Contribution ID: **3016** Type: **not specified**

O4.202 mpact of ultrafast laser generated Weibel magnetic fields on propagation dynamics of relativistic electron bunches

Thursday, 11 July 2019 11:55 (15 minutes)

See the full abstract here http://ocs.ciemat.es/EPS2019ABS/pdf/O4.202.pdf

During laser-solid target interactions, the onset of Weibel instability can generate super-strong magnetic field structures (up to several tens of MG) on the surface and within the bulk of the solid targets. Such magnetic fields can be used to understand several physical events in astrophysics such as blast wave shocks in gamma ray bursts, supernovae remnants, energetic inflows and outflows in white dwarfs and Active Galactic Nuclei. Further the instability is equally important for laser driven inertial confinement fusion (ICF) process and gamma-ray generation experiments. Here we report on the probing of Weibel magnetic fields at femtosecond time scale during the interaction between ultrashort (30 fs) highly relativistic (intensity I0 > 10^18 W/cm^2) laser pulses and solid targets, using electron bunches from laser wakefield accelerators. We will present experimental and simulation results showing integrated B-field of few kT·⊠m generated at the surface and in the bulk of the solid target within a depth of a few of microns. The results show that Weibel instability at femtosecond time scale can be explored with a convenient and simple method based on laser wakefield acceleration.

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Session Classification: BPIF

Track Classification: BPIF