

Nonlinear Crystal Optics

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Intended Audience

This course is specifically built for physicists as well as chemists interested in crystal parametric optics: crystal growers and designers wanting to identify the relevant parameters, laser physicists aiming at working in nonlinear optics or users willing to go deeper in the field at the frontier of crystal physics, coming from industry or universities and other academic institutes. Various job levels are concerned: PhD students, postdocs, engineers, researchers, professors.

Learning benefits

This lecture focuses on fundamental crystal parametric optics that is one of the most fascinating field of nonlinear optics involving corpuscular and wave aspects of light in strong interaction with the electrons of matter, and leading to optical frequency synthesis and mixing at the origin of numerous applications. This course aims at giving guidelines and tools for the design, characterization and use of crystals for parametric generation. This course should enable participants to:

- . explain the main lines and key parameters of fundamental crystal parametric optics,
- . compare the figures of merit of various nonlinear materials,
- . compute phase-matching directions, quasi-phase-matching periodicities, angular and spectral acceptances, effective coefficients, conversion efficiencies,
- . measure nonlinear coefficients, phase-matching directions, spectral and angular acceptances, a figure of merit, a conversion efficiency,
- . define the relevant parameters for the design of new nonlinear crystal,
- . list the main nonlinear materials enabling parametric generation,
- . identify the right crystal corresponding to the targeted application,
- . design up-conversion and down-conversion parametric devices.