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Creating laboratory gamma-ray bursts with 10ˆ21 W.cmˆ-2 laser EDISON LIANG, WILLIE LO, Rice University, HANNAH HASSON, TODD DITMIRE, GILLIS DYER, University of Texas at Austin, ILIJA MARCHENKA, FABIO FASANELLI, Rice University, MICHAEL DONOVAN, University of Texas at Austin — Using the Texas Petawatt Laser (TPW) to irradiate thick Au and Pt targets at 10ˆ21 W.cmˆ-2 and above, we have created high-density, short-pulse (100 fs) electron, positron and gamma-ray jets with in-situ physical parameters comparable to those found in cosmic gamma-ray bursts. For cm-sized targets, we discover that the hot electron emission is suppressed near the target normal direction, while the positron emission is not. This leads to the creation of angle-selected positron-dominated jets, which have many applications. We will present the results from both experiments and computer simulations, and discuss potential future applications.

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