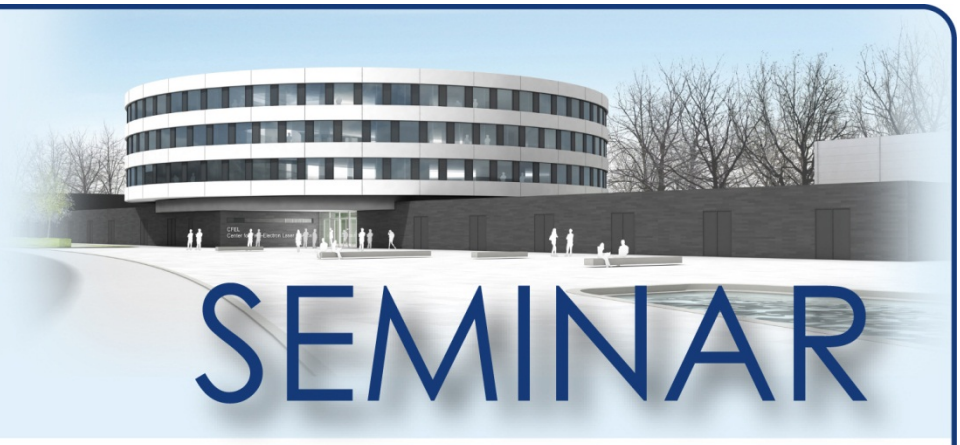
CFEL SCIENCE



SEMINAR

11th January 2011 - 11:00

Building 49, Seminar Room (108)

David Schmitz

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Evaluation of Subsurface-Damage by light scattering techniques

Residual Subsurface-Damage (SSD) limits the performance of optical components, especially in high-power laser applications. However, SSD is an unavoidable consequence of the material removal process during grinding and polishing. Therefore, evaluation and control of SSD during optical fabrication is of great importance for a cost effective production of optical components. Although conventional evaluation methods (etching and fracturing) provide good results for the analysis of subsurface structures, they always destroy the sample. As an alternative a nondestructive and even non-contact evaluation approach is presented here, which detects and quantifies SSD using scattered light. The experiments were performed on ground and polished fused silica and borosilicate glass, because of their widespread use in high-power laser applications. In these transparent materials the discrimination of the different scattering effects (surface, SSD and bulk scattering) poses a particular challenge. Thus, polarization characteristics of the scattered light were analyzed. This led to promising results, which were in good agreement with those obtained by conventional destructive methods (etching and fracturing).

Host: Jochen Küpper - Coherent Imaging Division - Controlled Molecule Imaging Group