

Relativistic electron-positron jets from intense lasers

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High-flux jets of relativistic electron-positron pairs with a few trillion degree temperatures have been produced in experiments through the “Bethe-Heitler” process using high power lasers [1]. The laser intensities were $10^{18} - 10^{21}$ W/cm² with pulse duration of 1-10 ps and energy 100 - 2000 J. Such a breakthrough enables the development of new diagnostic for high-energy-density physics [2], and leads a path toward the production of relativistic pair plasmas, allowing for interactive study of a state of matter otherwise found only in exotic astrophysical systems [3]. This talk will give an overview of the experimental results on the characterization of the laser produced relativistic positrons including their energy distribution, angular divergence and emittance. The inferred pair jet temperature & density and the pair production scaling with laser condition will be discussed. The presentation will conclude with a discussion of future possibilities for exploiting laser-produced pair jets and plasmas.

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