



Progress of 7-GeV SuperKEKB Injector Upgrade and Beam Commissioning



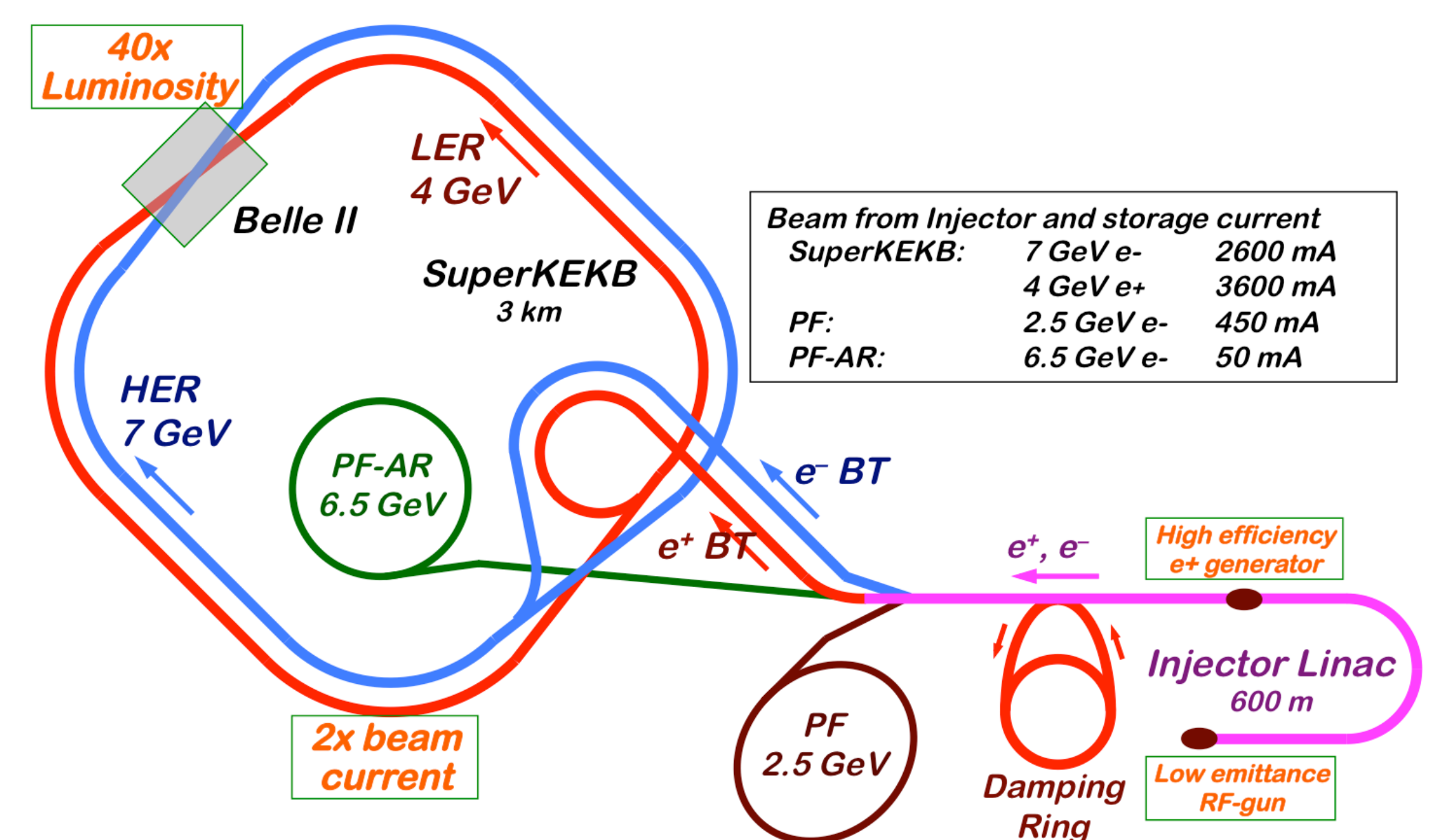
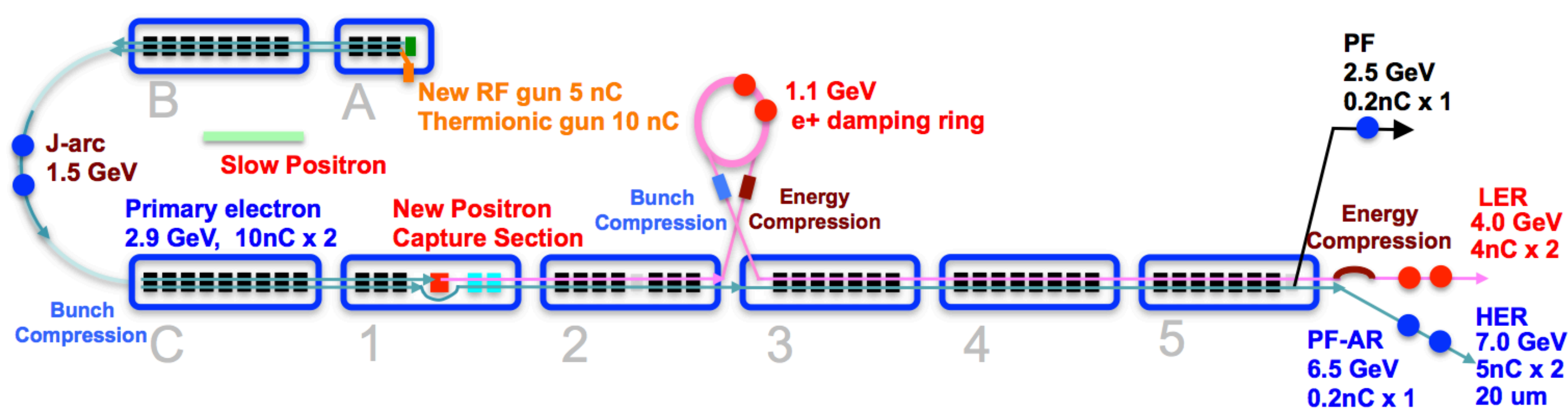
F. Miyahara, K. Furukawa, M. Akemoto, D. Arakawa, Y. Arakida, H. Ego, A. Enomoto, Y. Enomoto, S. Fukuda, Y. Funahashi, T. Higo, H. Honma, N. Iida, M. Ikeda, H. Kaji, K. Kakihara, T. Kamitani, H. Katagiri, M. Kawamura, M. Kurashina, S. Matsumoto, T. Matsumoto, H. Matsushita, S. Michizono, K. Mikawa, T. Miura, H. Nakajima, K. Nakao, T. Natsui, M. Nishida, Y. Ogawa, Y. Ohnishi, S. Ohsawa, F. Qiu, I. Satake, D. Satoh, M. Satoh, Y. Seimiya, A. Shirakawa, H. Sugimoto, H. Sugimura, T. Suwada, T. Takatomi, T. Takenaka, M. Tanaka, N. Toge, Y. Yano, K. Yokoyama, M. Yoshida, R. Zhang, X. Zhou - High Energy Accelerator Research Organization (KEK), Tsukuba, Ibaraki, 305-0801, Japan

KEK injector linac has delivered electrons and positrons for particle physics and photon science experiments for more than 30 years. It is being upgraded for the SuperKEKB project, which aims at a 40-fold increase in luminosity over the previous project KEKB, in order to increase our understanding of new physics beyond the standard model of elementary particle physics. SuperKEKB asymmetric electron and positron collider with its extremely high luminosity requires a high current, low emittance and low energy spread injection beam from the injector. Electron beams will be

generated by a new type of RF gun, that will inject a much higher beam current to correspond to a large stored beam current and a short lifetime in the ring. The positron source is another major challenge that enhances the positron bunch intensity from 1 to 4 nC by increasing the positron capture efficiency, and the positron beam emittance is reduced from 2000 μm to 20 μm in the vertical plane by introducing a damping ring, followed by the bunch compressor and energy compressor. The recent status of the upgrade and beam commissioning is reported.

e^- / e^+ Injector upgrade with high-intensity and low-emittance beams towards 40-times higher luminosity, preparing for Phase-II commissioning

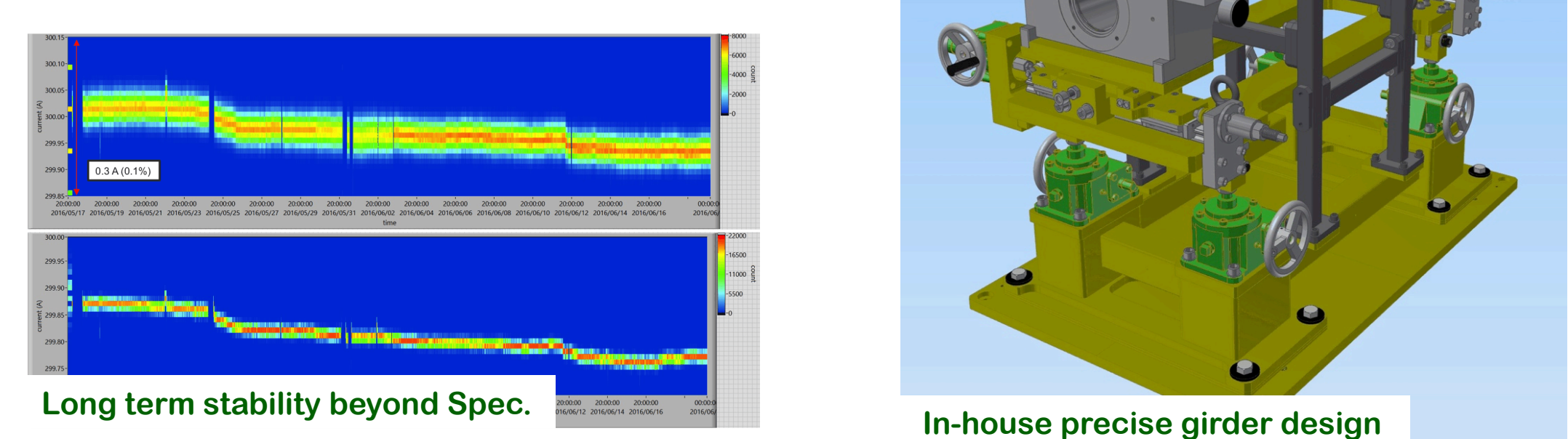
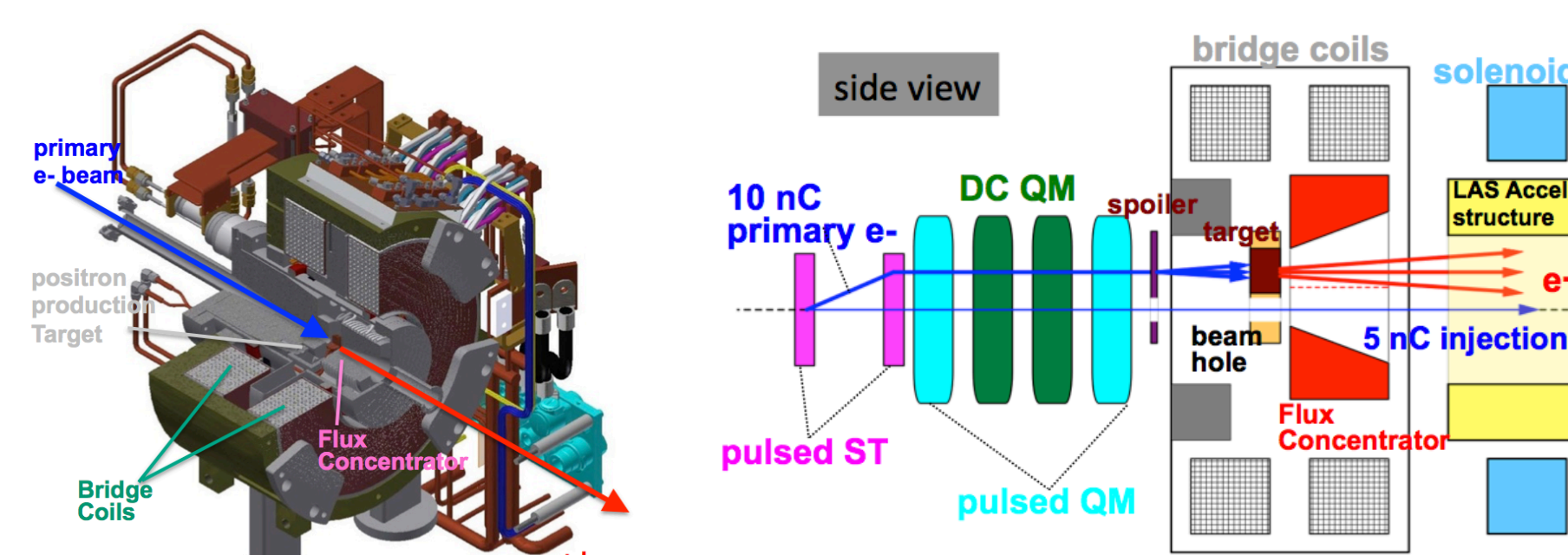
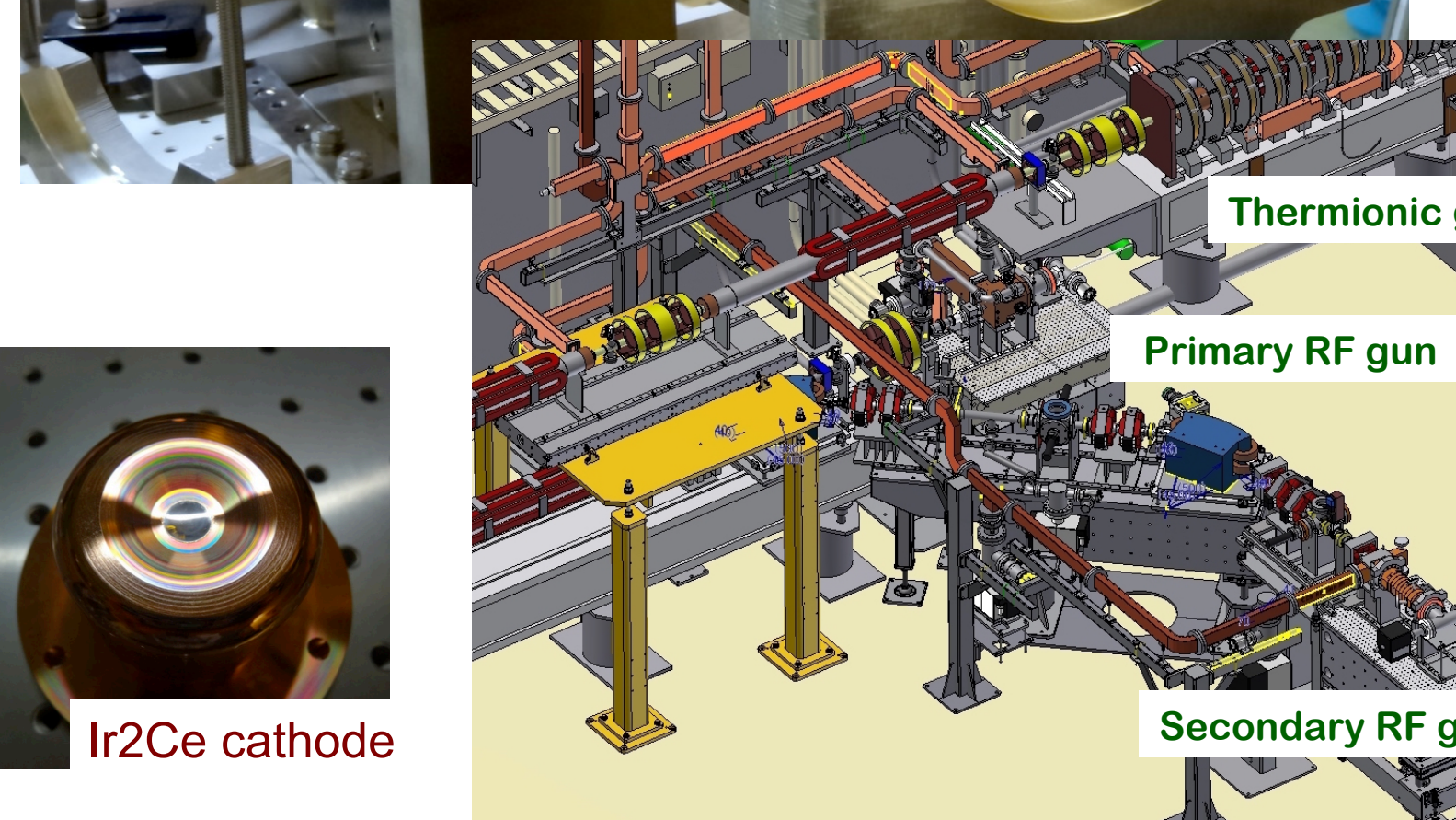
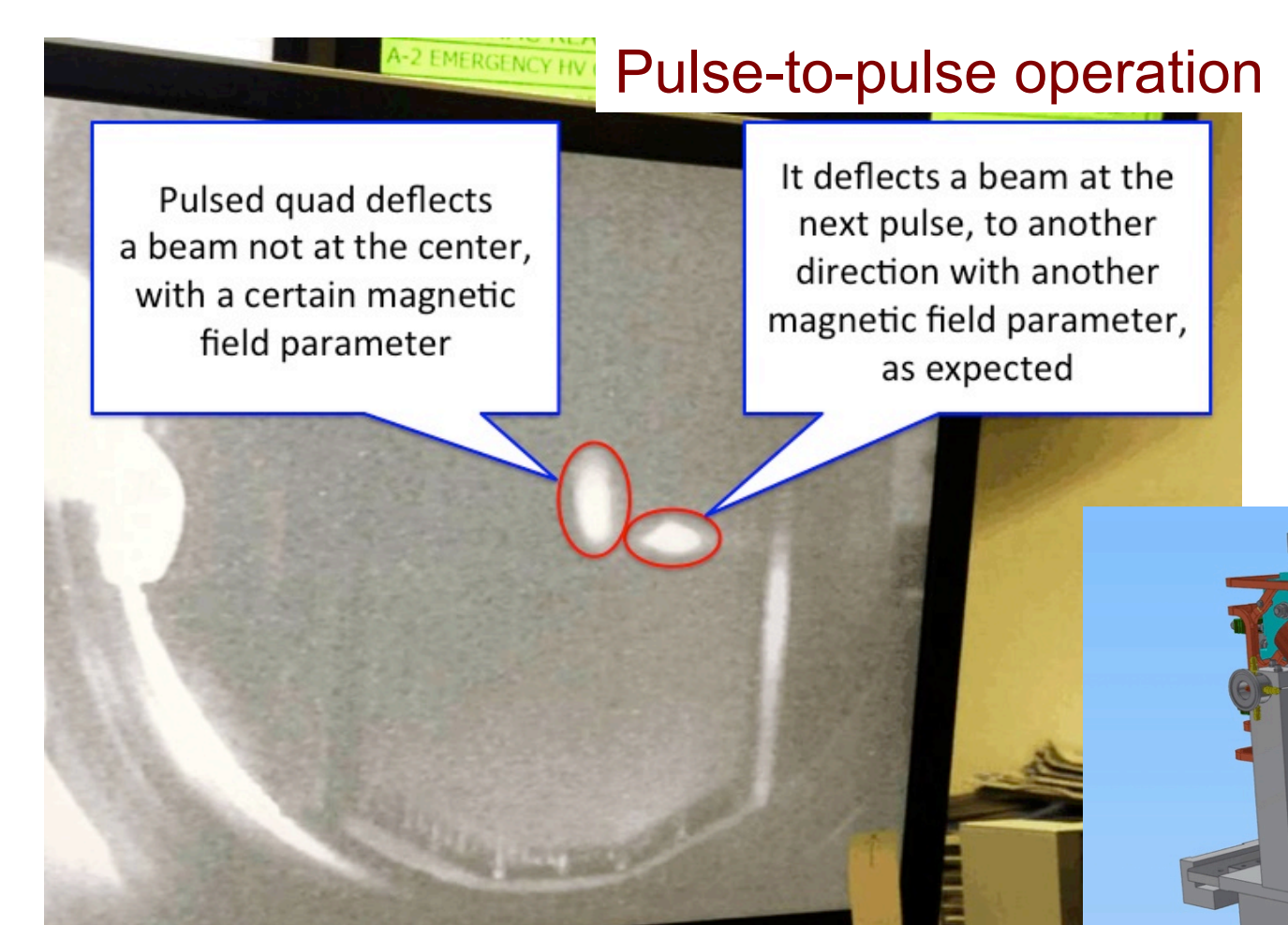
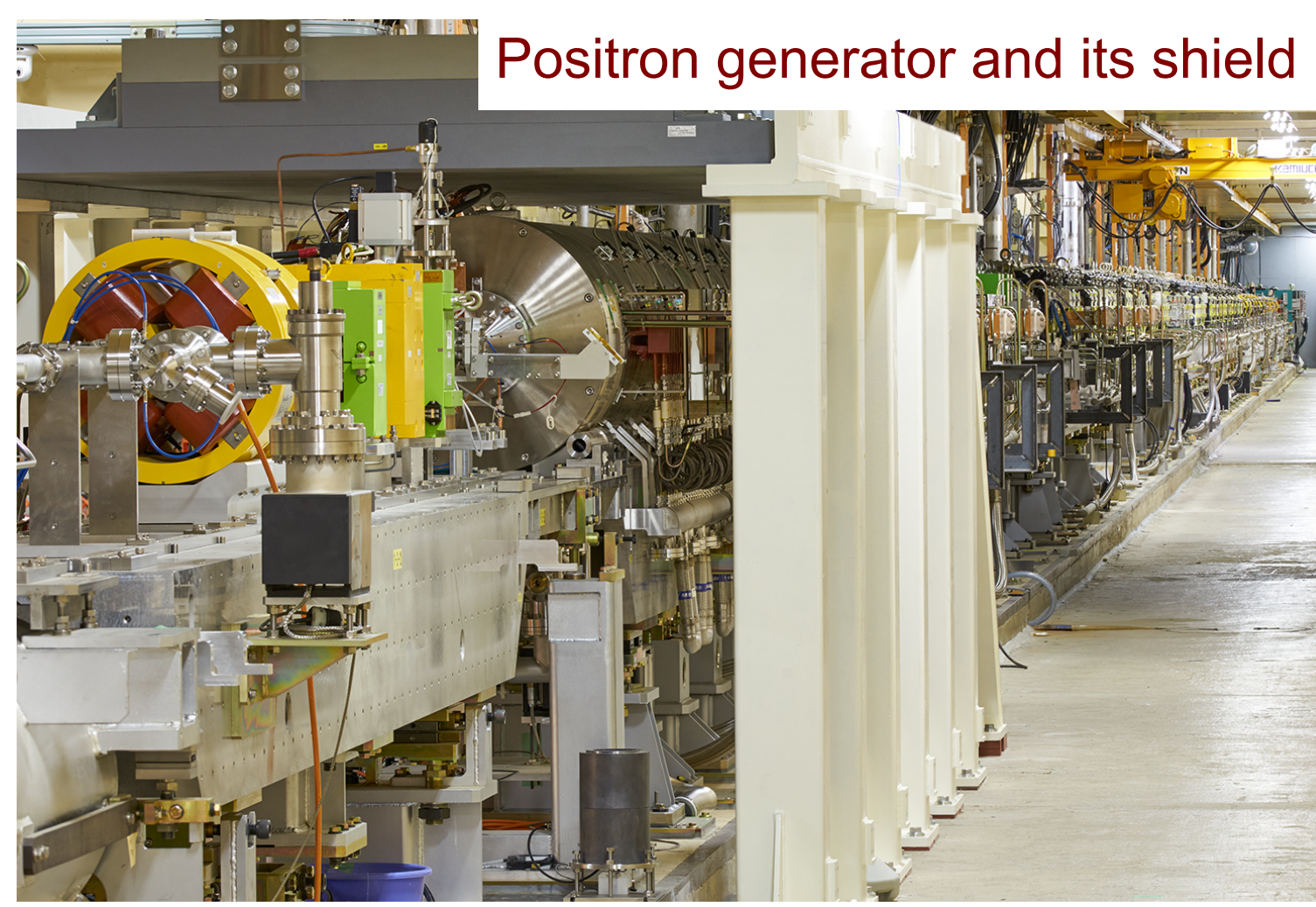
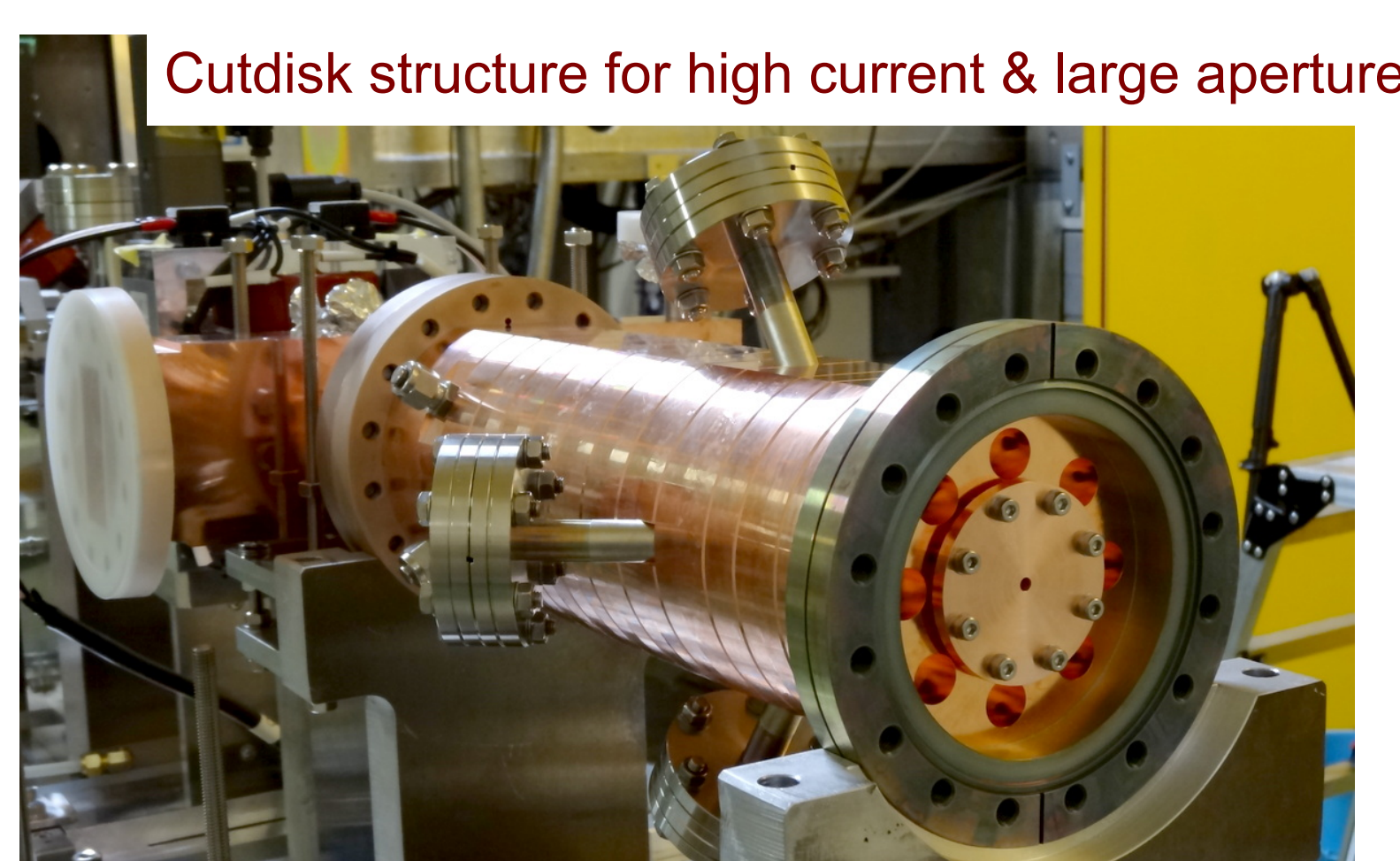
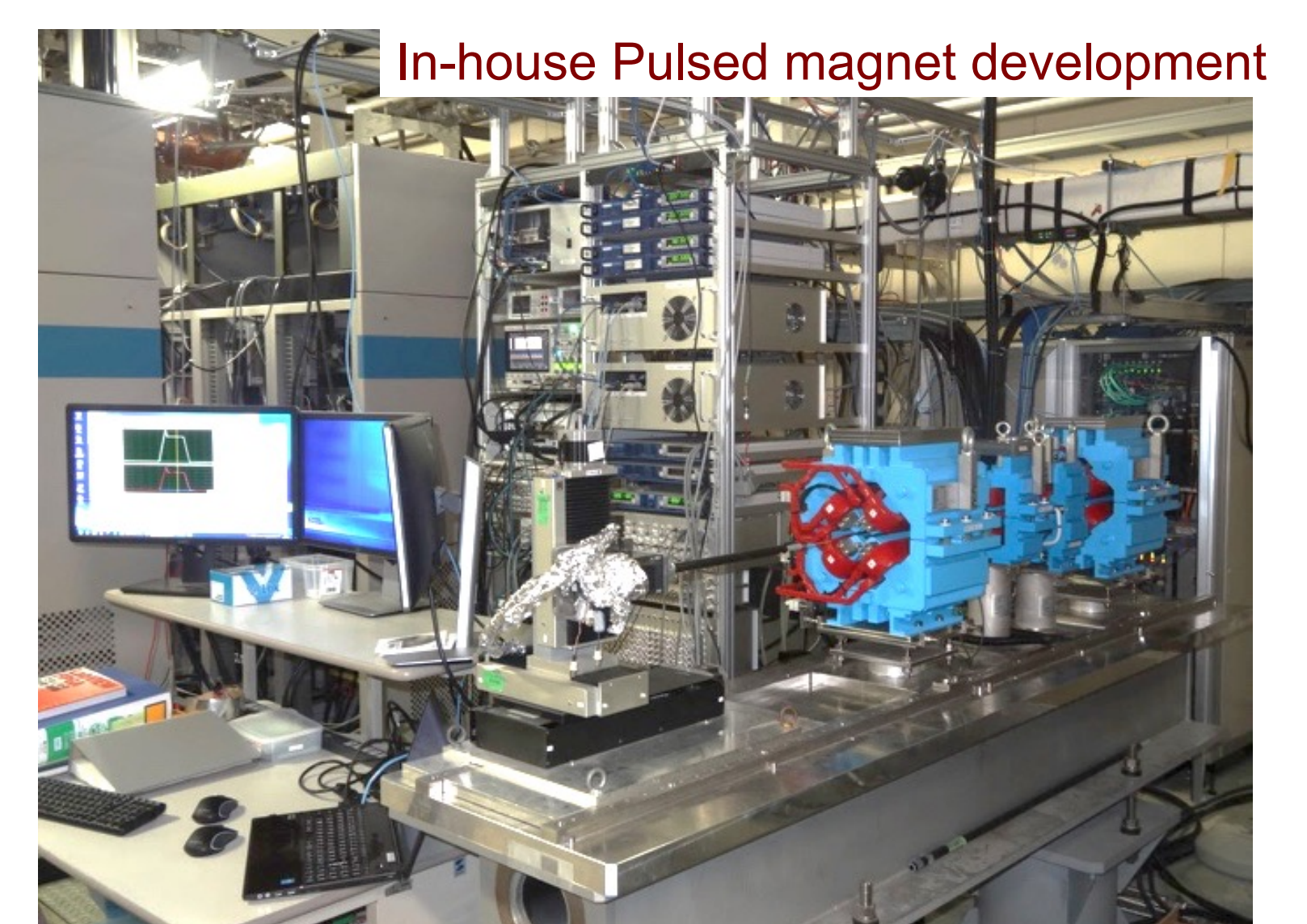
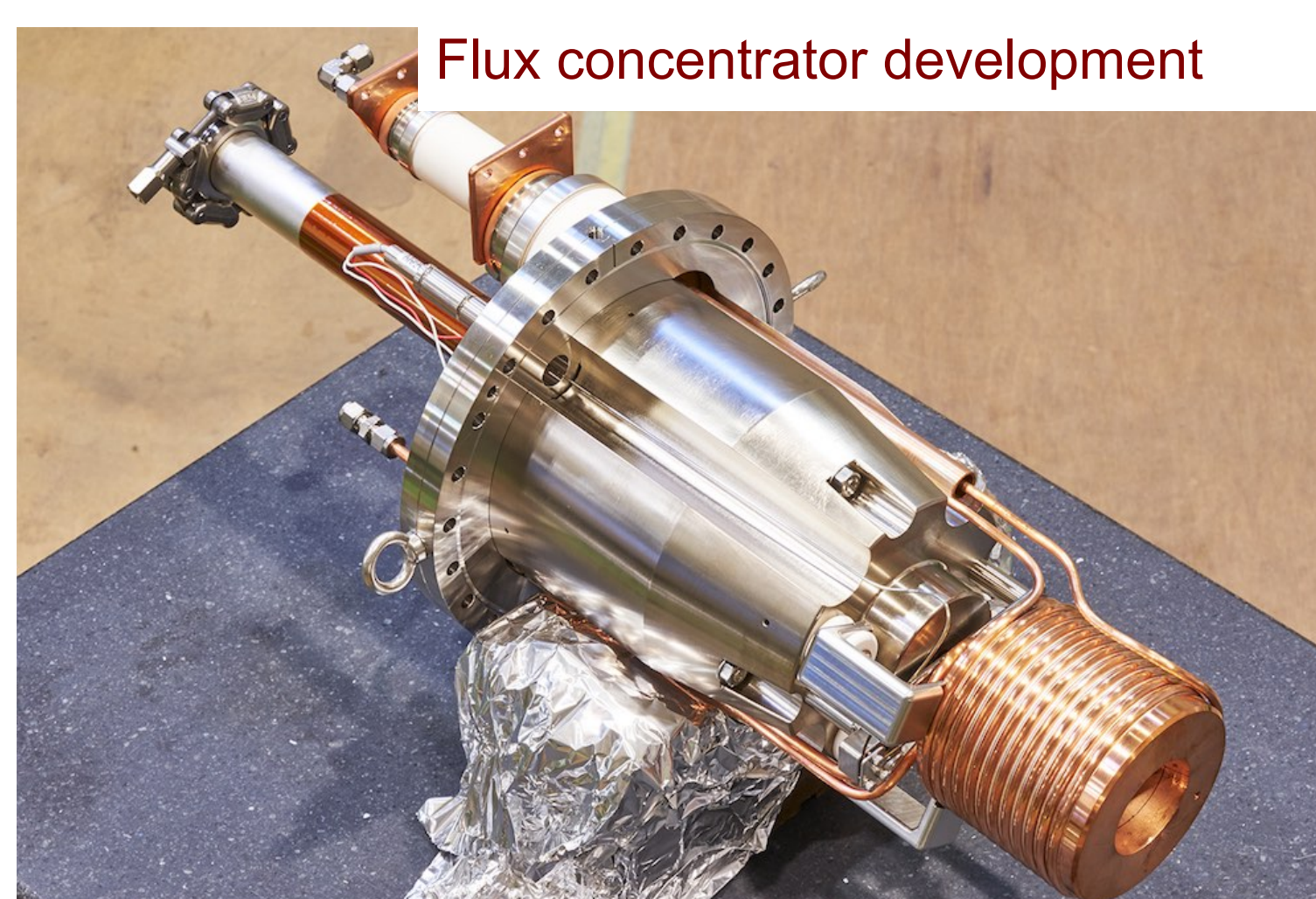
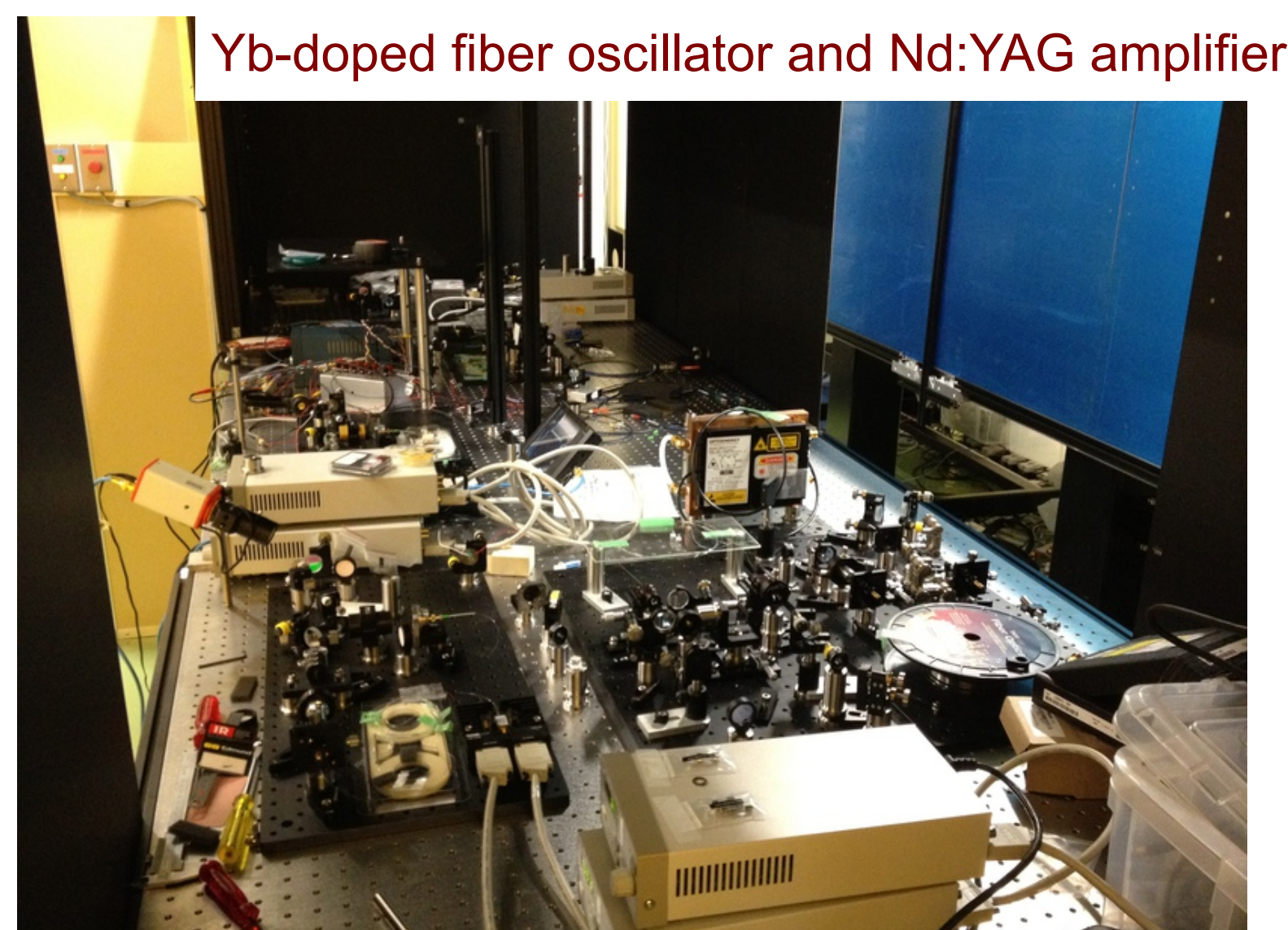
SuperKEKB and Injector Linac



High-current Low-emittance RF Gun

High-current Positron Generation

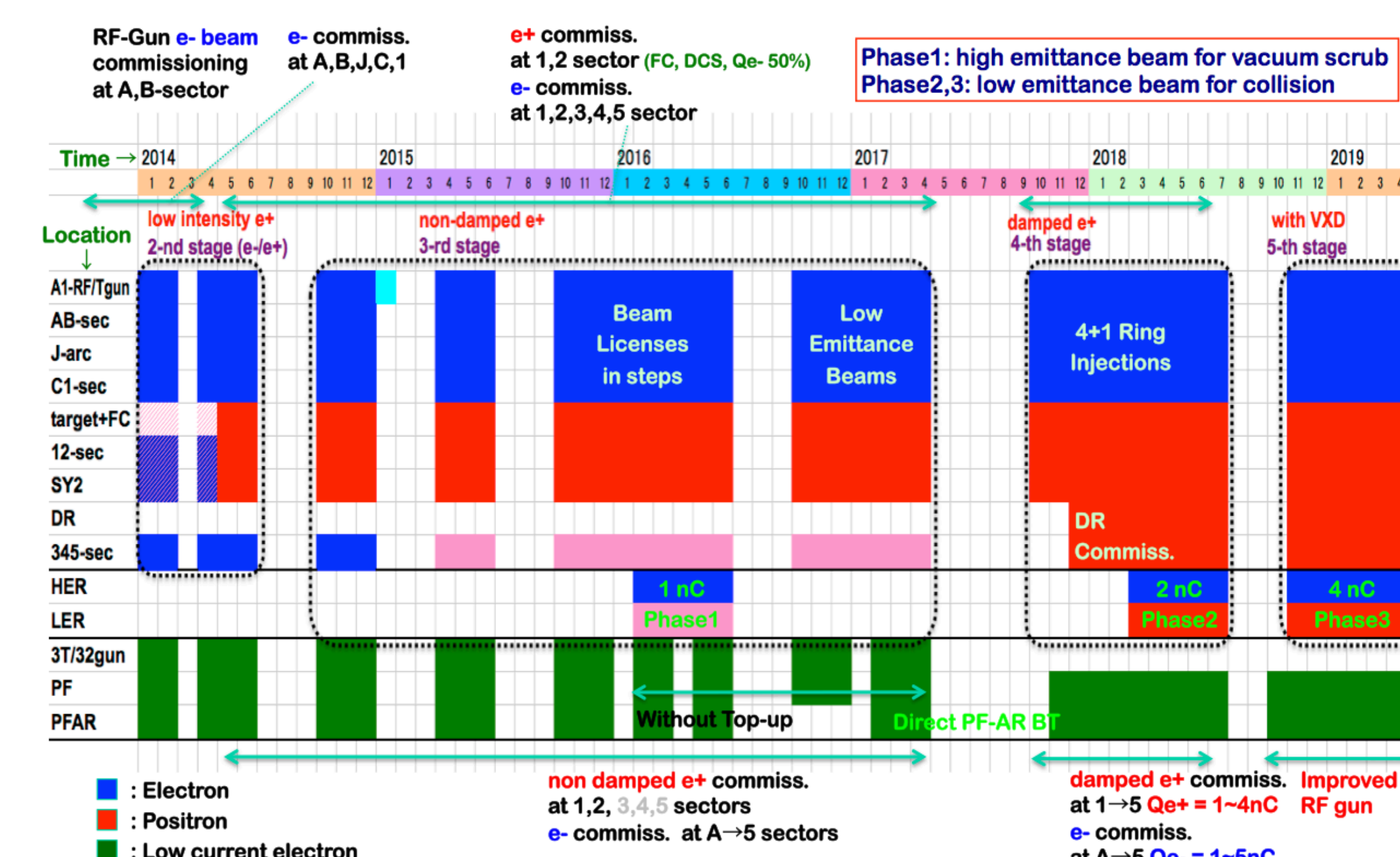
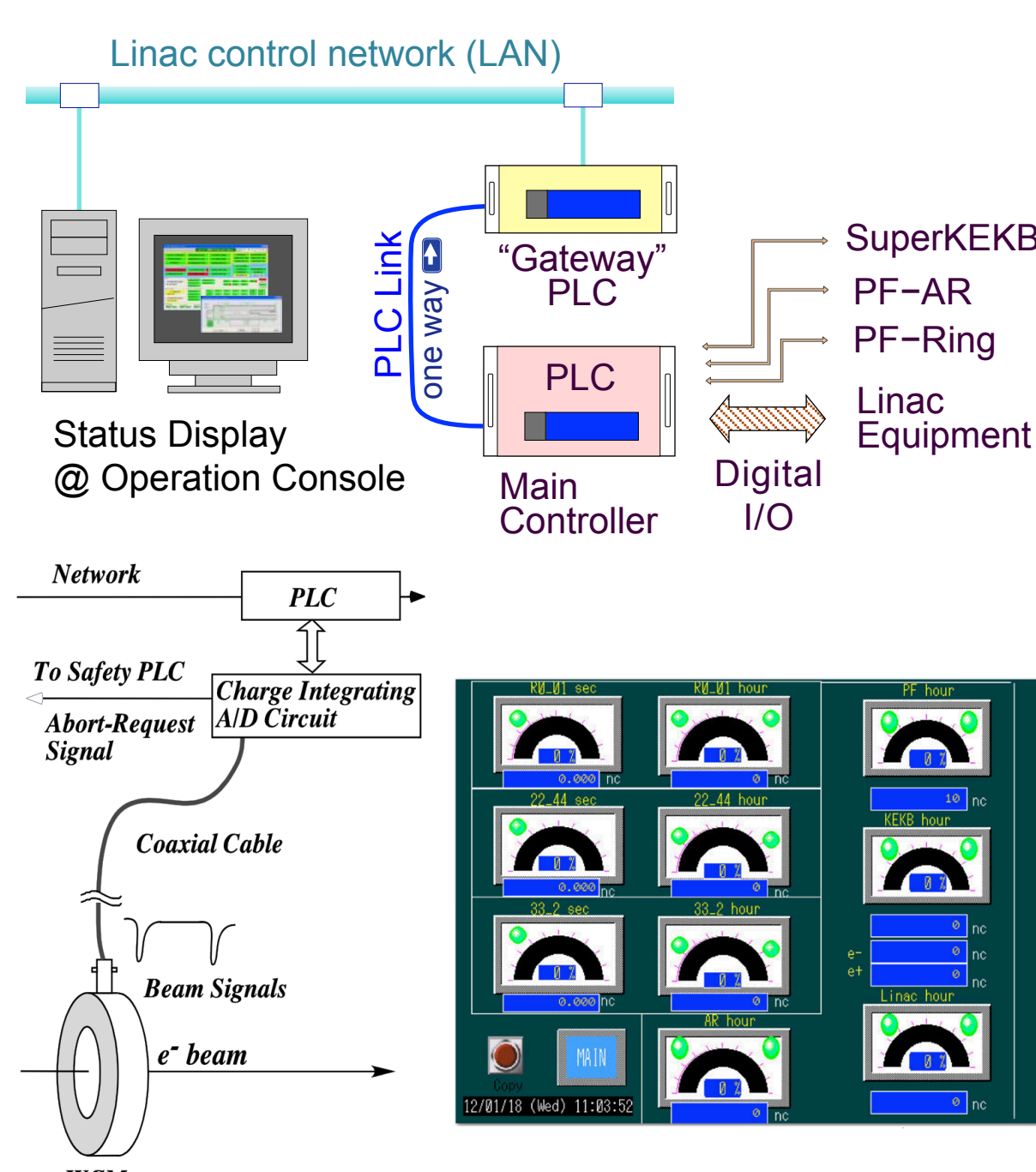
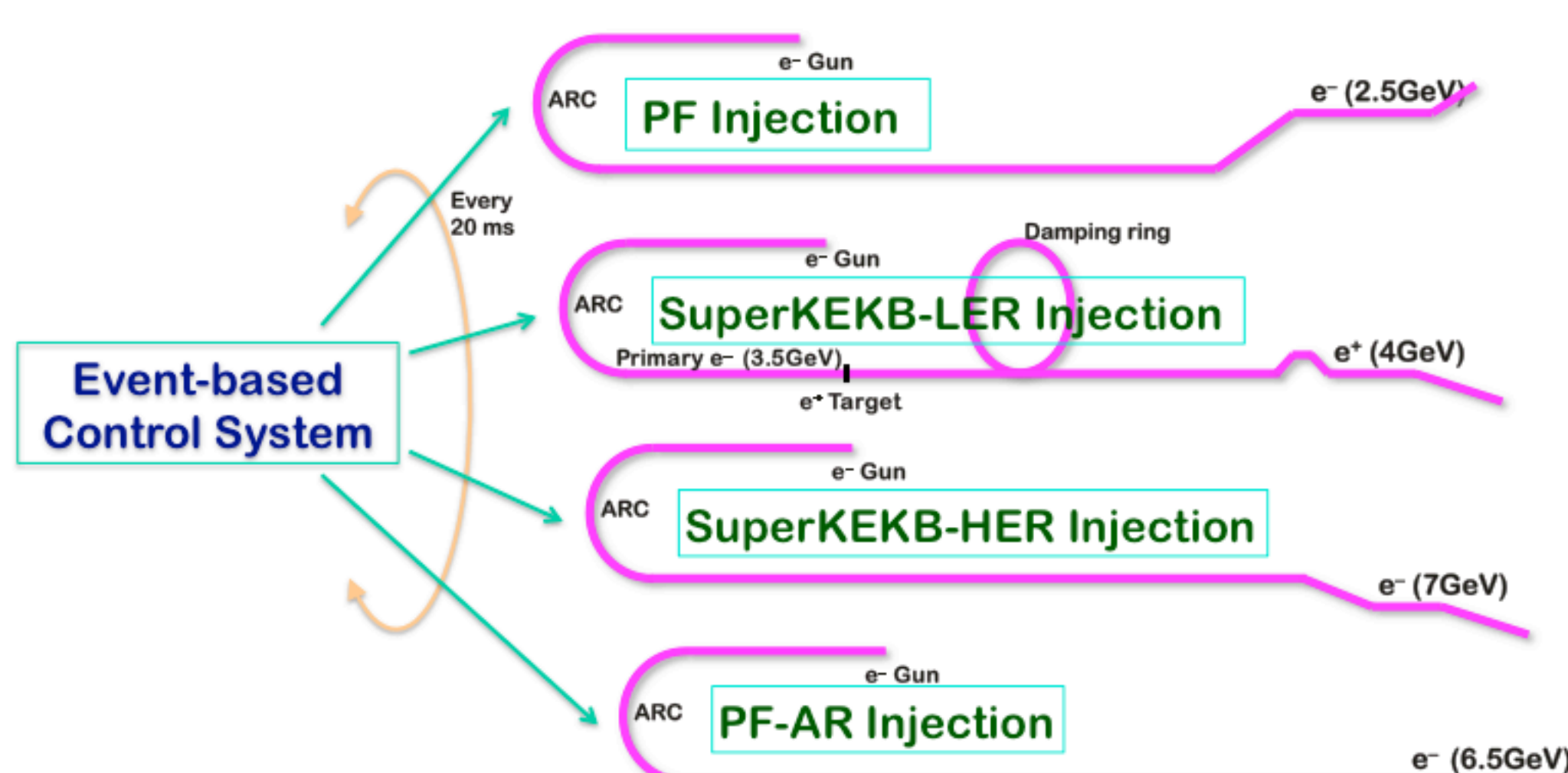
Small form factor pulsed magnets



Pulse-to-pulse modulation controls

Safety system upgrade

Schedule



Virtual accelerators for simultaneous top-up injections
Each VA with associated beam feedback loops