Electrical and magnetic spectrometry of ions emitted from laser-generated plasma at 10^{10} W/cm^2 intensity

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Plasmas were generated by 3 ns pulsed laser at 1064 nm wavelength using intensities of about 10^{10} W/cm^2 irradiating solid targets with different composition. The ion emission was investigated with time-of-flight measurements giving information of the ion velocity, charge state generation and ion energy distribution. Measurements use an electrostatic ion energy analyzer and a coil to generate a magnetic field suitable to deflect ions towards a Faraday cup and/or a secondary electron multiplier.

Ion acceleration of the order of hundred eV per charge state, plasma temperature of the order of tens eV, charge states up to about 4+ and Boltzmann energy distributions were obtained in carbon, aluminum and copper targets.

The presented results represent useful plasma characterization methods for many applications such as the new generation of laser ion sources, proton ion sources, pulsed laser deposition techniques and post ion acceleration systems.