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O4.J503 One order of magnitude enhancement of laser intensity with a single re-entrant micro-cone target in the petawatt regime

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Re-entrant cone was so far mainly used in the high energy density physics research especially in the laser fusion and has been proven to have an effective control on the fast electrons mainly for the fast ignition research [1]. Sentoku has shown that the re-entrant cone can increase the laser intensity up to 20 times from the level of 4 x 10^18 Wcm^-2 [2].
We show an improvement of Sentoku's results by using a plastic re-entrant micro-cone to increase the intensity of the light 12 times considering the initial intensity value from a higher intensity value of 8 x 10^20 Wcm^-2. Our work is a step forward in the global effort to push the laser intensity beyond 10^23 Wcm^-2 [3].
Laser beam intensity increase in the pettawatt regime has been enhanced by using an optical setup based on a single re-entrant micro-cone target. The model is described by two dimensional Particle-In-Cell simulations of the interaction of ultra-high intensity laser pulses with the microcone in predefined conditions. This approach is completed by a detailed study of the spatiotemporal electromagnetic field distribution at the laser matter interaction point which has been performed considering the incidence angle of the laser pulse on the micro-cone alpha = 0.1Deg, as can be seen in Figure 1. This technique aims to provide effective solutions to obtain high laser fields relevant for experiments proposed at multi-petawatt scale laser facilities such as Extreme Light Infrastructure (ELI).

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