# Action list for preparation of May 2002 Testbeam

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## 1 Goals

The testbeam will take place at the CERN X7 beam, from May 27 to June 5. The main goal of the test beam is to study

- the charge collection efficiency (cce) of the Hamamatsu prototype sensors and
- the particle detection efficiency for a 22 cm long ladder,
- as function of the track impact point in between readout strips,
- for the different strip geometries implemented on the prototype sensors,
- as function of bias voltage,
- at different positions along the ladders (and as function of track angle, if possible),
- using the Beetle read-out chip with an LHC-compatible shaping time.

## 2 Setup

The setup must comprise:

- two test ladders,

  - one ladder with two sensors (22 cm), and
  - one ladder with one sensor (11 cm);
  - ladders use simple G10 backbones (similar to May'01),
  - carry sensors, pitch adaptor, Beetle hybrid (three chips) and line driver,
  - are equipped with test-pulse pad for charge calibration

- a light-tight detector box for the two test ladders; the box must

  - provide cooling for the Beetle chips,
  - carry clear alignment marks,
  - allow for common vertical movement of the two ladders,
  - allow for individual horizontal movement (along strip direction) of each ladder,
  - allow for rotation of the ladders around the strip direction (if possible);
  - a grounding scheme must be developed and checked before data taking

- a beam telescope

  - two alternatives will be investigated:

   * use the VELO beam telescope, as in October'01
   * use a HERA-B beam telescope, similar to May'01
   - An important parameter for the decision between the two options will be the DAQ rate that can be attained with the associated DAQ systems.
   - an expert-on-call shift schedule for the beam telescope has to be established

- a data acquisition system for 6 channels (2×3 Beetles)

   - HERA-B DAQ system in case the HERA-B beam telescope is used
   - two options in case the VELO telescope will be used:
      * use Lausanne ODE prototype boards interfaced to the VELO testbeam DAQ, as in October'01;
      * use CRAM's of the VELO testbeam DAQ;
   - the readout should include a trigger TDC to allow efficient scanning of pulse shape and adjustment of trigger delay;
   - an expert-on-call shift schedule for the DAQ has to be established

At least basic monitoring software must be developed before data taking starts. As minimum requirement it must be possible to display

- raw and pedestal-subtracted pulse-height spectra

- raw and pedestal-subtracted ADC vs strip number

- pulse-height as function of trigger delay (ADC vs TDC)

- track correlations and residuals

- pulse-height spectra for associated clusters

- ...

# 3   Estimate of needed DAQ rate

- The aim should be to scan the interstrip region in 10 intervals with an error of 1% per bin. Then, 100k events are needed per setting and strip geometry. The sensors contain 5 different strip geometries, such that 500k events are needed per setting.

- The measurement program should comprise at least five bias voltage settings, three positions along the sensors and three different track impact angles, for totals of 11 different settings and 5,5M events.

- The testbeam lasts 10 days of 90k seconds each. Assuming an optimistic value of 30% for data taking efficiency gives 300k seconds of effective data taking.

- Taken together, these numbers suggest that a data taking rate significantly larger than 20 Hz will be needed in order to complete the measurement program in the allocated time.

# 1   Detector ladders

| item | responsible | dates | comment |
|---|---|---|---|
| sensor delivery | Olaf | 22/02 | |
| sensor characterisation | Phillip | 25/02 - 29/03 | (automatic probe station arrives 28/02) |
| hybrid delivery | Christian | | |
| pitch adaptor delivery | Christian | | |
| hybrid assembly/debugging | Christian | | |
| pitch adaptor bonding | Christian | | (send to Zürich on 22/03) |
| line driver | Christian | | (send to Zürich on 22/03) |
| ladder supports | Phillip | 25/02 - 22/03 | in Lausanne? G10 w/ alu inserts for hybrid cooling, as May'01 |
| ladder assembly | Phillip | 22/03 - 05/04 | |
| ladder debugging | Phillip | 08/04- 26/04 | |

# 2   Detector Box

| item | responsible | dates | comment |
|---|---|---|---|
| light-tight box | Phillip | 25/02 - 05/04 | for two ladders, alignment features, feed-throughs |
| ladder fixations | Phillip | 25/02 - 05/04 | individual shift along strips, rotation around strips |
| cooling | Phillip | 25/02 - 05/04 | use existing cooling blocks from May'01 |

# 3   Data Acquisition / Beam Telescope

| item | responsible | dates | comment |
|---|---|---|---|
| decision VELO vs HERA-B | all | 12/03 | |
| lab DAQ assembly/debugging | Marcus | 13/03 - 05/04 | |

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## 4 Laboratory tests / testbeam at CERN

| item | responsible | dates | comment |
|---|---|---|---|
| lab tests in Zürich | Phillip | 29/04 - 17/05 | charge calibration, source tests(?) |
| move setup to CERN | Phillip | 21/05 | |
| debug setup at CERN | Michael | 22/05 - 26/05 | |
| data taking | Michael | 27/05 - 05/06 | daily run meetings |
| establish run schedule | Michael | 29/03 | |
| establish shift schedule | Michael | 29/03 | |

## 5 Monitoring Software

| item | responsible | dates | comment |
|---|---|---|---|
| non-tracking related | Michaela | 05/04 | (pulseheight spectra etc) |
| track-related | Michaela | 17/05 | (residuals etc) |