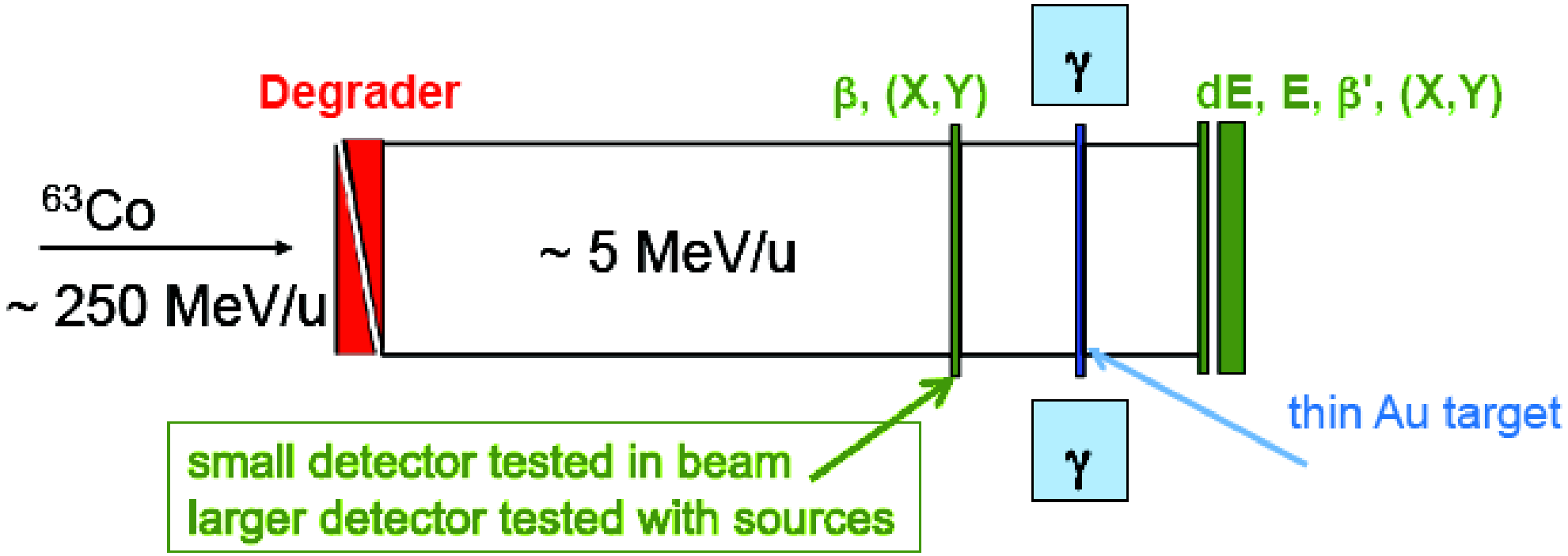
Why monitoring a beam profile?

Slowed Down Beam Setup at future HISPEC/DESPEC at FAIR:
- relativistic RIBs are decelerated to ~5-10 MeV/u by hitting a degrader
- ~80% of the primary beam survive the deceleration
- ~2% contaminants due to reactions in degrader

=> deliver gate on those 80% survived

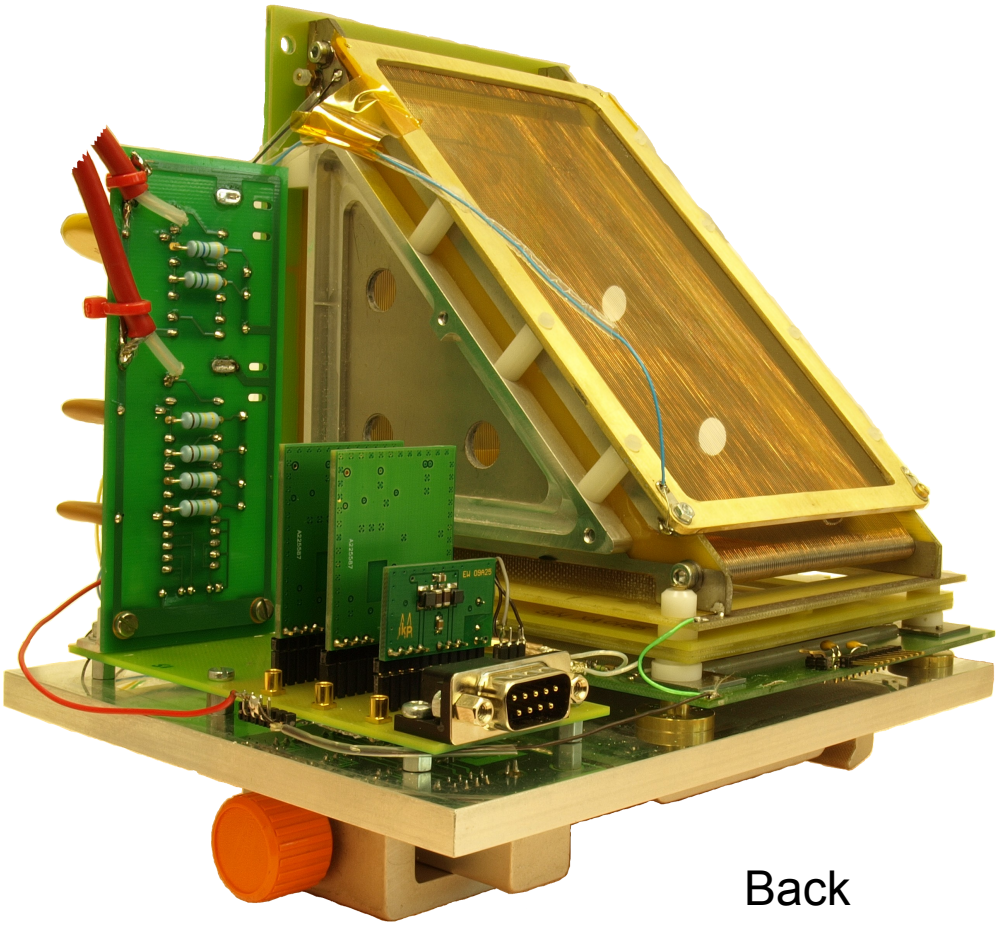


Courtesy of Plamen Boutachkov

Tentative Specifications

- Position and time sensitive beam profile monitor based on secondary electrons
- Timing resolution better than 200ps
- Spatial resolution better than 1mm
- Current active area of 80x100 mm^2
- Maximum transparency using most thin and less materials as possible
- Determine each ions track and time of flight using two units on an event by event basis

Front



Back

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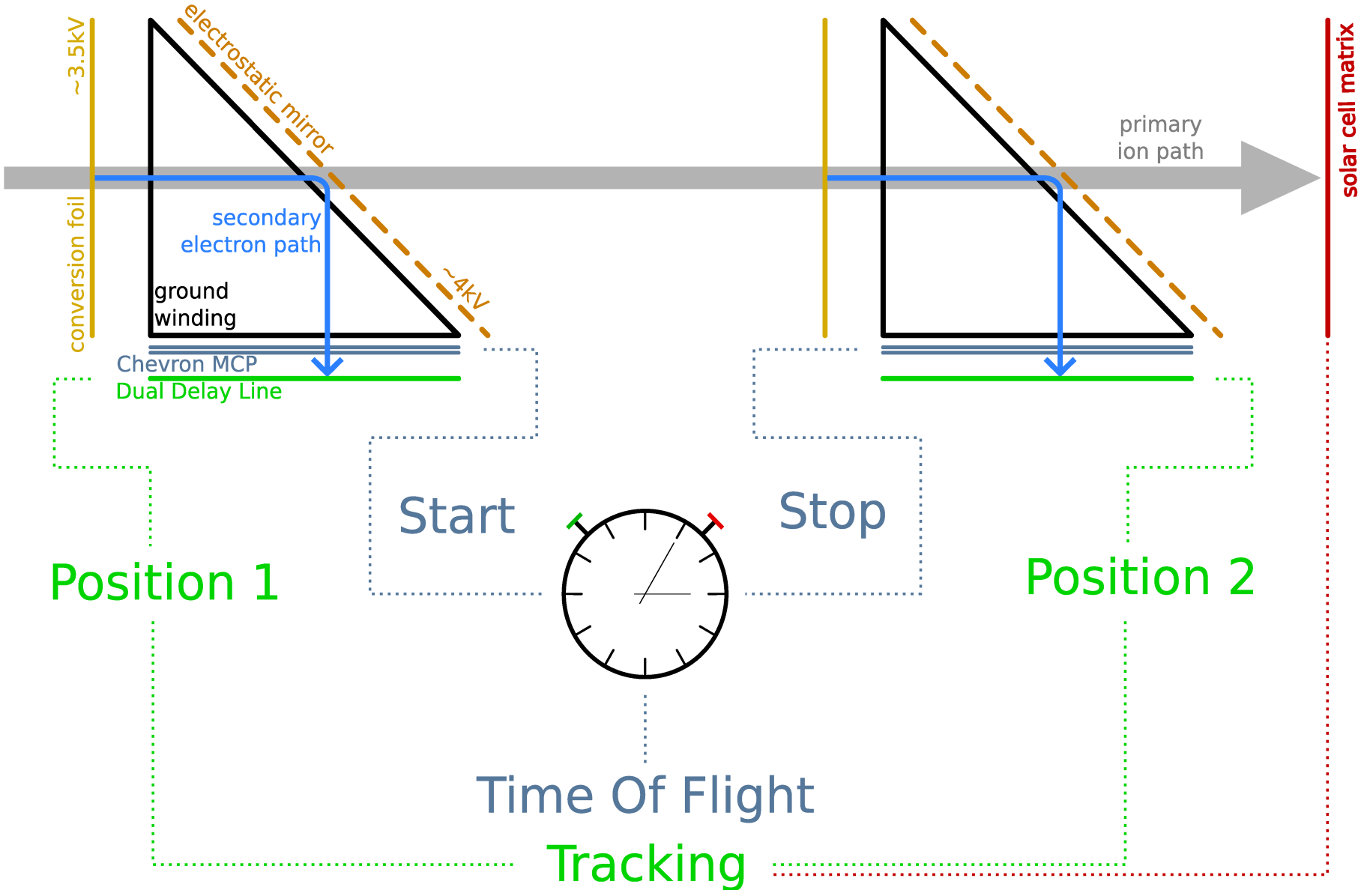


- MCPs give the fast timing signal
- Position is given by the DDLs
- Solar cells matrix (32 pixel, 16 ch.) used as auxiliary gate/trigger

Current Electronics

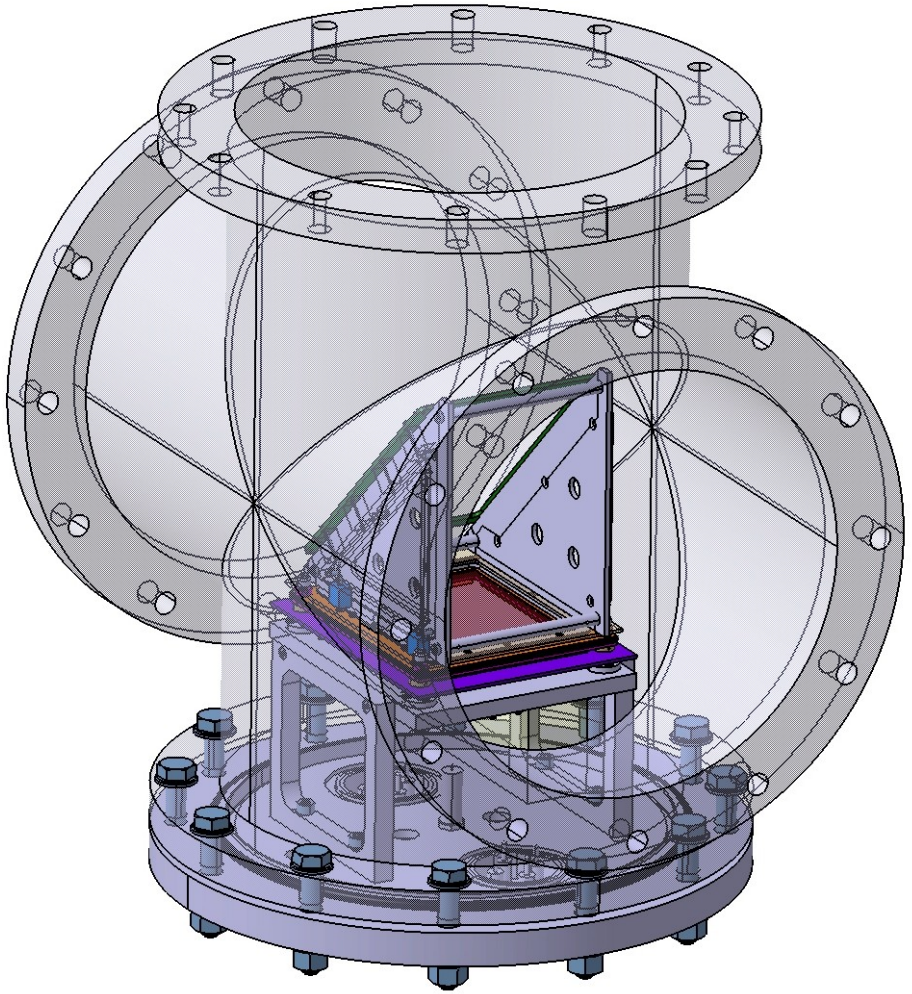
Dual Delay Line:
- one end of each DL is terminated
- one DL as reference, one DL for signal
- both read out by differential amplifier

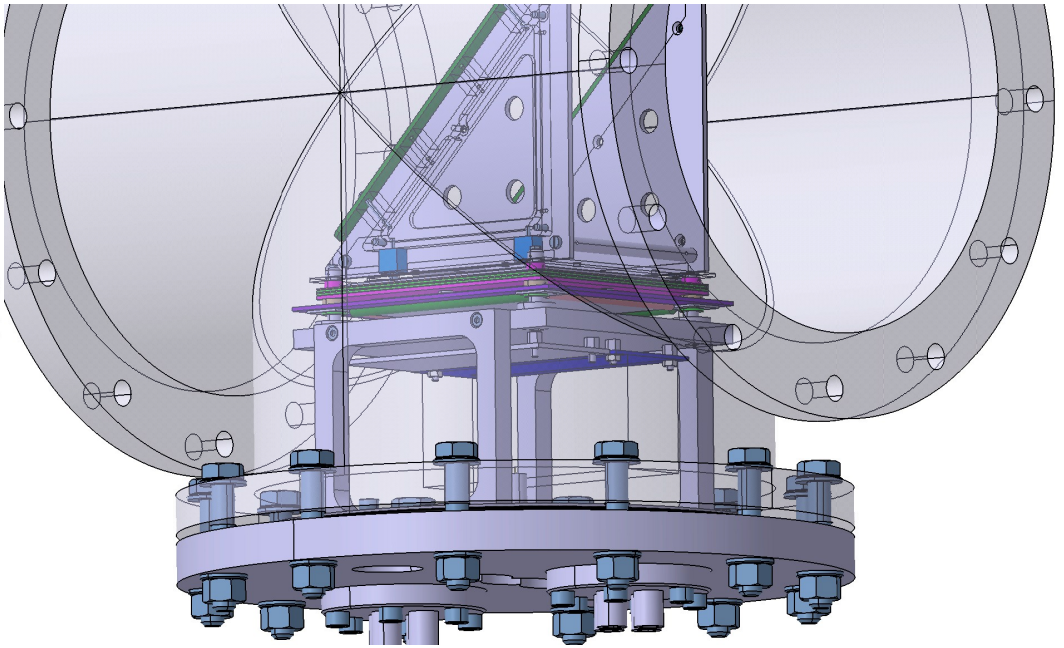
Advantages:
- high signal peak, low current

Disadvantages:
- electronics have to be inside vacuum
- hard to apply changes (e.g. fast or slow amp)

DAQ:
- signal is passed via TFAs and CFDs to TACs
- TACs digitized by XiA DGFs Ref. F

Current Design





Mounted on ISO200 flange:
- electronics close to feedthroughs
- ready for upcoming electronics / design

Current Tests at GSI

Cf spallation source:
- test in X7 is ongoing
- use of Cf spallation source
- combination with DSSSD for energy information
  and projection of trajectory

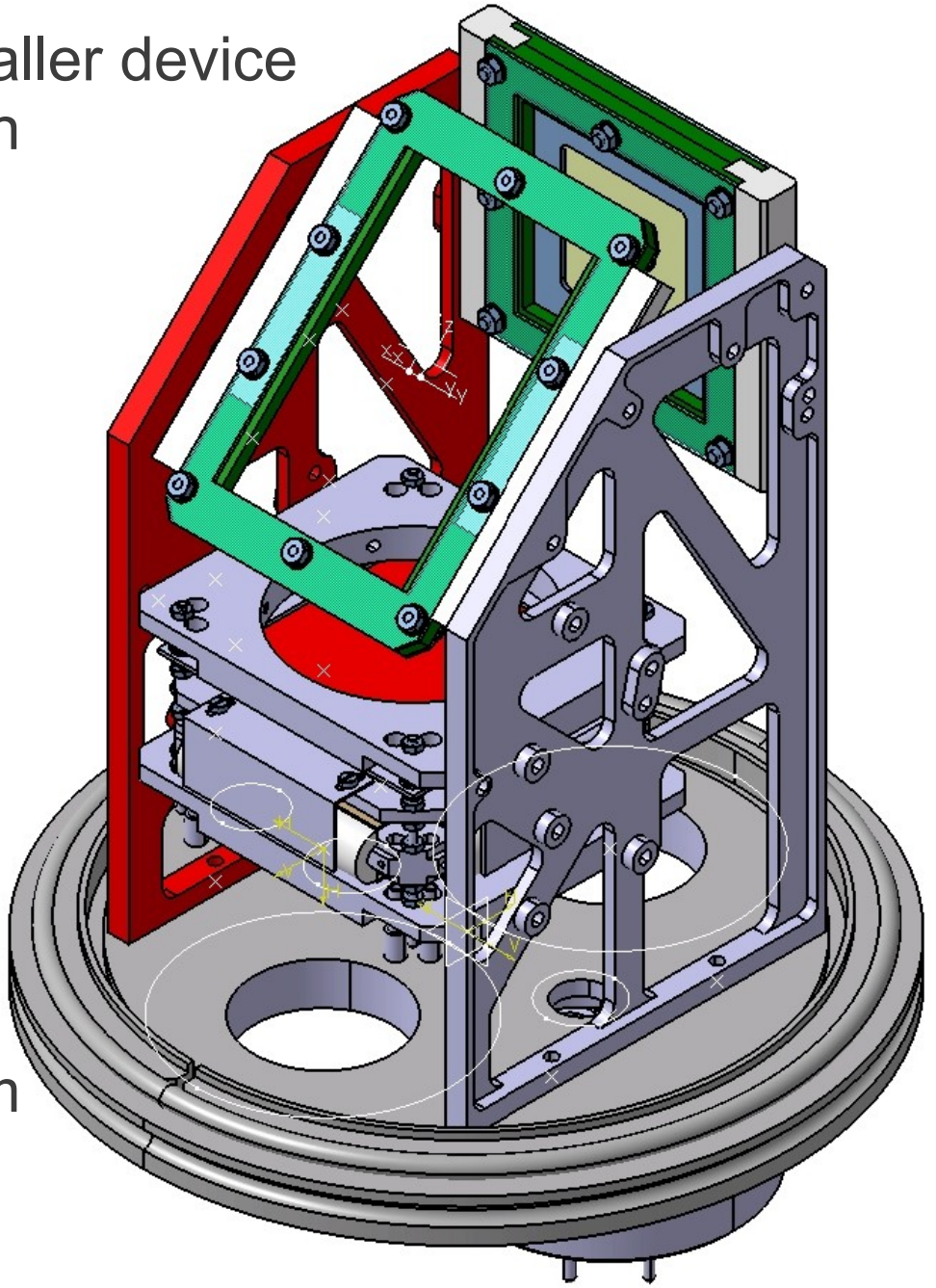
DAQ:
- use of VME TDC (CAEN V1290A)
- additional information from VME QDC (CAEN V862)

Future design concept

Spin-Off for AMS-ToF
- took experience to design new, smaller device
- prototype for new large BPM design

Major changes:
- no triangle any more
- single, modular units
- fulfillment of isochronous condition
- variable distances
- permanent focusing of Ses

New electronics:
- DDL read out by differential trans-former instead of differential operational amplifier
- signal is 50Ω impedance matched
- amps/electronics outside of vacuum
- easy to change/play with
- signal decoupled from HV supply
- disadvantage: lower pulse height



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Future measurements / applications

(p,p'γ)-campaign in Cologne
- ~90% of p' ejected in forward direction
- use of BPM with “center-hole” to decrease counting of primary ions
- distinguish p' by ToF (energy) and trajectory (scattering angle)

Isobaric separation for AMS purposes
- smaller version is built and mounted at Cologne-AMS
- tests are ongoing

Slowed down beam at GSI
- as intentional usage for SED based BPMs
- “Umbrella” proposal is granted