

## **Study of betatron X-ray spectra and electron energy spectra generated by laser wakefield acceleration at MEC facility**

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Betatron X-rays created by laser wakefield acceleration (LWFA) are of fundamental interest in plasma physics (XANES spectroscopy, etc.) due to their broadband X-ray spectra, compact source size and ultra short duration. In particular, the femtosecond duration of electron bunches produced during LWFA offers the opportunity to study warm dense matter (WDM) in detail via pump/probe experiments. In this study, we used the SLAC MEC optical laser (Ti:S 800nm, 1J in 40 fs) focused in a gas cell to generate betatron X-rays. A spectroscopy technique called “single-hit spectroscopy” or “single photon counting” (SPC) can be used to characterize the betatron X-ray spectra. We will describe precisely this technique within the context of this experiment. Also, a detailed analysis of spectra will be presented followed by perspectives for this technique applied to betatron sources. Electron energy spectra will be also analysed and compared to betatron X-ray spectra to prove the accuracy of the SPC technique.