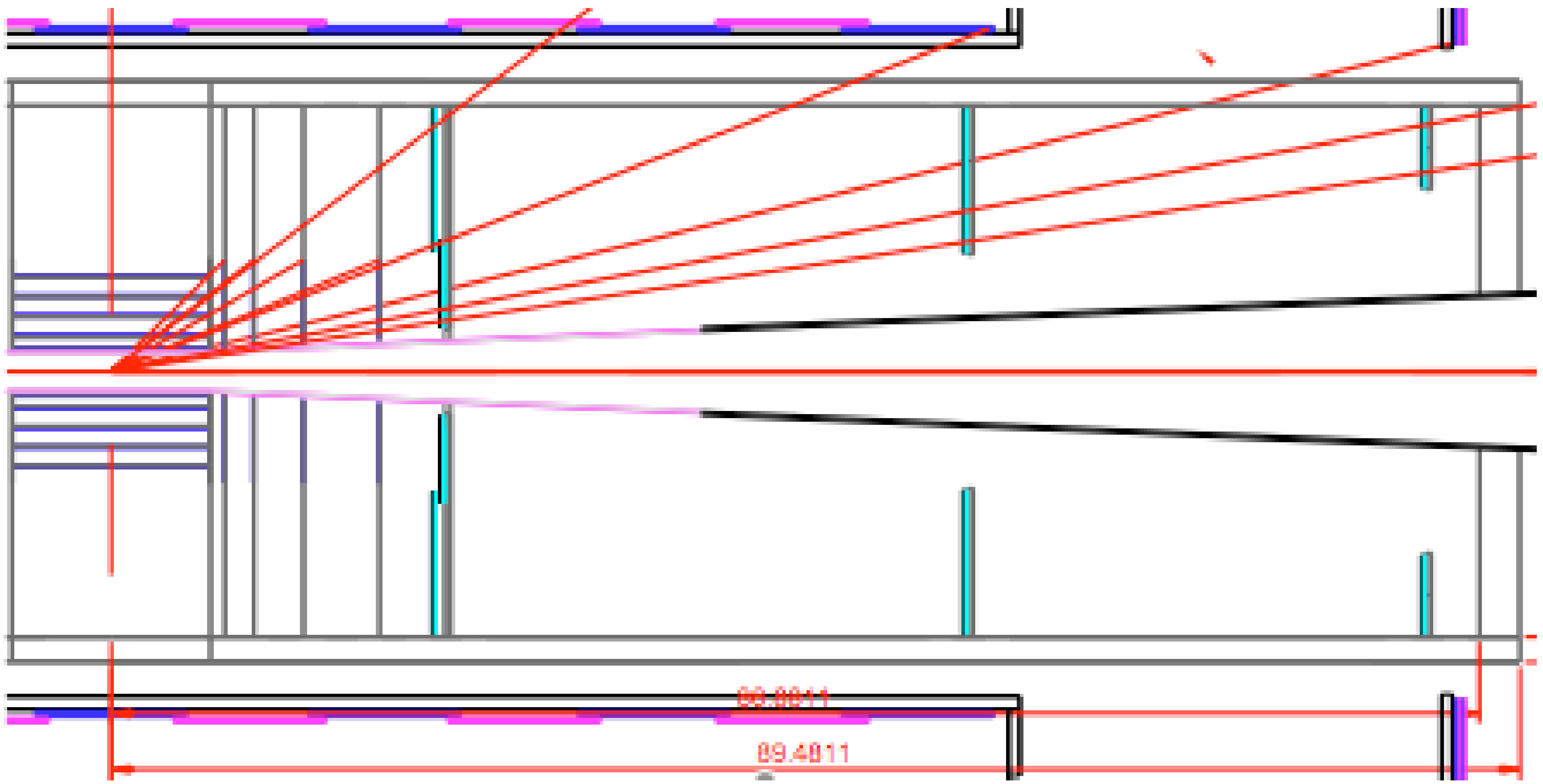
LOI Vertex Needs

- Detector Description
  - Detector positions and mass from Bill Cooper Drawings
  - Supports from Bill's drawings
  - We need to generate a cable map with associated masses
  - Pixel sizes (based on A. Raspereza DEPFET result) based 50 micron thick sensors.
    - Barrel 25 x 25 micron
    - Disks 20 x 40 micron



M. Davier - Expected LOI contents: final wording of IDAG additional requests

(1) Detector optimization: identification of the major parameters which drive the total detector cost and its sensitivity to variations of these parameters.
(2) Plans for getting the necessary R&D results to transform the design concept into a well-defined detector proposal.
(3) Conceptual design and implementation of the support structures and the dead zones in the detector simulation.
(4) Sensitivity of different detector components to machine background in the context of the beam parameter space considered in the RDR.
(5) Calibration and alignment schemes.
(6) Estimates of overall size, weight, and requirements for crane coverage and shielding.
(7) Push-pull ability with respect to technical aspects (assembly areas needed, detector transport and connections, time scale) and maintaining the detector performance for a stable and time-efficient operation.
(8) A statement about energy coverage, identifying the deterioration of the performance at energies up to 1 TeV and the consequent detector upgrades.

Benchmarking Document

- ***Energies***

The majority of analyses will be done at 500 GeV. This should be used as the default point. Exploring the behaviour of the detectors and systems at larger energies is important, but takes second priority. Some special studies will need other energy points:
Higgs production at the ZH threshold (for a 120 GeV 250 GEV Ecms seems sensible),
At the moment well defined machine configurations exist for 500 GeV and for 1000 GeV. We will need in addition machine configurations for 250 GeV. The GDE has been asked to provide these.

Machine Backgrounds

The complexity and sheer number of background hits and particles from machine induced background make it impossible to superimpose these on the generator level on an event-by-event basis. These should therefore be taken into account by superimposing background hits to the final events, after they have been processed by the detector simulation. We suggest to produce and make available centrally produced background "4-vector" files, which then need to be further processed for each version of a detector and full simulation program.
Machine backgrounds need to be taken into account in two ways: (three bullets?)

- extra hits will be present in the event, primarily from pair background. This will be taken care of by superimposing background hits onto the physics events.
CAIN and Guinea-pig are the most frequently used program to generate the pairs,
Pairs will be created taking the 14mrad crossing angle of the accelerator into account.
- In addition to the background from pairs, muons from the beam halo will enter the detector and create hits. Simulations of these effects do exist, but need to be made available. The normalization of the muon flux is not yet clear. It will among other things heavily depend on the assumption of how large the tails of the beams in the BDS are.   - so ,,,
- The actual center-of-mass energy of the event will change due to beamstrahlung. Several parameterizations exist for this. We propose to investigate whether BSGEN and CIRCE programs can be updated to include the latest machine configurations. -ignore?

Benchmark Document

- *Signal Samples*

For each reaction we indicate the main detector parameters which are to be tested with this reaction. Performances for 250fb-1 for Ecm=250GeV and 500 fb-1 for 500 GeV should be presented.

1. **e+e-→ZH, H→e+e-X, μμX (MH=120 GeV, Ecms=250 GeV)**
2. **e+e-→ZH, H→cc, Z→νν (MH=120GeV, Ecm=250GeV)**
3. **e+e-→ZH, H→cc, Z→qq (MH=120GeV, Ecm=250GeV)**
4. **e+e-→Z→τ+τ- (Ecm=500 GeV)**
5. **e+e-→tt, t→bW, W→qq' (Mtop=175GeV, Ecm=500 GeV)**
6. **e+e-→χ+χ- /χ20χ20 at Ecm=500 GeV**

These reactions represent a minimum number of physics processes to be studied.

The following reactions are of very high importance for the physics reach of the ILC project. However they are less relevant to the optimization of the detector parameters, or have overlap with other reactions included in the list above.

1. **e+e-→ZHH**
2. **Secondary Vertex reconstruction and quark charge measurement**

a. This reaction is very important for the optimization of the vertex detector. However it relies on very sophisticated vertexing tools to be fully implemented. - What reaction?

3. low ΔM SUSY

Background Simulation

- Part of “benchmark” description - but not specified in detail
- Use LCFI package in a simple reaction to study secondary vertex reconstruction.
  - $e^+e^- \rightarrow bb$?
  - at what energies?
- Background files - define machine extremes
  - Low power machine
  - High luminosity machine
  - 1 TeV machine
- Integration times for baseline (low power machine?)
  - Single bunch
  - 88 crossings (29 microseconds - VIP chip)
  - 150 crossings (50 microseconds)
  - 10 crossings (for extrapolation)