

## **Talbot X-ray deflectometry and applications at HED facilities**

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Radiography is one of the most fundamental diagnostics to study the dynamics of laser-generated plasmas. However, it is classically performed relying only on the transmission changes of the X-rays. Due to the weak absorption of low Z materials, achieving highly resolved and contrasted X-ray radiographs is usually difficult. To enhance radiography capabilities in high energy density experiments one can, rely on X-ray refraction which has a larger effect for such media. We developed a grating-based diagnostic which makes use of the Talbot effect to produce diffraction patterns sensitive to the phase changes while keeping

records of the transmission's variations induced by a sample to the X-ray wavefront. This X-ray phase contrast imaging method has the potential to become a valuable tool to increase the contrast of X-ray radiographs of materials regularly used in inertial confinement fusion or laboratory astrophysics (foams, DT, plastic, up to medium Z materials). We present here the recent developments of various designs of Talbot-Lau X-ray deflectometers tested at laser and XFEL facilities and the primary results obtained from pump-probe experiments on the OMEGA-EP laser and Spring-8 SACLA XFEL. The talk will also provide the perspectives on future applications to be performed at XFEL and laser facilities and on the next steps to increase the performances of the diagnostic.