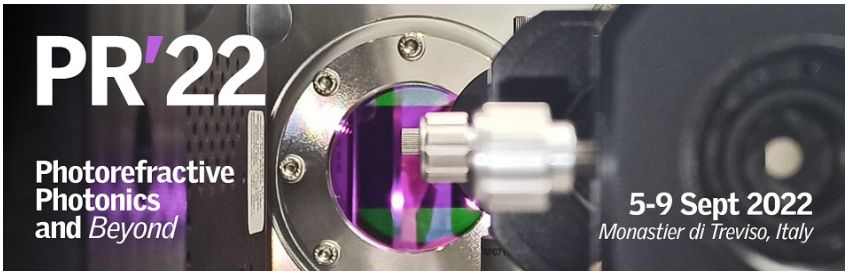


Contribution ID: **17** Type: **Regular Talk**

# Slowdown of nanosecond light pulses without distortion in a SPS crystal

*Friday, 9 September 2022 10:25 (25 minutes)*

Slow light has been observed in several physical systems, including optical fiber, and photorefractive (PR) media. The ability to slow down light pulses is a fascinating phenomenon with important applications, such as optical telecommunications. For that, it is essential that the slow light phenomenon has a large bandwidth, so that it can respond quickly to the short light pulses that will carry the data. However, in the PR crystal, only light pulses of the order of milliseconds or seconds have been slowed down, and because of the high dispersion, they are broadened at the output of the PR crystals [1], leading to loss of information.

Recently, we have demonstrated that the two-wave mixing (TWM) effect in the pulsed regime can slow down nanosecond light pulses in a PR SPS crystal [2]. This is possible only if the laser intensity is high enough to reduce the crystal response time to the value of the input pulse duration. Here, we show that by optimizing the TWM in the pulsed regime, nanosecond light pulses can be slowed down without suffering from broadening. For a coupling strength of 5 and response time of 32 ns, pulses of 20 and 70 ns can be delayed respectively by 2 et 15 ns.

References:

[1] E.Podivilov, and al, Phys. Rev. Lett. 91, 083902 (2003).
[2] N. Bouldja, M. Tsyhyka, A. Grabar, M. Sciamanna, and D. Wolfersberger, Phys. Rev. A 105, L021501 (2022).

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**Session Classification:** Nonlinear light-matter interaction and applications

**Track Classification:** Nonlinear light-matter interaction and applications