DISCUSSION 4 : TUESDAY MORNING (11.30HRS - 13.00HRS)

Calibration and Stability of Diagnostics Equipment

Topics are divided in 3 categories: *BPMs*, *Current Monitors* and *Optical Monitors*.
The animators, Volker Schlott (volker.schlott@psi.ch) and Laurent Farvacque (laurent@esrf.fr) have here below listed issues as a basis for discussion.
Further suggestions and/or contributions are welcome and can be communicated to the animators (preferably before DIPAC in order to adapt the schedule and to allow a proper planning of the discussion session).

Beam Position Monitors (BPMs):

- Is there a need for calibration of BPM chambers on a test bench?

- Are mechanical resp. machining tolerances (< 0.05 mm) good enough to simply apply theoretical calibration factors, which are derived from EM-simulation codes like MAFIA, POISSON etc…?

- Is the initial error on the complete BPM system, including mechanics and electronics, low enough to store beam (in case of a storage ring) and simply apply the method of *beam based alignment* (BBA) to solve all further calibration issues of the system?

- To what accuracy leads BBA? How often should it be repeated in order to guarantee always a well "calibrated" system?
- How is BBA actually implemented in the different labs?

- Is online calibration of BPM electronics necessary (e.g.: new calibration for each change in gain settings)?
- How often should this procedure be repeated and to what level of accuracy? Is a (short) "time-out" in the position measurement tolerable?

- Are BPM electronics in general stable enough to be only calibrated once (before installation)?

- How important are *absolute* position measurements (with respect to the magnetic center of an accelerator)?

- How important is the reproducibility of a (absolute) "golden orbit"? How close is such a "golden orbit" to a calibrated "BBA" orbit?

- How are drifts resp. movements of the vacuum system (BPM block) considered in determination of beam positions (golden orbits)?
- Usually drifts occur in case of temperature gradients in the vacuum chamber (heat load from the beam) and/or changes in the ambient (tunnel) temperature - locally and globally after a shut-down.
  Should these mechanical drift be monitored and corrected?

Current Monitors

- How are calibrations of current monitors (DC to wide BW monitors) usually done?

- A short description of successful techniques and implementations in the labs or on the machines would be appreciated !!!

- How precise and how reproducible are calibration procedures of current monitors?
- In case of lab calibrations: How close are the calibrations to the measurements on the machine?
- In case of online calibration: How much do calibration features influence the actual measurement on the beam?
- How often do the calibrations need to be repeated?
- Is cross calibration desirable or even necessary?

- What influences most the stability and reproducibility of current measurements (temperature, bunch pattern etc…)?
- What are the (easiest) cures to these problems?

Are there universal monitor design criteria for current monitors of different kinds (DC to wide BW) to obtain optimum results?

Optical Monitors

- What is the best way of calibrating an optical monitor (screen moniotr or synchrotron radiation monitor)?
- In case of a fixed optical set-up (magnification) : in the lab…?
- In case of a flexible optical set-up (telescope optics…) : online with the use of calibration grids etc…?

- What are the stability requirements for optical set-ups in terms of mechanical and timing stability?
- Stability considerations for different optical set-ups and different machine environments would be appreciated!!!

- How well do we have to know about timing electronics in case of “fast optical measurements”?
- Is there a well tested timing unit with lowest jitter (?? ps)?

- How much should we and can we learn from our experimentalists (especially in case of storage rings)?

- Should we resign on doing optical monitoring for cases like beam size, emmittance, stability and let the experimentalists take over?