SuperKEKB/Belle-2 plans at LAL

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IN2P3-KEK BEAST meeting in Strasbourg 19-20 January 2015

Present scope and priorities

- LAL fast luminosity group: Cécile Rimbault, Viacheslav Kubytskyi, Didier Jehanno (electronics & DAQ), Dima El Khechen (PhD), P.B.
- Cooperate closely with ZDLM (Uehara-san) and SuperKEKB machine (Funakoshi-san et al.) within TYL-FJPPL → work in collaboration
- Main emphasis:
  - phase 1: 500 μm diamond sensor @ 13m in LER, 10 ns fast charge amplifier and full DAQ (ADC, FPGA, DAC) at KEK for single beam particle loss measurement; beam pipe modification; commissioning
  - phase 2: same as above, for ZDLM during luminosity tuning with knobs by KCG; commissioning; feedback preparation (analog → digital)
  - phase 3: 500 → 140 μm diamond sensor; 10 → 2-3 ns fast charge amplifier; feedback implementation (analog → digital); optimize performance
- Additional work:
  - Characterization of zero degree radiative Bhabha cross-section
  - Single LER sensor → plan for two LER + two HER sensors
  - Simulation of single beam particle losses
- PhD thesis of Dima El Khechen < 9/16 → 3/17 ? (may be possible, but not easy)
- Support: IN2P3/accelerator, H2020/Jennifer, TYL-FJPPL, P2IO, ANR ?

Prospects for future involvement

- Developing a digital version of the lock-in amplifier based feedback to stabilize the horizontal IP beam position → can be done within our FPGA
- Contributing to understanding collimator optimization "algorithm" through campaigns of simulations ↔ measurements along the rings
- Cooperate with Strasbourg team to characterize beam induced backgrounds in Belle-2 (in support of future physics activity ?)
- Probing radiative Bhabha cross-section suppression at very small vertical beam sizes, from phase 3
- Investigate short LER lifetime in presence of beam-beam effects ? (Ushiroda-san)
- Investigating SuperKEKB/MDI aspects relevant for designing future HE colliders (e.g. beam loss & collimation simulation, measurement, optimization, IP beam-beam induced particle backgrounds, low-Pt cross-section suppression,…)