Timing with collisions procedure I)first setting

- **In first approximation**
  - **Relative timing between cells of one detector should be OK (TED + corrections)**
  - **Relative timing between ECAL HCAL PS SPD should be OK (cosmics + TED)**
  - **Delay chips adjusted for TED measure corrections,+HV corrections,+costeta**
- **First setting at 450 GeV**
  - **Use LHC timing adjustment to set average Kernel variable to 0 in online plots with default TTCRX calo setting and default delay chip**
    - **2ns offset <K>=.01, 4ns offset <K>=.04, 6ns offset <K>=.09 etc…**
    - **Around K=0 the Hcal trigger is OK**
    - **3 runs of few 100 events each should allow timing to better than ≈ 3ns**

II) Refining global timing

- **To be more accurate (< 1ns) one has to**
  - **Shift by + 12.5ns the CROC TTCRX**
  - **Measure asymmetries**
  - **Correct for example per crate average asymmetries with TTCRX**
  - **Shift back by 12.5ns**
- **But after a shift of 12.5ns the trigger operation is not guaranteed (especially if done by TTCRX)**
  - **One possibility trigger A side only and shift B by 12.5ns then trigger with B and shift A => doubles adjustment time(?) but trigger available for rest of LHCb**
  - **Trigger with one detector (HCAL) adjust the others => cannot shift with TTCRX of ECAL, PS crates => shift 12.5ns with delay chip => may be out of range for some delay chips(?)**
- **Time needed not limited by counting rate 6 runs 30 min?**

III) Checking per cell timing

- **Same problem need to shift by 12.5ns**
- **For ECAL/HCAL need 50K events at 450 GeV (Yasmine's MC results)**
- **For PS? SPD?**
- **Is on line analysis possible? Needed?**

IV) Checking the scan curve

- **Checking the maximum is 12.5ns from asymmetry=0 point**
- **Checking that maximum is flat to 1%/2ns**
- **50K events/points at 5TeV!!! 450 GeV??? If trigger one side => 100K events**
- **If simultaneous scan on all detectors => impact on procedure**
- **Off line analysis only**