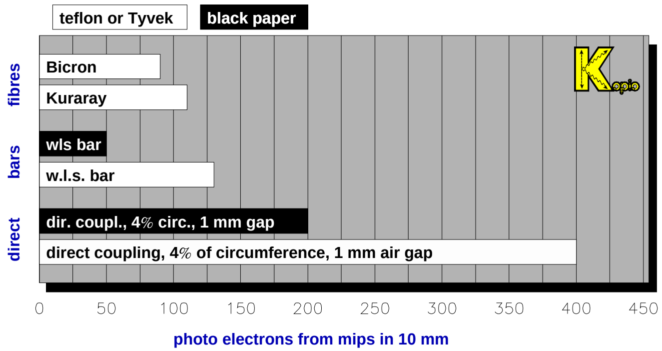
Status of Charged Particle Veto Design

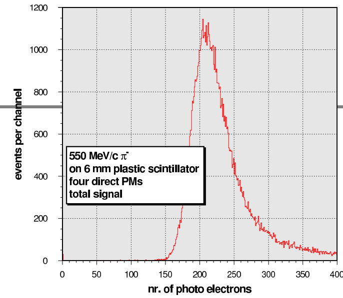
P. Truöl for the Zürich group

Heinz Kaspar, Peter Robmann, Simon Scheu, Andries van der Schaaf

The results from our beam tests are available in the technical notes tn027 and tn029 (http://pubweb.bnl.gov/people/e926/technotes/tn027.ps) http://pubweb.bnl.gov/people/e926/technotes/tn029.ps and the analysis presented at the November 2002 video conference by Andries van der Schaaf http://pubweb.bnl.gov/people/e926/meetings/nov02/andries.html The summary slide from the latter presentation is reshown below:

Summary and conclusions



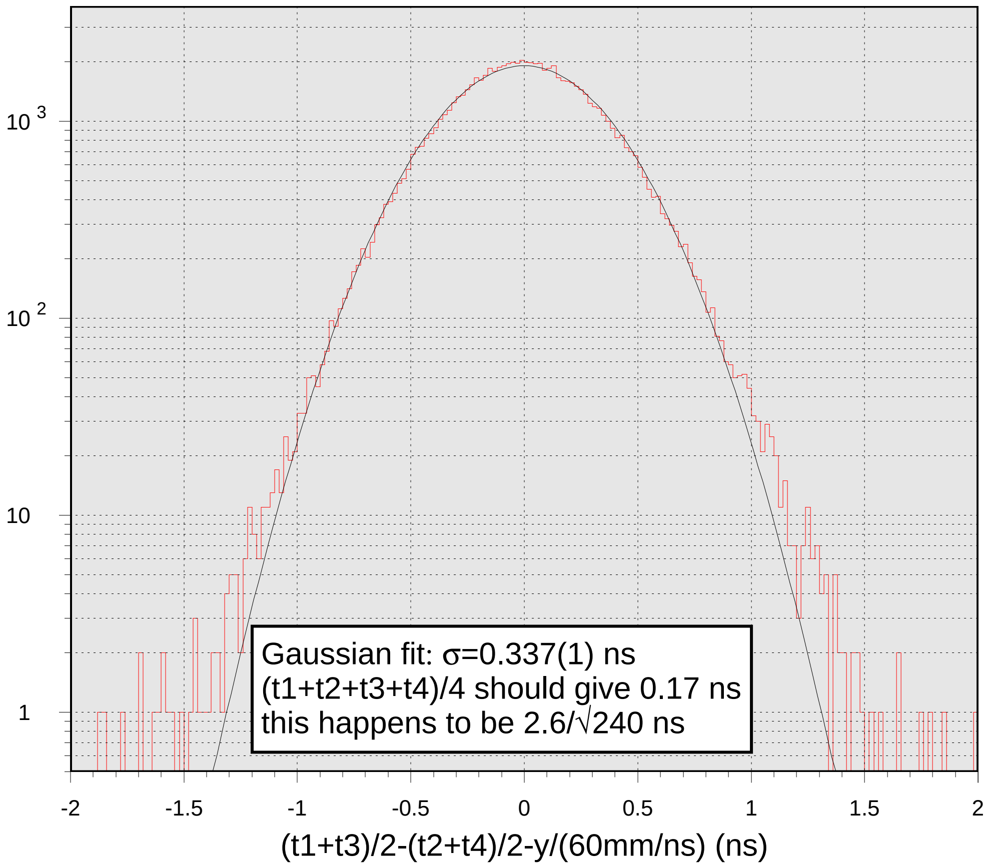


Observed yield of photo electrons for 550 MeV/c π^- normalized to 10 mm plastic.

- W.l.s. fibres give 120 photo electrons per 10 mm at best. This is for non-scintillating Kuraray Y-11. SCSF-81Y-11(200) yields only 75 p.e.
- W.l.s. bars give slightly more and are simpler to build and cheaper. An alternative for the photon veto?
- Direct coupling is both simpler and 2.5x faster and gives at least four times more signal. By using four PM's per scintillator module one might consider multiplicity logic (2/4) and can live with dead channels.
- Who is afraid of PM's in vacuum?

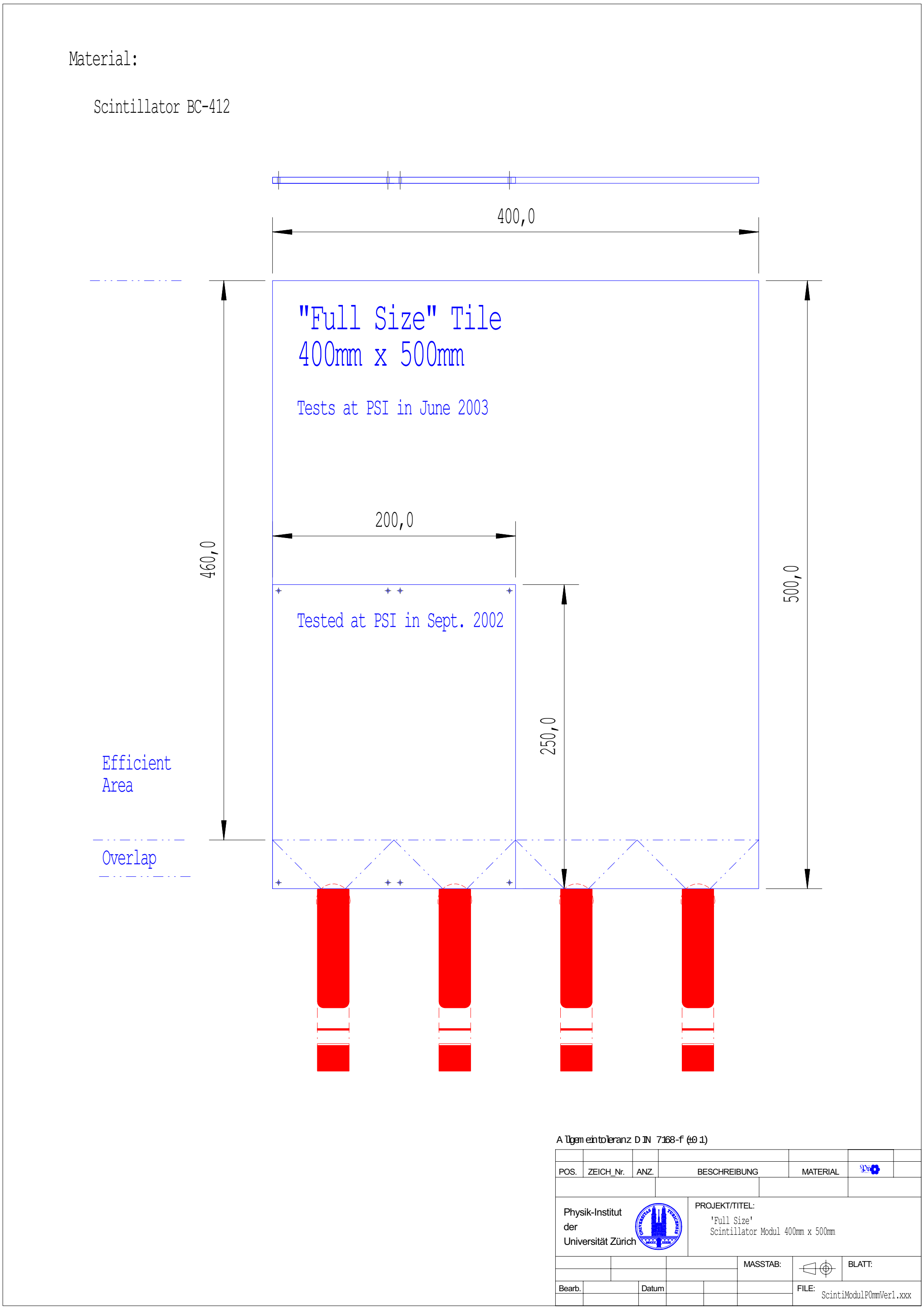
Since the options with the photomulipliers directly coupled to the scintillators yields considerably more light, we are presently concentrating on this option. We investigate further in our test setup the influence of various light guides, run a photomultiplier with a scintillator attached to it in vacuum over a period of almost a year now monitoring its performance with a source, and also studied how we can mount the counters inside the tank. Some ideas to this matter are shown below.

The only new piece of information concerns the timing resolution, the position corrected time difference for the signals from two of the four photomultiplies is shown:



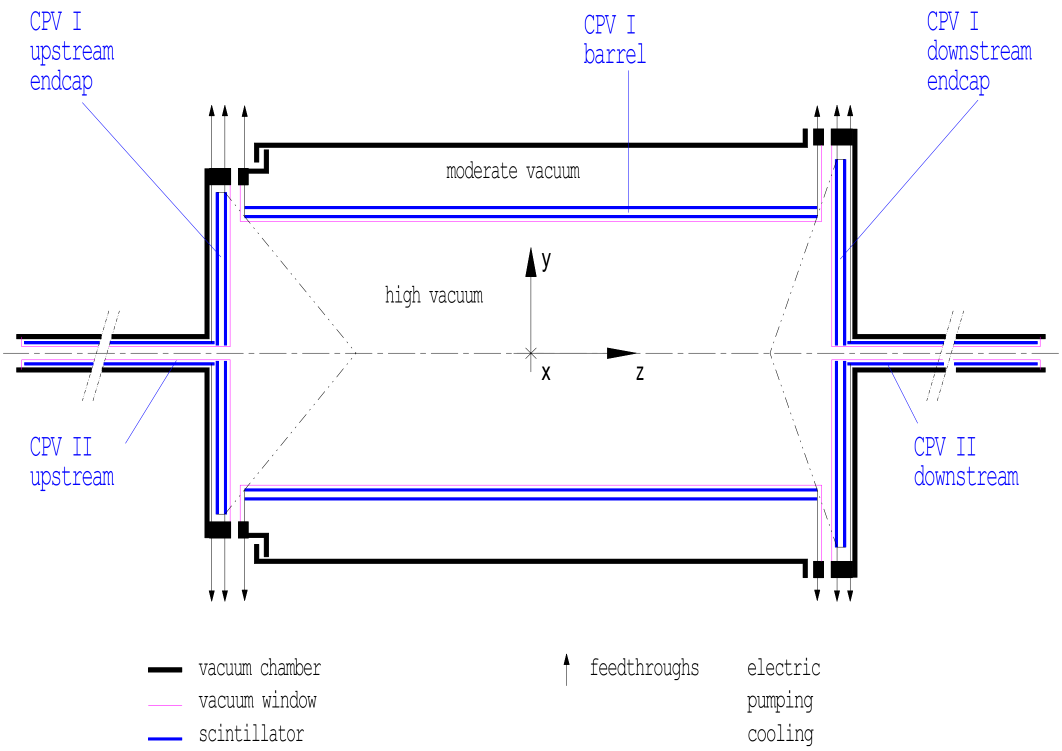
Distribution of the time difference between upper and lower pair of PMs in the setup with direct coupling, corrected for the observed dependence on y. The mean of the four PMs would have a twice narrower distribution independent of position. We could not verify this because there was no decent time reference.

End of June and early July we have obtained test beam time at PSI, where we will test the full size prototype shown below:

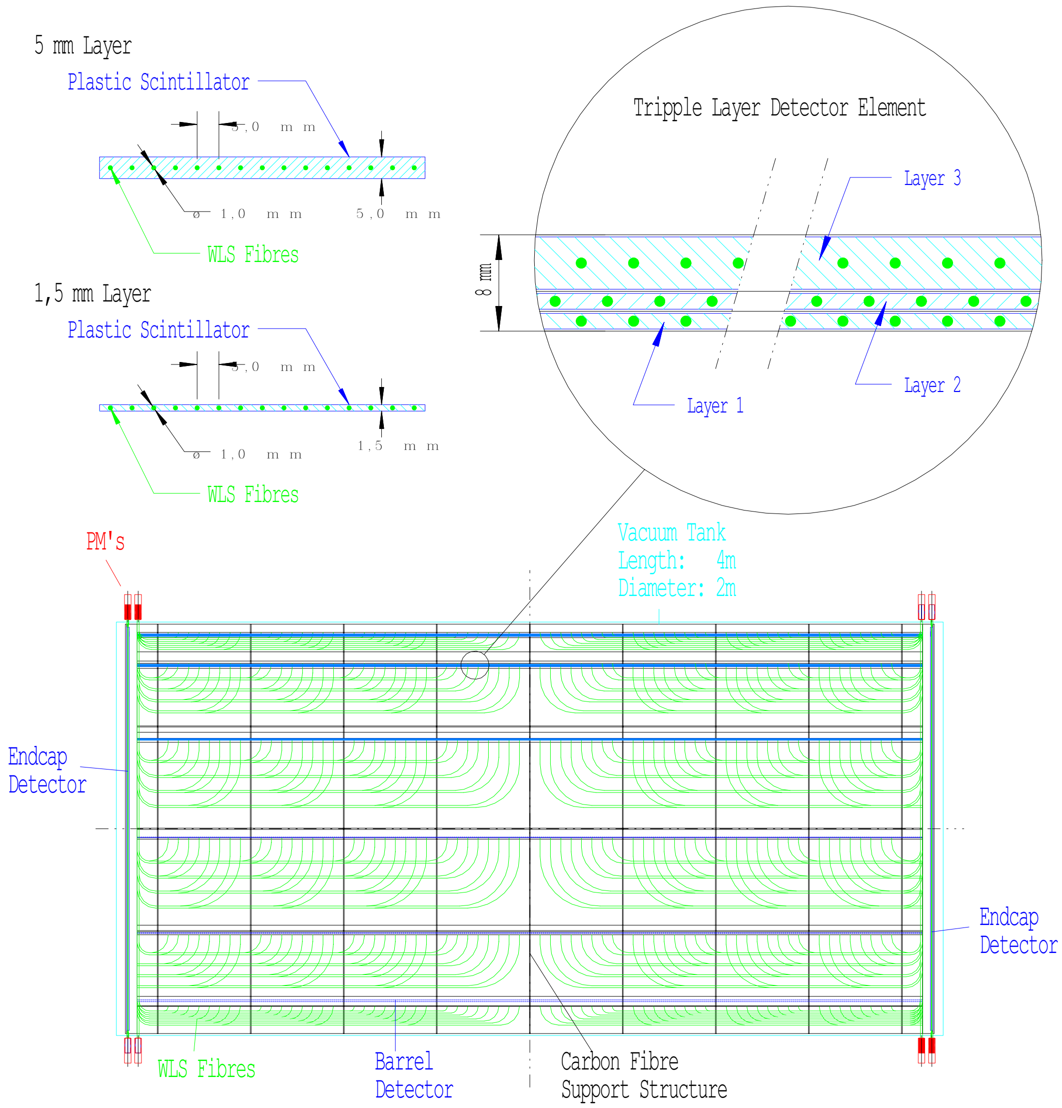


In the following we show slides indicating how the charged particle veto might actually be mounted inside the tank starting from the old version in the TDR:

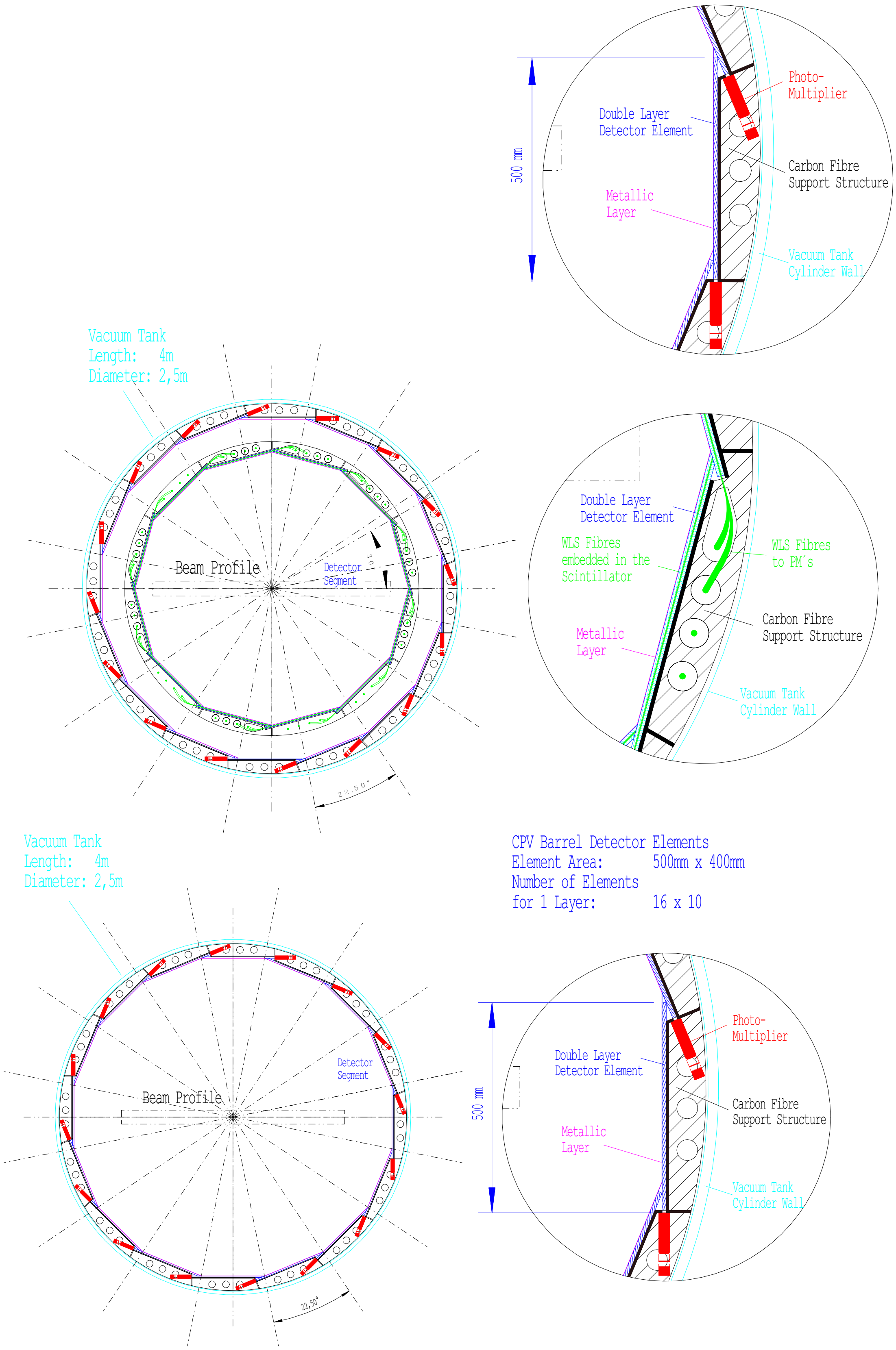
Version 4



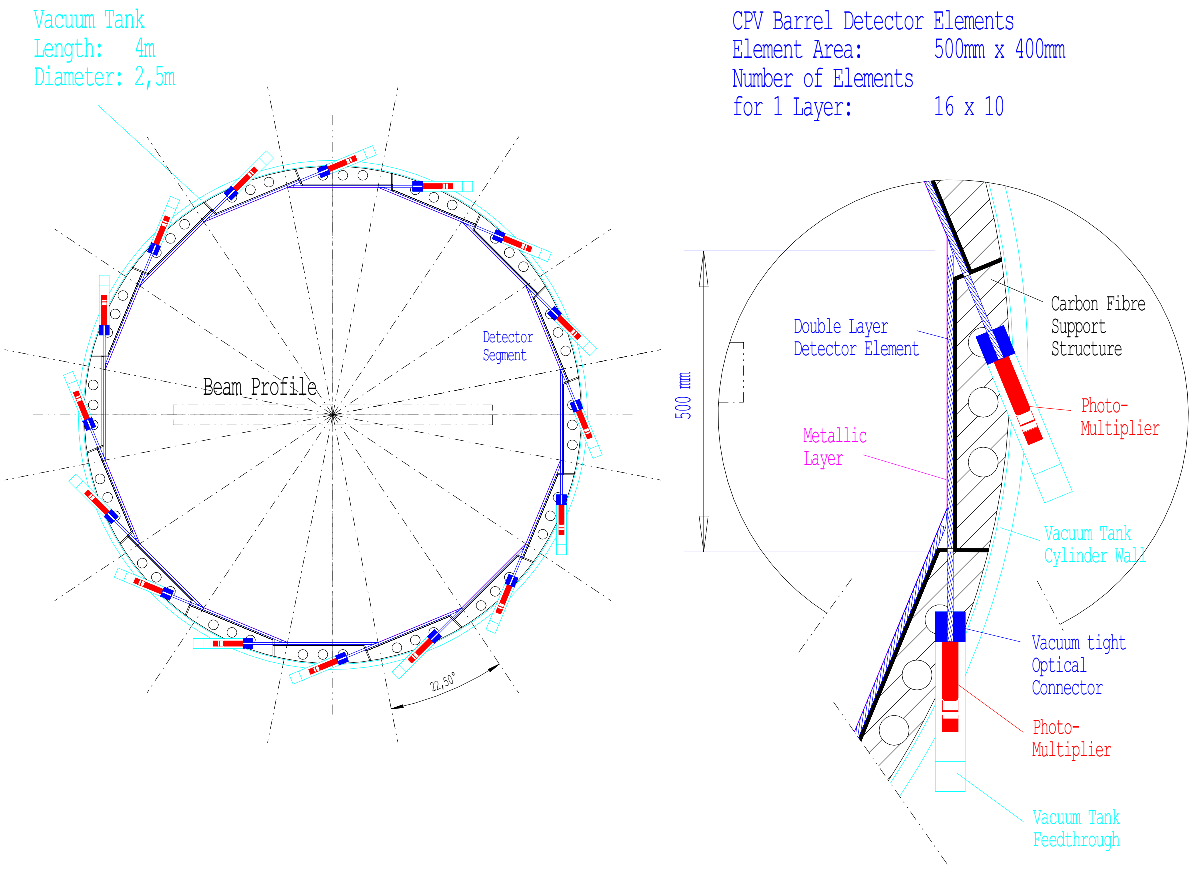
Overview



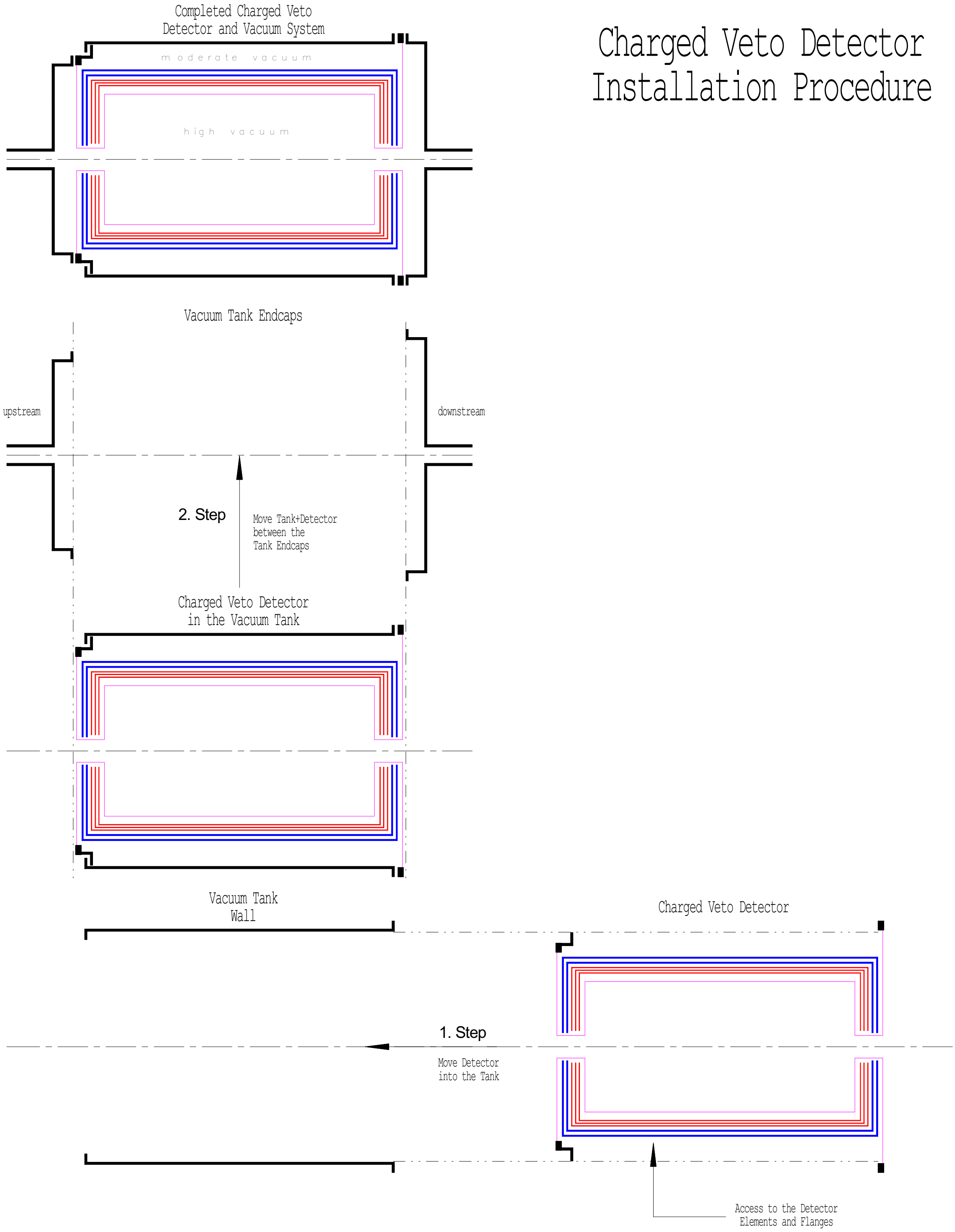
Fibre option in the TDR



How a Version with PM's in the tank could be constructed.

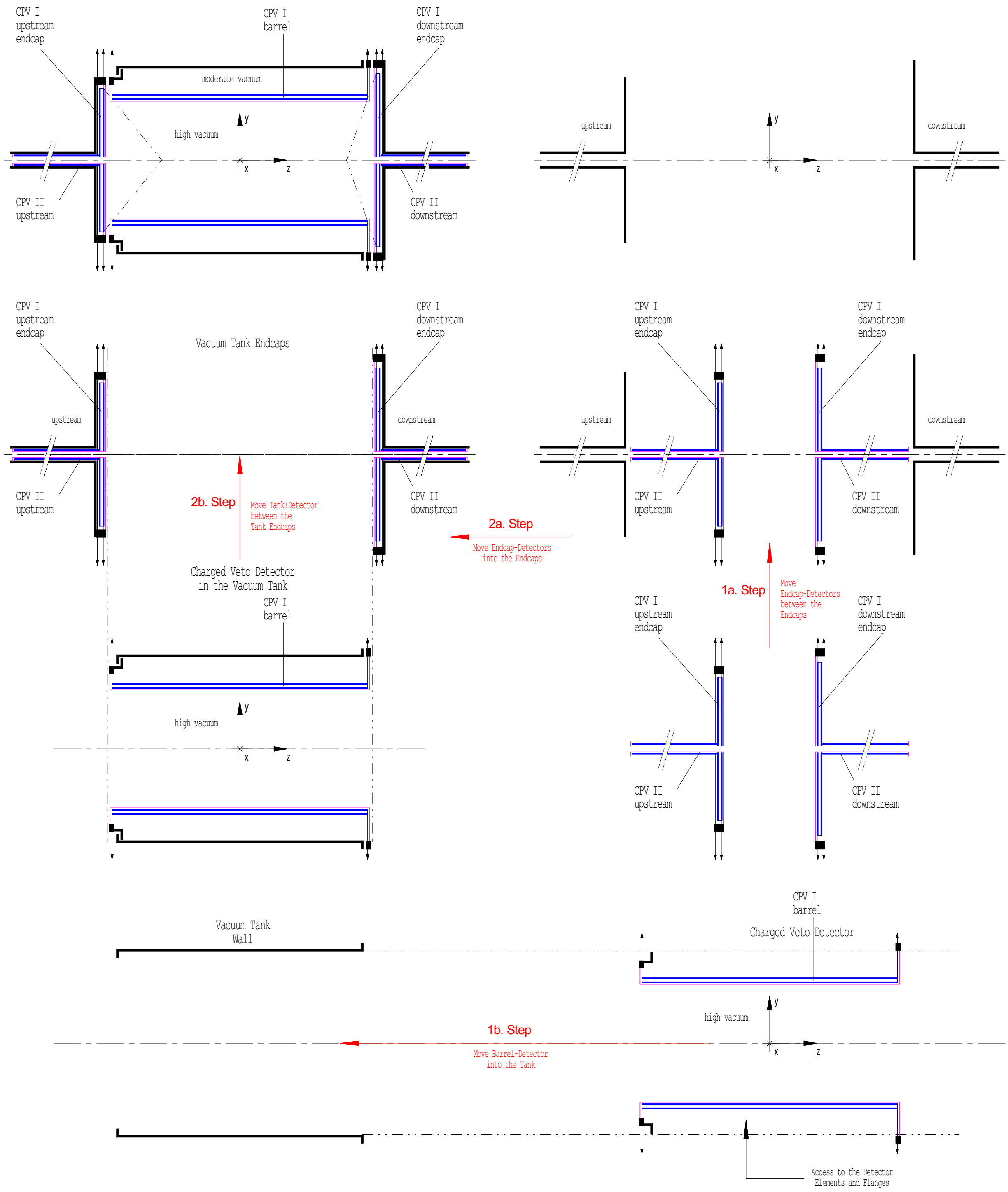


How a Version with PM's in the tank could be constructed, which allows access to the PM without breaking the vacuum.



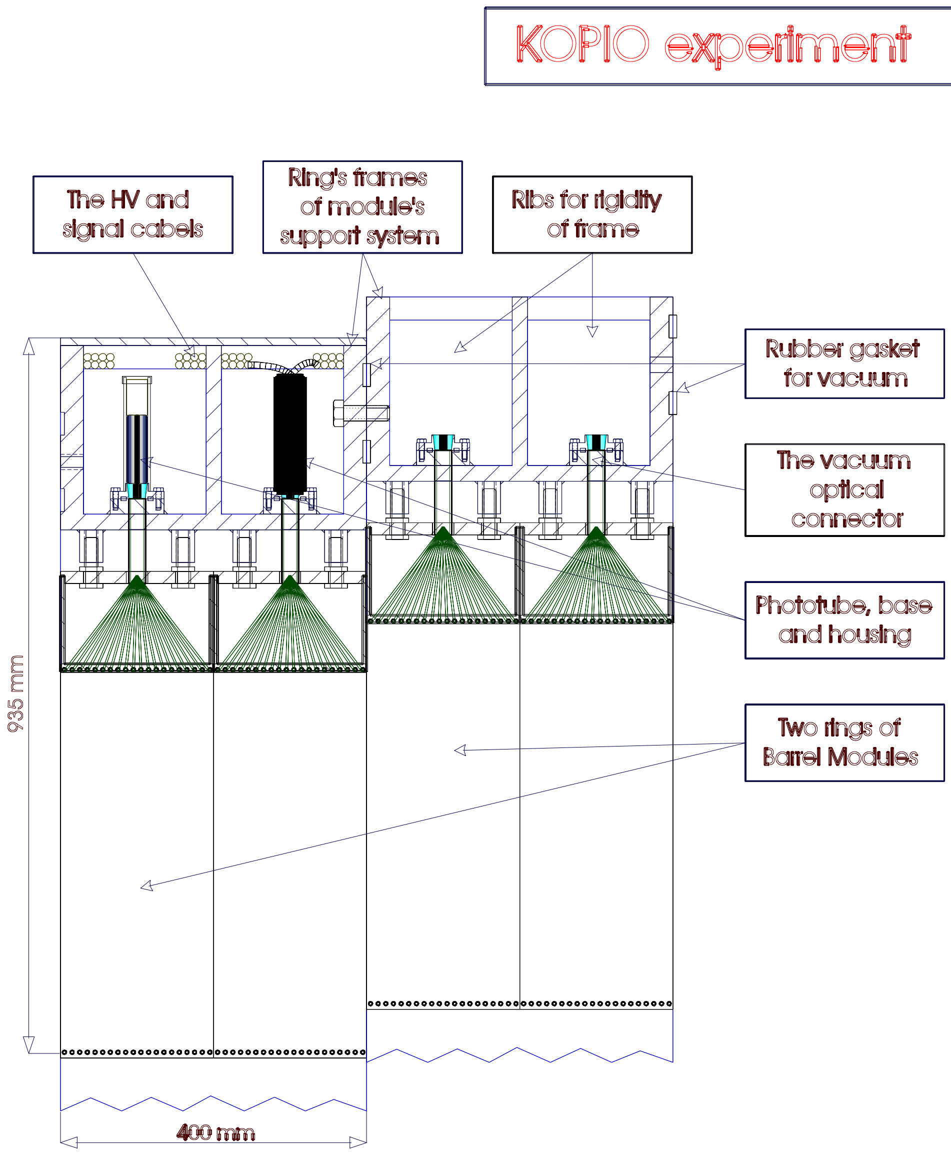
The installation procedure for the charged particle veto, as foreseen up until now.

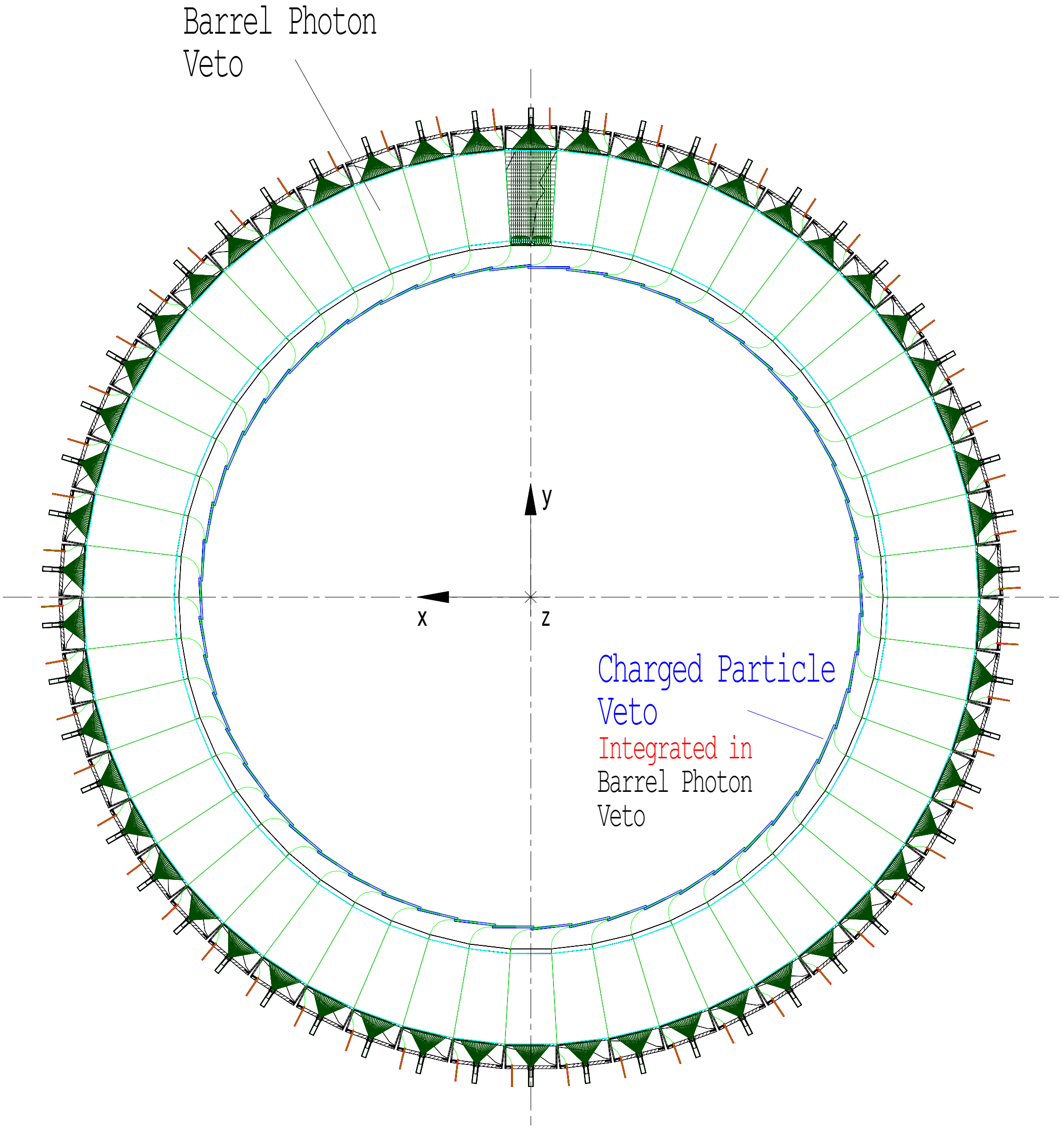
Charged Veto Detector Installation Procedure

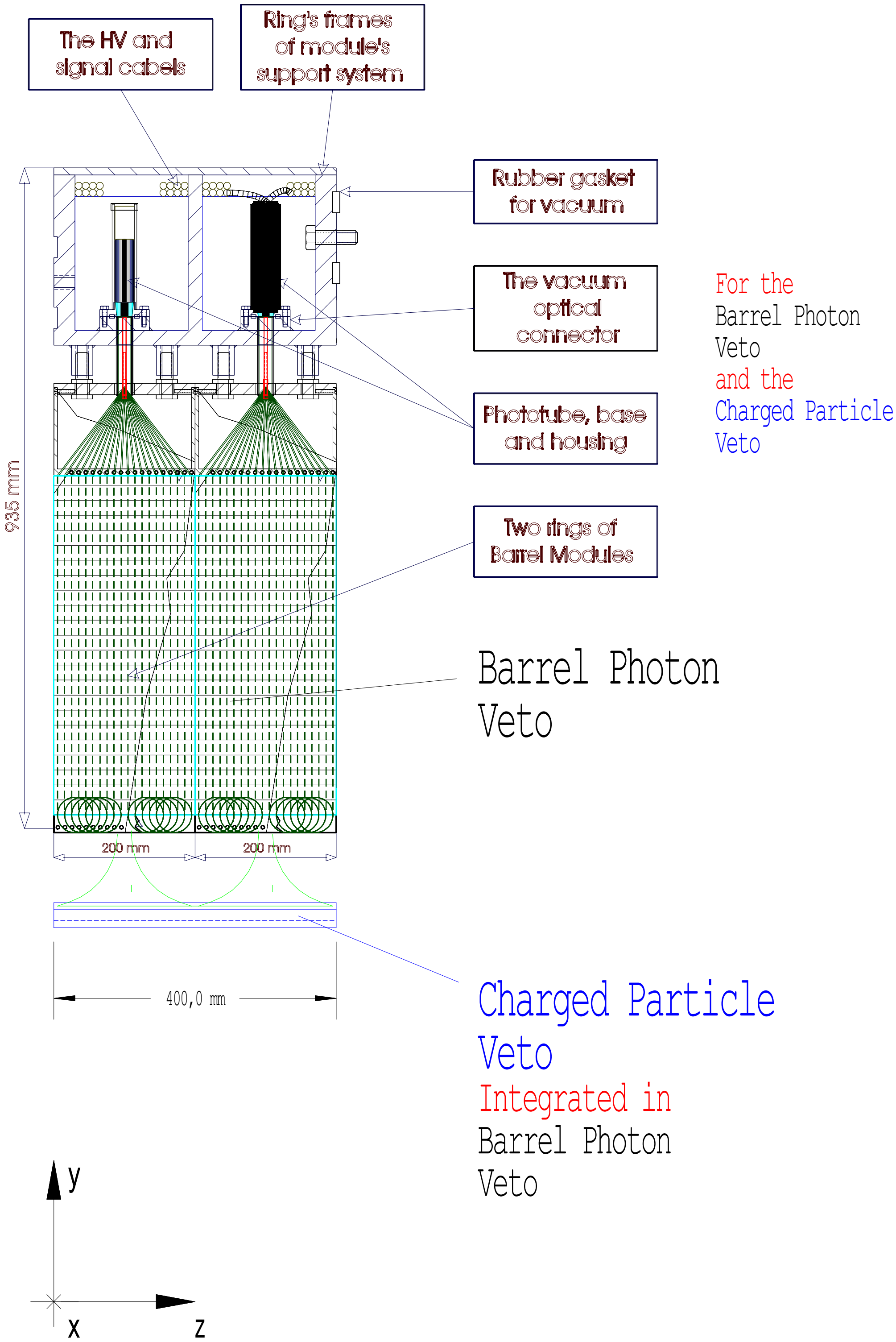


Alternative, recently thought of installation procedure for the charged particle veto.

The last four slide show how a charged particle veto (with fibre readout) may be made part of the cylindrical version of the barrel photon veto (V.V. Issakov option):




Barrel Photon
Veto
y
x
z
Charged Particle
Veto
Integrated in
Barrel Photon
Veto


The HV and signal cabels
Ring's frames of module's support system
Rubber gasket for vacuum
The vacuum optical connector
Phototube, base and housing
Two rings of Barrel Modules
For the Barrel Photon Veto and the Charged Particle Veto
935 mm
200 mm
200 mm
Barrel Photon Veto
400,0 mm
Charged Particle Veto
Integrated in Barrel Photon Veto
y
x
z

Barrel Photon Veto