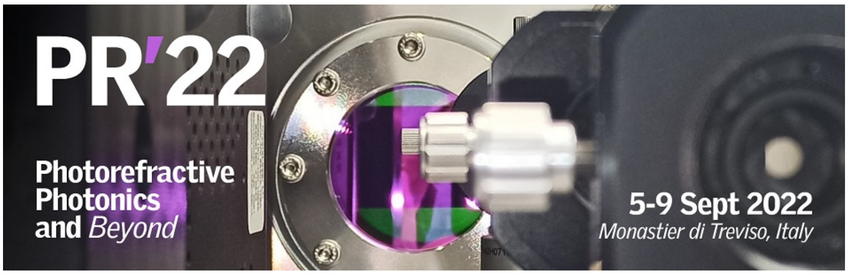

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Conical diffraction cascades and interplay with linear and nonlinear material properties

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Internal conical diffraction is a well-known singular phenomenon observable whenever a tightly focused wave is incident with its wavevector along one of the two optical axes of an optically biaxial crystal. The effect gives rise to a vector type wave with the Poynting vectors associated to each linear polarization component lying on a slanted cone surface with circular base. The number of these cones can be multiplied by a factor 2^{N-1} if a cascade of N biaxial crystals with perfectly aligned optical axes is considered. However, as it will be discussed in this contribution, a dramatic change in the shape of the conical diffraction vector beams can be achieved if a proper manipulation in wavevector space is performed between the different crystals in a cascade. Highly peculiar non-circularly shaped vector beams can be obtained, some of which associated to a reversed curvature as compared to the one proper to circles. While the main effect is due to the material birefringence, conical diffraction in both single step and cascaded configurations is influenced also by other linear and eventually nonlinear optical properties of the involved crystals (optical activity, photoinduced effects, $\cdots$). Such an interplay is discussed in the case of photorefractive $Sn_2P_2S_6$ crystals, as compared to standard materials commonly used for conical diffraction, such as centrosymmetric $KGd(WO_4)_2$.

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