LNF/KEK collaboration for SuperKEKB

- Proposal of a collaboration on some topics and for the commissioning stage
- Collaboration activity on Feedbacks started already several years ago, coordinated by A. Drago (LNF)
- Identified topics at the moment (see following slide):
  - Optics, in particular crab waist option
  - Lifetimes and backgrounds studies
  - Injection system studies

SuperKEKB-LNF collaboration

- Proposal by the LNF scientists (December 2013)
  - 1) Feedbacks implementation (collaboration started already, Contact Person: Dr. Alessandro Drago),
  - 2) Optics studies, in particular the problem of the "crab waist" sextupoles (Contact Person: Dr. Maria Enrica Biagini),
  - 3) Lifetimes and backgrounds studies (Contact Person: Dr. Manuela Boscolo),
  - 4) Rings injection studies (Contact Person: Dr. Susanna Guiducci).
- Status
  - Things seem to have been delayed in Director General/ Trustee-level communication between both labs.
  - We have received official endorsement from a Trustee (Okada-san) and have begun discussing and writing a rough draft of collaboration agreement.

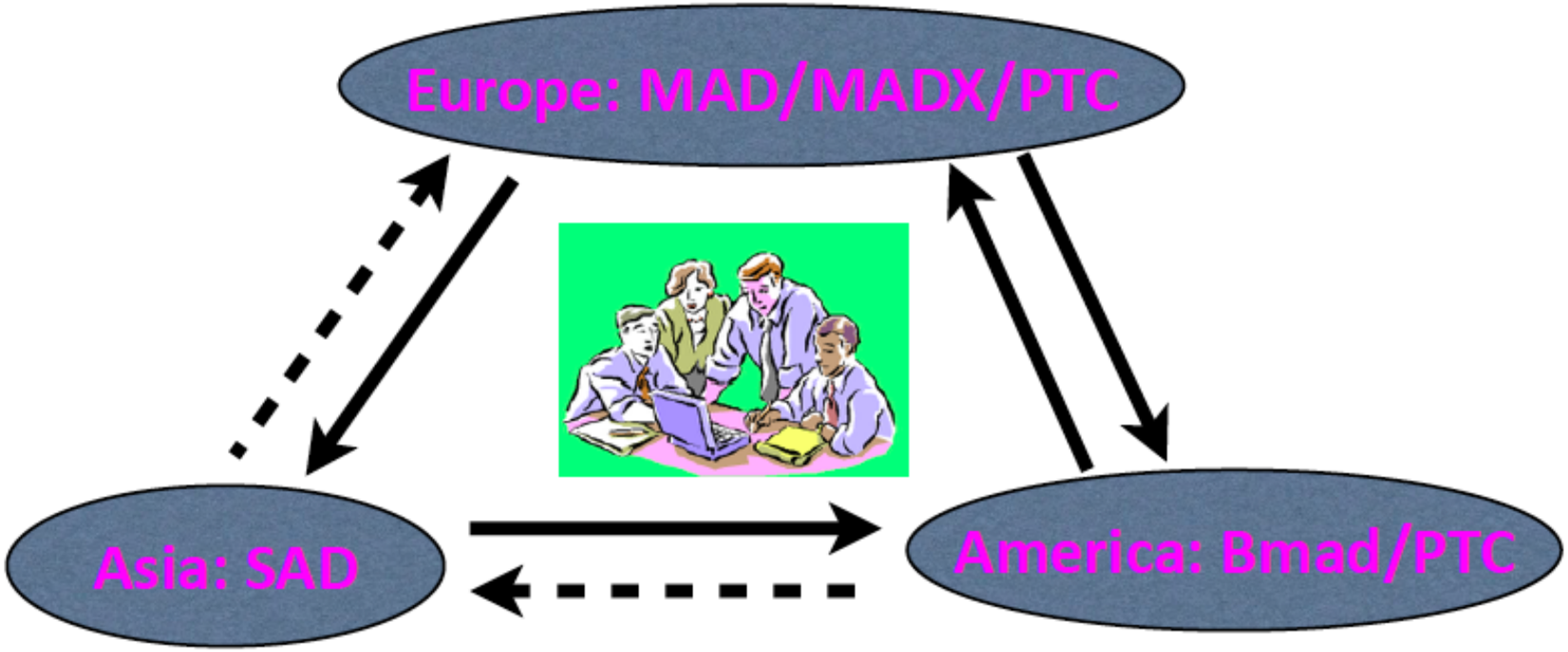
SuperKEKB-LNF collaboration on bunch-by-bunch feedback systems

- Long term collaboration based on the strategy of using identical systems in both colliders (KEK and DAΦNE) to test in parallel the feedbacks with the beams and to discover any possible weak point
- The collaboration started in 2003 by testing at DAΦNE the first system based on only one FPGA chip. In the past the implementation was based on real digital signal processors. Team: A.Drago (LNF), M.Tobyiama (KEK), D.Teytelman & J.Fox (SLAC)
- Many new versions have been released along the years: at the begin only for the betatron feedback and later also for the synchrotron system
- Last improvements (already implemented at DAΦNE) consist in important adaptations devoted to ultra-low emittance beam:
  - designing feedback based on 12-bit conversion in place of 8-bit to have less quantization noise and better dynamic range
  - designing a new low noise front-end for the transverse feedback

6. Future plans

➤ A recently initiated project: Benchmark studies for accelerator design codes

- SAD: TRISTAN, KEKB, SuperKEKB, J-PARC, …
- Bmad: CESR, ERL, …
- MAD/MADX: LHC, FCCs, DAϕNE, Super τ-charm, …



D. Zhou (KEK) @ IPAC15 conference (3-8 May 2015)

Present status

- Benchmark studies of ring lattices has started
- Feedbacks studies and implementation is continuing
- Meeting with KEKB and Belle2 management on June 26th at KEK during the Bell2 meeting, to better define topics and assignments
- Open to other topics/collaborators