

Reverse Saturable Absorption of Intense X-ray Pulses in Aluminum

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Reverse saturable absorption (RSA) is the property of matter where the optical absorbance increases with increasing light intensity. It is a well-known optical phenomenon, but has not been observed in x-ray regime, where fast non-radiative core-electron transitions typically dominate population kinetics during light-matter interactions. In this talk, I will discuss the observation of the decreasing transmission of intense XFEL pulses with 10^{17} W/cm² at the below K-absorption edge of aluminum. XFEL pulses interacting with solid aluminum sample are modelled using the collisional-radiative code SCFLY. Intensity dependent x-ray absorption / transmission could be ascribed to the resonant absorption channel, and the detailed population kinetics and relevant sample conditions will be discussed.