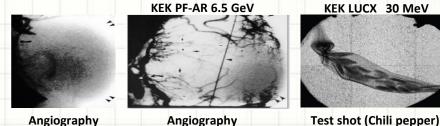
## **R&D** Plan and applications

- Establish technology for laser pulse power accumulation in special, self-starting optical cavity with the high multiplication factor to achieve more than 10MW as the stored power.
- Study and optimize the Compton collision scheme for efficient X-ray and  $\gamma$ -ray generation.
- Study the dielectric wake-field acceleration structures including its radiation mechanisms in GHz-THz range for efficient energy de-chirping and possibly cooling of the relativistic electron beam to increase monochromaticity of the scattered Compton light.

(a) X-ray tube

## Applications



(b) Synchrotron radiation

Exposure time 30 ms



Exposure time 10 sec

(c) Laser-Compton X-ray

- Polarized Positron and Electron beam Generation. •
  - Construction of future lepton colliders, including Higgs factories and  $\gamma$ - $\gamma$  colliders.
  - Upgrade SuperKEK-B injector and open-up possibility to study Pol. e<sup>-</sup> e<sup>+</sup> collision physics within BELL-II collaboration.
- Advanced X-ray Imaging with fast polarization switching.
  - Compact X-ray source with wide possibilities to explore new areas of applied biology and solid state physics, like homochirality study and direct observation of a magnetic moment distribution in materials.
- Nuclear Physics by polarized gamma-ray. •
  - Realization of a tunable polarized  $\gamma$ -ray source for experimental nuclear physics, for example nuclear resonance fluorescence study.

