

University of Warsaw plans and responsibilities

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PHYSICS**

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Mechanical frame

- Frame design

We are willing to take the responsibility for the frame design.

We do have manpower and resources required.

Basic specifications need to be fixed as soon as possible.

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- **Frame prototype**

We would like to have a mockup prototype built as soon as the design is finalised, to make sure it meets all the requirements.

It would include ordering (or manufacturing) absorber plates from some other material and testing with empty sensor envelopes...

Cost to be estimated. Some additional funding can be required...

Mechanical frame

- Delivery of frame elements

We are willing to take the responsibility for ordering the elements. Some could be produced in our workshops, depends on the design.

We will need to apply for dedicated funding to cover the costs - we can not guarantee at the moment that we get it...

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- Frame assembly

Three steps can be required:

- Assembly of mechanical frame elements only - in Warsaw
- Assembly with tungsten planes and survey of the structure
 - requires proper instrumentation (!)
 - also tests with empty envelopes or damaged sensors possible
- Assembly with sensor planes - should rather be done at the final test destination, to minimise sensor damage risk

Table in experimental hall

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Detector alignment

The overall concept and requirements still to be defined.

We do want to contribute...

(Some initial comments included in the second part)

Schedule

We do hope the initial design of the frame can be completed in 2-3 months after all specifications are fixed.

Next steps will depend on the time required for element delivery.

Assume up to 6 month for prototype and another 6 months for the final frame. Needs to be verified, but do not expect it to be a problem...

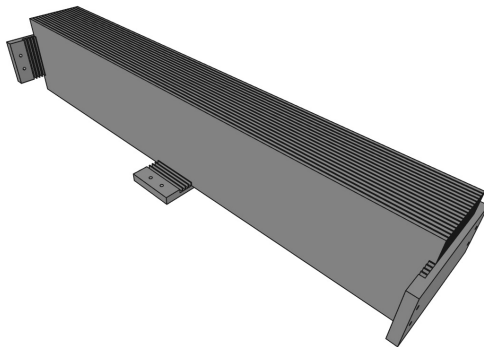
We make our plans following the detector design concept, which looks most promising in our opinion. We show some sketches below...

Tungsten planes

With 20 sensor layers, the detector should have 21 absorber planes, for sensor protection and stability.

(≥ 25 should be ordered ?)

Planes should be inserted directly in the frame (without any additional frame/envelope): much simpler design and should give better mechanical stability.



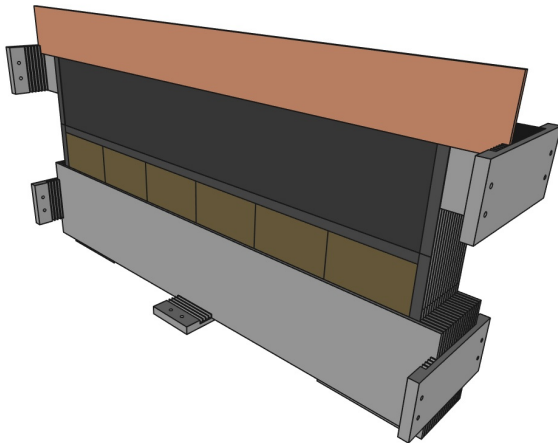
Sensor planes

Sensor planes should not be glued to tungsten

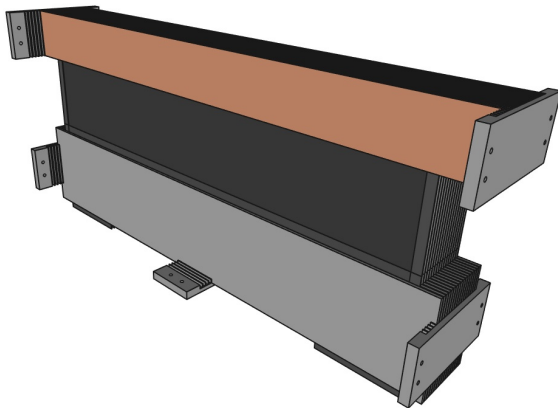
They should be put in (carbon fibre?) envelope, with U-frame (1 cm wide in the drawing below) giving rigidity and firm connection to the PCB.



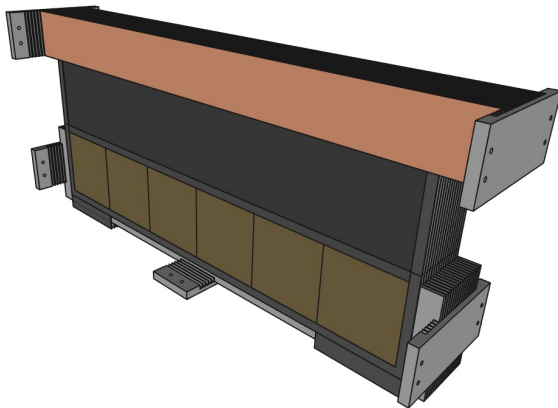
Sensors would be inserted from the above and their position fixed by the position of the PCB. Position measurement for each plane possible...



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Main stages:

- 0 precise assembly !
- 1 frame alignment/positioning in the 'global experimental frame' in the hall (in praxis on the experimental table ?) (relatively to the tracker ?)
- 2 local alignment of sensor planes in the frame:
3 degrees of freedom seems to be most important: X'Y' translation and rotation around (local) Z' axis perpendicular to planes
⇒ relative position of sensor planes
- 3 fiducialisation of sensors position in the carbon fiber envelopes
(after assembly/glueing)

What are the requirements for the above items ?

Can we justify the requirements by some simulations ?
(impact on energy/position reconstruction)

Questions to be answered:

- 1 frame alignment/positioning in the 'global experimental frame' in the hall (in praxis on the experimental table ?) (relatively to the tracker ?)
- ⇒ decide on the number and optimal location of 'monuments' for the retro-reflectors (geodetic survey)

Questions to be answered:

- ② local alignment of sensor planes in the frame:
3 degrees of freedom seems to be most important: X'Y' translation and rotation around (local) Z' axis perpendicular to planes
⇒ relative position of sensor planes
- ⇒ can we trust to the precision of the assembly or do we want to monitor the planes position also on the experimental table ?
- ⇒ invent system of markers (on the edge of PCB boards ?) visible to the laser tracker or other optical device

Questions to be answered:

- ③ fiducialisation of sensors position in the carbon fiber envelopes
(after assembly/glueing)
- ⇒ special instrumentation needed (like CMM - coordinate measuring machine) or measuring scope. Are they available ? Where ? What type (mechanical, optical, laser or white light ?)