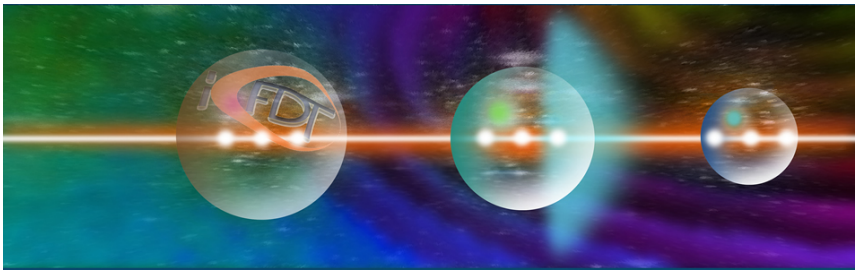

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Characterization of a X-Ray source for contact-microscopy applications obtained from laser-produced plasma

Thursday, 4 October 2018 14:30 (1h 30m)

A promising field of application of the X-ray radiation generated by intense laser-matter interaction is the contact-microscopy of biological samples. In order to optimize the yield on the desired spectral window, it is fundamental to have accurate characterization of this emitted radiation. To this purpose, an experimental campaign is underway with the three-nanosecond phosphate Nd:glass laser at the ABC laboratory in ENEA. The plasma was generated by irradiating solid targets with energy up to 30J, and intensity on target I≈1013Wcm-2. A transmission grating provided low-resolution spectra of a wide spectral range (5-50Å). This covered also the so-called "water window" region, namely the spectral region between oxygen and carbon K-absorption edges (23 to 44 Å) where the absorption of carbon is ten times that of oxygen, and for this reason is of high interest for the contact-microscopy application. The X-ray yield in this spectral region was also monitored by a PIN diode filtered with 0.5μm vanadium foil and coupled with a grazing-incidence copper mirror. A spherically-bended mica crystal was used to obtain high resolution spectra of the region going from 5.1 to 5.7 Å. This narrow spectral range was analyzed for determining density and temperature of the produced plasma through the identification of different lines and of their intensity. In addition to the aforementioned diagnostics, several Imaging Plates detectors where placed inside the experimental chamber and equipped with different filtering masks, in order to have an additional estimation of the plasma temperature.

Summary

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