ICFA Statement on Linear Colliders

August 12, 1999

Scientific panels charged with studying future directions for particle physics in Europe, Japan, and the United States have concluded that there would be compelling and unique scientific opportunities at a linear electron-positron collider in the TeV energy range. Such a facility is a necessary complement to the LHC hadron collider now under construction at CERN. Experimental results over the last decade from the electron-positron colliders LEP and SLC combined with those from the Tevatron, a hadron collider, have led to this worldwide consensus.

At the Lepton-Photon 99 conference, reviews of the latest experimental results point ever more clearly to the conclusion that there is fundamentally new physics in the energy range just beyond the reach of existing colliders. At the very least we will find one or more Higgs scalar bosons or other structure that has the same effect as a Higgs boson on the existing data. To explore and characterize fully the new physics that must exist will require the Large Hadron Collider plus an electron-positron collider with energy in the TeV range. Just as our present understanding of the physics at the highest energy depends critically on combining results from LEP, SLC, and the Tevatron, a full understanding of new physics seen in the future will need both types of high-energy probes.

Major laboratories around the world are presently conducting accelerator research and development that will lead to detailed designs of a linear electron collider capable of reaching this energy range. The technology being developed for this purpose will also have applications to other areas of science and technology through new generations of intense light sources. A worldwide group is studying the physics at an electron-positron collider and the detectors needed to observe that physics.

ICFA recommends continued vigorous pursuit of the accelerator research and development on a linear collider in the TeV energy range, with the goal of having designs complete with reliable cost estimates in a few years. We believe that an electron collider optimized for the new physics should be built in a timely way with international participation.