

**Plenary Talk**

PV VII Thu 9:00 Audimax

**Direct high-efficiency generation of the third harmonic wavelength in interference layer systems** — ●MARCO JUPE<sup>1</sup>, DETLEV RISTAU<sup>2</sup>, and WOLFGANG RUDOLPH<sup>3</sup> — <sup>1</sup>Laser Zentrum Hannover e.V., Hollerithallee 8 30419 Hannover, Germany — <sup>2</sup>Leibniz Universität Hannover, Welfengarten 1, 30167 Hannover — <sup>3</sup>Dept. Physics and Astronomy, University of New Mexico, Albuquerque, NM 87131 USA

The direct generation of third harmonics delivers significant technical advantages for integration in optical systems. In particular, the compact form of the one-step conversion process can prove to be a decisive advantage over the classical, two-step second-order conversion processes. In addition, centrosymmetric materials can be used for the

third-order process, which significantly expands the material spectrum. A major technical challenge for the conversion is the strong dispersion of the refractive index and the associated phase mismatch, which cannot be compensated even by exploiting birefringence. Here, a concept based on interference filters to solve this problem was developed by UNM. The interference filters are designed to generate the THG in the high refractive index layer and compensated in the low refractive index layers. Additionally, exploiting resonant structures increases the conversion efficiency. In the presentation, theoretical and experimental results up to now are presented. For the designs, six different concepts have been developed and evaluated up to now. In application, the damage threshold of the materials currently limits the efficiency. Nevertheless, efficiencies of just under two percent have been shown.