Polarized Positron Source for ILC

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LHC and ILC are two energy frontier machines. Both are expected to provide fruitful data in TeV region. The LHC restart is scheduled in coming Autumn 2010, and in coming several years we expect that data from LHC will open a new era of high energy physics. ILC(*) is expected to follow LHC. Then ILC will provide us precision data which is necessary to complete a picture of TeV region and to reconstruct underlying laws of physics.

ILC is a electron-positron linear collider and its numerous distinguishing features enable us to get such a precision data. Since both electrons and positrons are elementary particles, total energy of the collision is well defined, momentum of the initial state is zero (balanced), and background is very small. Those features make ILC data very precise. In addition, beam polarization is one of most powerful features of a linear collider. It is useful to suppress backgrounds, enhance signals, decide weak mixing of final state particles, etc.

In the seminar, the comparison of LHC and ILC is explained. Then the role of polarized beam in ILC is described.

Two schemes are proposed to provide polarized positron beam for ILC: (1) helical undulator and (2) laser-Compton scattering. In the seminar concept of the laser-Compton positron source with technologies used in it is described.

*) ILC and CLIC
ILC is a linear collider based on the superconducting accelerating technology. ILC technology is the most mature way when we are going to start construction of a linear collider up to 1 TeV in near future. On the other hand, CLIC is a linear collider based on the two-beam accelerating technology which is totally different from conventional accelerators. It can reach multi-TeV center of mass energy. The CLIC technology can be more advanced than the ILC technology, however the CLIC technology requires much more R/Ds to reach construction ready. The Compton-based polarized positron source can be applicable to both ILC and CLIC. In the seminar, the application to ILC is described.