A new idea “nugget” from FOCUS:

**Control of Relativistic Electrons from Laser Plasmas**

*Anatoly Maksimchuk and coworkers in FOCUS*

Relativistic electrons are known to come from the interaction of a laser pulse with a high-density plasma foil, but the production mechanism must be understood better in order to control it. Anatoly Maksimchuk and FOCUS coworkers studied the production in the presence of an underdense preplasma in front of the foil, with 2D particle-in-cell (PIC) simulations for pulse durations comparable to a single-cycle and for single-wavelength spot size. The electrons are accelerated predominantly in forward direction for a preplasma longer than the pulse length. Otherwise, both forward and backward electron acceleration occurs. The primary mechanism responsible for electron acceleration is identified. Simulations show that the energy of the accelerated electrons has a maximum versus the pulse-duration for relativistic laser intensities. The most effective electron acceleration takes place when the preplasma scale length is comparable to the pulse-duration. The result of this research in accepted for publication in *Physical Review E* (2003).