コンパクトERL

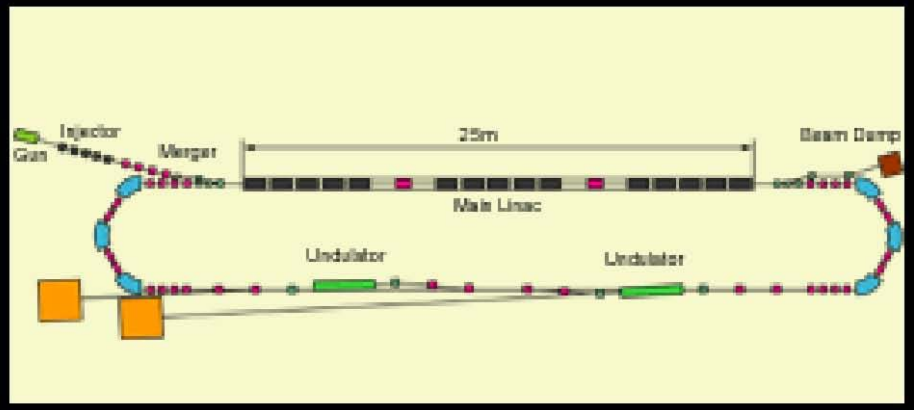
- ERLの原理実証を行いながら加速エネルギー、電子銃の電流を増強していく。(1モジュールで～60MeV)
- ERLの特徴:
  （高輝度、短パルス性、高い繰り返し周波数）
- レーザーコンプトンX線源(微小光源、短パルスX線源)
  （60MeV,10kHz, 10 マイクロアンペアでもOK? ）
- テラヘルツ領域のCSRの利用研究
  （60MeV, ~数10mA、バンチ圧縮）
- 加速エネルギーの増強
  （～200MeV以上→VUV高輝度光源）
- 実機へ

ERL Project

High Energy Accelerator Research Organization (KEK)
Institute of Materials Structure Science (IMSS)
Photon Factory

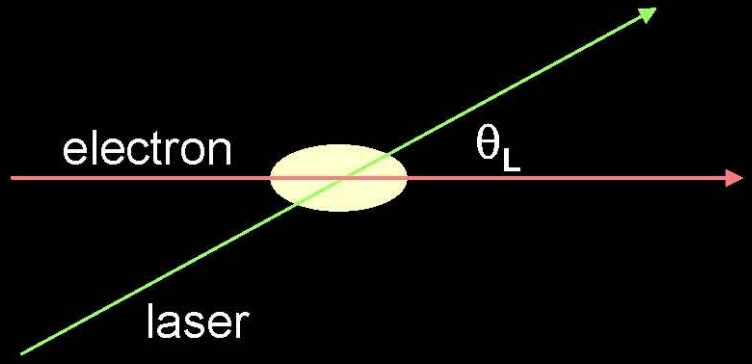
- ISAC continues to strongly support the ERL development in that it offers a route to next generation performance that compliments Spring-8, XFELs and other Japanese light sources. Further, it can strongly engage the KEK accelerator competence and position KEK to be at the forefront of future light sources.
- Developing a compelling science case for the ERL project and facility, including organizing and involving the user community.
- Develop the ERL within the vision of “photon sciences” as a core competency for KEK.
- Develop a realistic, multi-phase project time line based on milestones and incremental successes – utilizing technology proven at KEK.
- Organize, galvanize and strengthen the VUV/SX community in Japan .
- Identify commonality among the future accelerator projects at KEK and better integrate and include the ERL (and PF) in this core accelerator technologies” program.
- Rename the “test facility” and plan it for cutting edge scientific applications in addition to its key R&D role. It is important to identify a “champion” for this project.
- Seek international partners within the Asia-Pacific region for developing and financing and utilizing the large ERL project.

Laser-Compton X-ray source at ERL test facility (60-150MeV)



$$E_{Xray} = 2\gamma^2 E_{Laser}(1-\cos\theta_L)/(1+\gamma^2\theta^2)$$

$$Flux = (N_L N_e/wh)(L_{eff}/L_b)\sigma_c$$



E_{Laser} = 1.55eV, $E_{electron}$ = 60 MeV (γ=117), θ_L = 90 degree のとき、
軸上(θ=0)で**E_{Xray} = 42.4 keV**

レーザーパルス(1.55eV, 1mJ)のフォトン数： $N_L = 4 \times 10^{15}$ photon
電子バンチ中の電子数(60MeV, 1nC)： $N_e = 6 \times 10^{9}$ electrons
電子バンチの水平幅： $w = 50 \times 10^{-6}$ m
電子バンチの高さ： $h = 50 \times 10^{-6}$ m
コンプトン散乱断面積： 1×10^{-28}

Flux = 1 x 10^6 photons/pulse
10kHzのとき、
Flux = 1 x 10^{10} photons/sec
1GHzのとき、
Flux = 1 x 10^{15} photons/sec

足立氏から提供