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Characterizing a multi-MeV e-beam induced plasma through visible spectroscopy and imaging THIERRY D'ALMEIDA, MAXIME RIBIERE, RMI MAISONNY, SANDRA RITTER, DAMIEN PLOUHINEC, GRARD AURIEL, CEA — High energy electrons interaction and propagation mechanisms in solid targets have a broad range of applications in high energy density physics. The latter include fast ignition for inertial fusion research, production of ultra-high mechanical stress levels, plasma interactions with e-beam particles in electron diodes, radiative hydrodynamic models... This paper presents the results from recent experiments conducted on the multi-MeV generator ASTERIX operated at CEA-Gramat. This high flux density electron beam was launched from an aluminum cathode onto an aluminum-tantalum target for voltage and current of 2.4 MeV and 55 kA, respectively. A set of optical diagnostics were fielded in all of the experiments, including a UV-visible spectrometers and a fast imaging. The imaging data obtained during the experiment allowed for the ablated species velocity to be determined. based on spectroscopic analysis, the light emission was attributed to aluminum and tantalum excited atoms and ions. The analysis of this time-integrated spectrum based on radiative transfer model clearly unveiled two distinct regions of the plasma over its expansion: a hot core surrounded by a cold vapor. A quantitative analysis of these results is presented.

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