

Physics and Applications of High Brightness Beams



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Shaping the collective interaction of relativistic electrons with matter

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In this talk, I will discuss how the collective field of a relativistic electron beam can be used to instigate novel quantum dynamics and allow us to study ultrafast physics beyond typical laser-excited systems. At LCLS, the beam-supported fields can be shaped into strong ($V/\text{\AA}$), broadband (0-10 eV), and/or microbunched pulses that are intrinsically synchronized and mutually coherent with a soft x-ray laser. Preliminary experience commissioning a photon-electron pump-probe experiment (PEPPEX) illustrates the opportunities and challenges associated with using a space-charge field for ultrafast science.

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