

Roadmap for Plasma Wakefield Acceleration Requires order[s] of magnitude advancement for colliders & photon sources



Advanced Accelerator Development Strategy Report

DOE Advanced Accelerator Concepts Research Roadmap Workshop
February 2-3, 2016

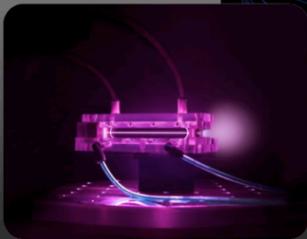
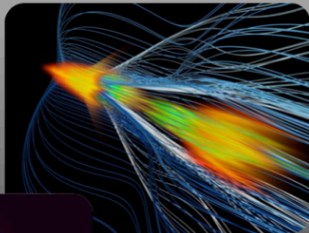


Image credits: lower left LBNL/R. Kaltschmitt, upper right SLAC/CLAW. An

Strategy for future particle colliders

DOE Office of Science HEP
General Accelerator R&D program

TeV to multi-TeV in 100's of meters
nC class charge
50kHz class rate
nm emittance
percent energy spread

Intermediate applications: photon
sources for nonproliferation,
security, basic science, industry,
medicine

Thomson: keV-MeV
Betatron: keV
Free Electron Lasers
GeV-class, \geq kHz, 10-100pC, μ m

| Currently | Developing |
|----------------------------|--------------|
| E: Stable few % | <1% |
| ΔE : Stable at 10% | <1% |
| Diverg: \sim mrad | < 0.1mrad |
| Point: \sim mrad | < 0.1 mrad |
| Emittance: 0.1 μ m | 0.01 μ m |
| Charge: \sim 10 pC | \sim 100pC |
| Efficiency: few % | \sim 30% |
| Rate: Hz | \geq kHz |
| e- only | e-, e+ |

Scalable: ex. higher charge options
- Long wavelength driver: $Q \sim \lambda$
- Higher intensity