Present status of ERL Project
– 3GeV crass ERL and XFEL-O -

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The energy recovery linac (ERL) being developed at KEK could help usher in a new era in materials science. Illumination of a specimen with a short, coherent, nanometer-wide X-ray beam will enable scientists to conduct nondestructive measurements on rapidly evolving dynamical materials and microorganisms with nanometer spatial resolution. This would benefit research for a host of applications in materials, life, chemical, and environmental sciences. Some interesting examples include the development of next-generation high-speed communication devices and catalysts for clean hydrogen energy and other applications for drug-discovery research, sub-cellular imaging, and efficient light energy utilization. To this end, we had settled a combination of 5GeV crass ERL and XFEL-O as the future light source. However, even though the energy of ERL decreases slightly ; for example 3GeV crass, the electron beam emittance can be kept as the value of 15-17 pmrad, which is still very attractive to keep a good performance of the light source for both of soft and hard X-rays. Last year, we considered seriously about the possibility to change the energy from 5 GeV crass to 3 GeV crass, and then we decided to decrease the energy of the ERL as 3 GeV crass as shown in Fig.1.

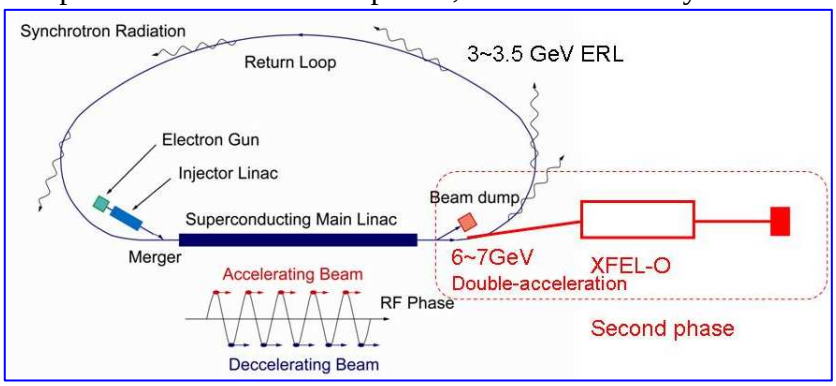

Fig.1: 3GeV crass ERL and 6-7GeV XFEL-O

As the first stage, 3 GeV crass ERL will be constructed for the experiments by means of high brilliant soft X-ray and hard X-ray with sub-pico second pulsed synchrotron radiation. The merits of changing the energy are as follows; one is the wide varieties of user's demands such as spectroscopy measurements to investigate the electron states in materials by means of soft X-ray to coherent hard X-ray imaging to investigate the electron structure in materials. In addition to the first stage of the construction of ERL, the 6-7 GeV XFEL-O will be a second phase construction. 3 GeV crass ERL accelerator automatically can produce enough quality electron beams to realize the XFEL-O with the double acceleration. Therefore, the second phase can be achieved by just the construction of the 50-60m undurator and the X-ray resonator by using diamond crystal optics. The designed time schedule is as shown in Fig. 2.

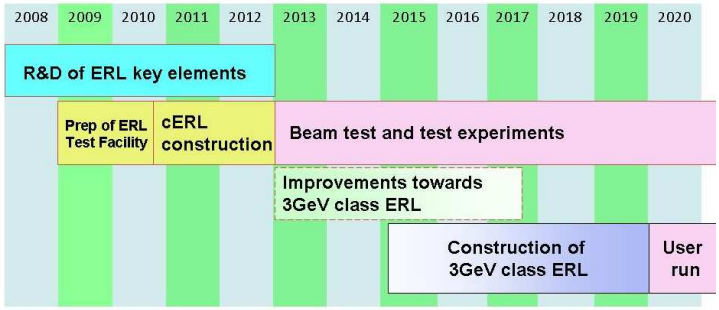

Fig. 2 : Time schedule for ERL construction