

Plenary Talk

PV V Wed 9:45 ELP 6: HS 3+4

Nonlinear optical effects and their utilization in thin film interference coatings — ●MORTEN STEINECKE — Laser Zentrum Hannover e.V., Optical Components Department, Hanover, Germany

Nonlinear optical effects play a crucial role in modern optical systems. They are applied in mode-locking for the generation of ultrashort optical pulses and for unlocking measurements at new timescales. However, implementing the required nonlinear optical processes mainly relies on conventional optical systems comprising separate components and free-space constructions, which limits the possibilities for future applications and miniaturization. Contrary to this, optical coatings offer highly developed capabilities for combining optical functions into a monolithic stack of transparent materials. But, so far, the applica-

tions of optical coatings have generally been limited to the linear optical regime or for assisting the implementation of nonlinear processes, e.g., with chirped mirrors. This talk provides an overview of the combination of selected nonlinear optical effects with specially designed optical coatings aiming to create novel components as alternatives to established optical systems. Different effects are considered, e.g., the optical Kerr effect, which can be utilized to achieve all-optical switching of light, and the THG, where the concept can solve phase-matching issues and significantly increase conversion efficiency. The results for the THG, and especially the Kerr-based optical switches, show great promise for this novel field of optical components and indicate a large potential for further research into the fundamentals of nonlinear effects in different optical materials and the required manufacturing processes.