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The last two accelerators planned are extremely high intensity devices, through which it is proposed to produce an accelerating wave in a plasma. There has been some initial progress. This has involved experiments at UCLA and DESY of ways to inject particles into the head while they were focused by an ion scattering medium, whereas they were damped by a co-moving untagged particle. In both experiments, particles in excess of 1 GeV/c were obtained. A series of experiments for demonstrating the relevance of induced electrons is currently underway at UCLA. Work at the same laboratory has shown beam-driven radiation to be promising for producing waves that are necessary for generating heat waves. Calculations and simulations of the effects of plasma instabilities, laser self-focusing, and overall efficiency.

A wakefield accelerator, a 10-GeV, high-current electron beam produces the accelerating field. The relationships between the density, momentum of the driving beam and the acceleration mechanism are well understood and calculations and simulations of the interactions of plasma instabilities and self-focusing of the driving beam have been made. It is expected to begin soon at a major US national laboratory an experimental program at Argonne National Laboratory in collaboration with the University of Wisconsin to concentrate on demonstrating wakefield driven plasma waves.

DISCUSSION OF WAKEFIELD AND INDUCED PLASMA ACCELERATORS

Induced or wakefield structures can also be used to accelerate beams to high energy. One such a wakefield accelerator is underway at the Deutsches Elektronen-Synchrotron (DESY). The ring shaped driving beam has been produced, and the preparation of the accelerating beam should be completed within the next year. A different wakefield accelerator, a proton beam as driver to obtain good acceleration efficiency, experimental work is now in progress at the Argonne facility.