Contribution ID: **2947** Type: **not specified**

I4.J501 High-quality gamma-rays driven by petawatt laser pulse in near-critical density plasmas

Thursday, 11 July 2019 11:40 (30 minutes)

See the full abstract here http://ocs.ciemat.es/EPS2019ABS/pdf/I4.J501.pdf

The nonlinear synchrotron radiation of direct laser-accelerated electrons in nearcritical density (NCD) plasmas recently has been proposed as a very efficient scheme to produce multi-MeV gamma-rays [1]. In this presentation, we demonstrate that by employing a plasma density channel, the divergence angle and transverse size of the gamma-rays can be much reduced [2]. In addition, we propose a highly efficient gamma photon emitter obtained by irradiating a not-so-intense laser pulse on a miniature plasma device consisting of a plasma lens and a plasma mirror [3]. In this novel scheme, brilliant gamma-rays with very high conversion efficiency (higher than 1%) and spectral intensity (higher than 10^9 photons/0.1%BW/s) can be achieved by employing currently available lasers with intensity of 10^21 W/cm^2. The practical effects of different nanostructures in the plasma lens and the oblique laser incidence are also discussed in this scheme [4]. At last, a novel scheme by exploiting an intense Laguerre Gaussian laser pulse interacting with under-dense plasmas is also proposed to produce helical gamma-rays with very small divergence angle (less than 5Deg) and ultra-high brilliance (~10^24 photons/s/mm^2/mrad2/0.1%BW) at a laser intensity of 10^22 W/cm^2 [5]. Such high-quality gamma-rays generated in these schemes would find applications in wideranging areas.

References

[1] D. J. Stark et al., Phys. Rev. Letts. 116, 185003 (2016).
[2] T. W. Huang et al., Appl. Phys. Letts. 110, 021102 (2017).
[3] T. W. Huang et al., New J. Phys. 21, 013008 (2019).
[4] T. W. Huang et al., Plasma Phys. Control. Fusion 60, 115006 (2018).
[5] L. B. Ju, T. W. Huang et al., submitted (2019).

pppo

Presenter: HUANG, T. (EPS 2019)

Session Classification: BPIF-BSAP

Track Classification: Joint Sessions