Electron acceleration in dense plasmas heated by picosecond relativistic laser

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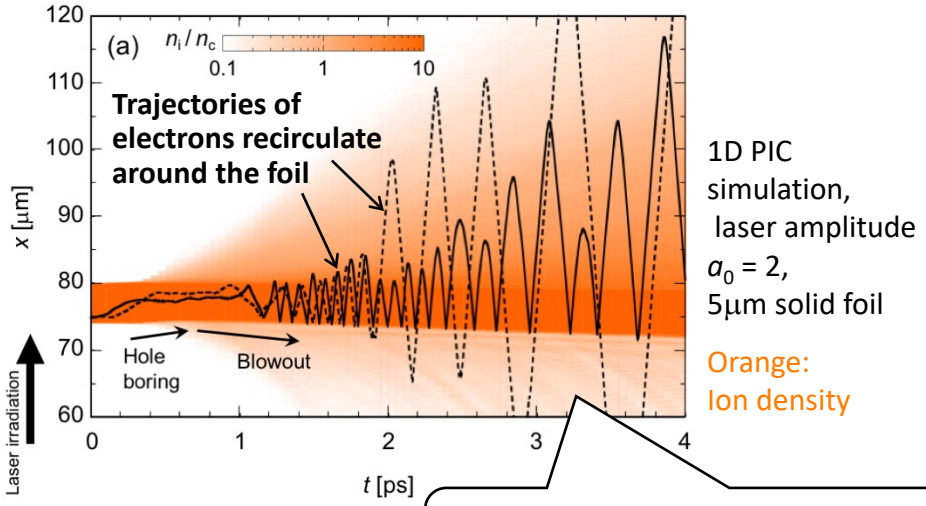
- We studied energetic electron generation in **picosecond relativistic laser-plasma interactions**.
  - Becoming available using recent kJ-class high power lasers.
  - The interaction enters into the ***mesoscale*** between kinetic and fluid regimes.
- We found that

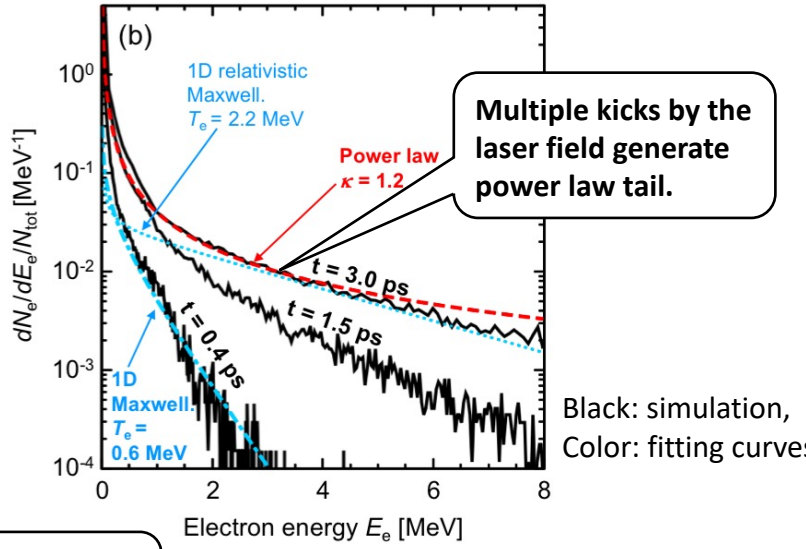
1) Electron acceleration is enhanced after the plasma changes structure of the laser-irradiated surface in the ion time scale (~ ps).



1D PIC simulation, laser amplitude $a_0 = 2$, 5μm solid foil

Orange: Ion density

2) Power law energy distribution of electrons is formed during the multi-ps recirculation.



Black: simulation, Color: fitting curves

Acceleration in the bouncing motion is similar to the Fermi acceleration in universe.

- Superthermal electron generation by ps lasers discussed here can be a basis for laboratory applications and also can provide a key to understand astrophysical phenomena such as cosmic ray acceleration.