Title
Review of "Direct longitudinal laser acceleration of electrons in free space"

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Review of:

Direct longitudinal laser acceleration of electrons in free space

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Abstract:

An accelerator is a tool used to accelerate sub-atomic particles to astounding speeds, which creates large amounts of x-ray radiation. The particles moving at almost the speed of light are usually sent to be crashed into other particles moving in the opposite direction or just into a target. These collisions are used to create radioactive isotopes, or unstable atoms which cannot otherwise be studied, and only last a short amount of time. These collisions are also studied to help identify the interactions of a whole new world of physics. The physics of that which is very small.

Introduction:

When people discuss particle accelerators, many think of something massive such as the large hadron collider which is a 27-kilometer-long ring to accelerate particles. Not very easy to build or use and definitely very costly, so scientists have been developing new technology to make a smaller version. This is where laser acceleration comes into play, with a compact laser-driven accelerator wide-spread use can be made and more labs can have access to this technology without making such a massive project such as the large hadron collider. Laser acceleration uses radially polarized beams to make this possible because of the cylindrical symmetry of the laser allows it to be focused down to a size smaller than the foci of the beams.

Discussion:

Laser acceleration uses radially polarized beams to make this possible because of the cylindrical symmetry of the laser allows it to be focused down to a size smaller than the foci of the beams. Using simulations the authors of "Direct longitudinal laser acceleration of electrons in free space" were able to model what such an accelerator would look like shown in the figure below. The models show that not only is technology like this possible, but it is also a feasible solution to the cycle of creating larger and larger colliders.

Conclusion:

In conclusion these compact laser accelerators can be used to dramatically reduce the cost and size of particle accelerators allowing for more access to this technology and a wider spread understanding of what happens in the world of the very small.

Figures:

DIRECT LONGITUDINAL LASER ACCELERATION … PHYS. REV. ACCEL. BEAMS **19,** 021303 (2016)

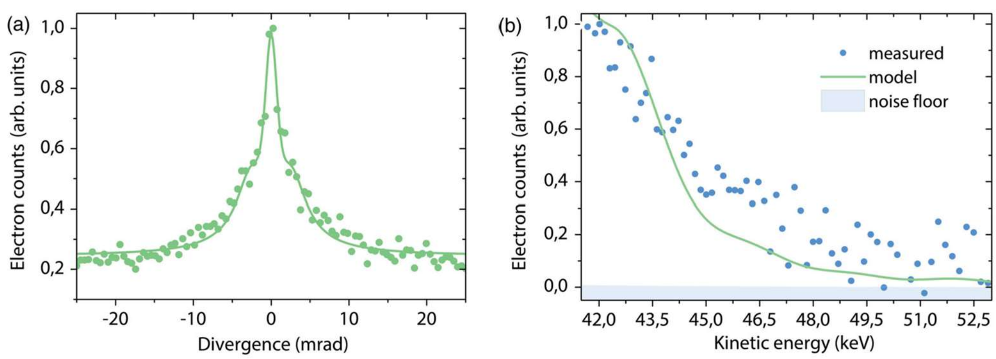

FIG. 4. Electron bunch after interaction. (a) Modeled histogram of electrons with final electron kinetic energy ranging from 42 to 53 keV as a function of divergence with half-angle deflection of less than 25 mrad. From model, FWHM divergence of the electron bunch is expected to be 3.28 mrad. (b) Final measured and modeled kinetic energy of accelerated electron in the region of interest up to 53 keV.

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