List of changes and improvements for the next generation CLIC module

Some documentation exist already:
See Module review, lessons learned review CLEX installation, Critical item compendium

- Let's assume we go away from a tolerance based design to a adjustable design:
  Enough evidence found in existing module experience

Necessary Improvements:

- Support of rf structures and PETS:
  adjustability, two point support, longitudinal adjustability, fixations, alignment references
- Vacuum system:
  separate or manifold, number of pumps, mechanical design of system (force free), cost ?
- Coupling between girders:
  Need to be solved if we stay with independent girders, not good enough right now
- Phasing of the structures:
  No clear tolerances and strategy, probably needs to be designed into the module
- BPM fixation in DB Quad:
  New mechanical concept needed, couple fix or adjust, depends on PACMAN as well,
  current solution insufficient
- Cooling system integration:
  system has to be designed in from the beginning. Too many pipes right now

List of changes and improvements for the next generation CLIC module

Necessary Improvements:

- Articulation point, girder support and regulations:
  Simply not practical in the current design, should we keep it or better independent girders
- WPS supports and reference to girder:
  Reference get's lost in current design and setup, integration with girder needed

New features or concepts:

- New girder design, made of cast concrete, one piece including cradle and WPS support, what else ?
- How about putting WPS on object which should be aligned ? RF-unit, numbers?
- One support for both beams, less movers, less sensors
- Longer support, less movers, less sensors
- DB- Quad support separate, what are the requirements ?
- Relative orientation of the two beams
- Vacuum sectors
- New waveguide system, can we simplify, do we need the hybrid (save one load)

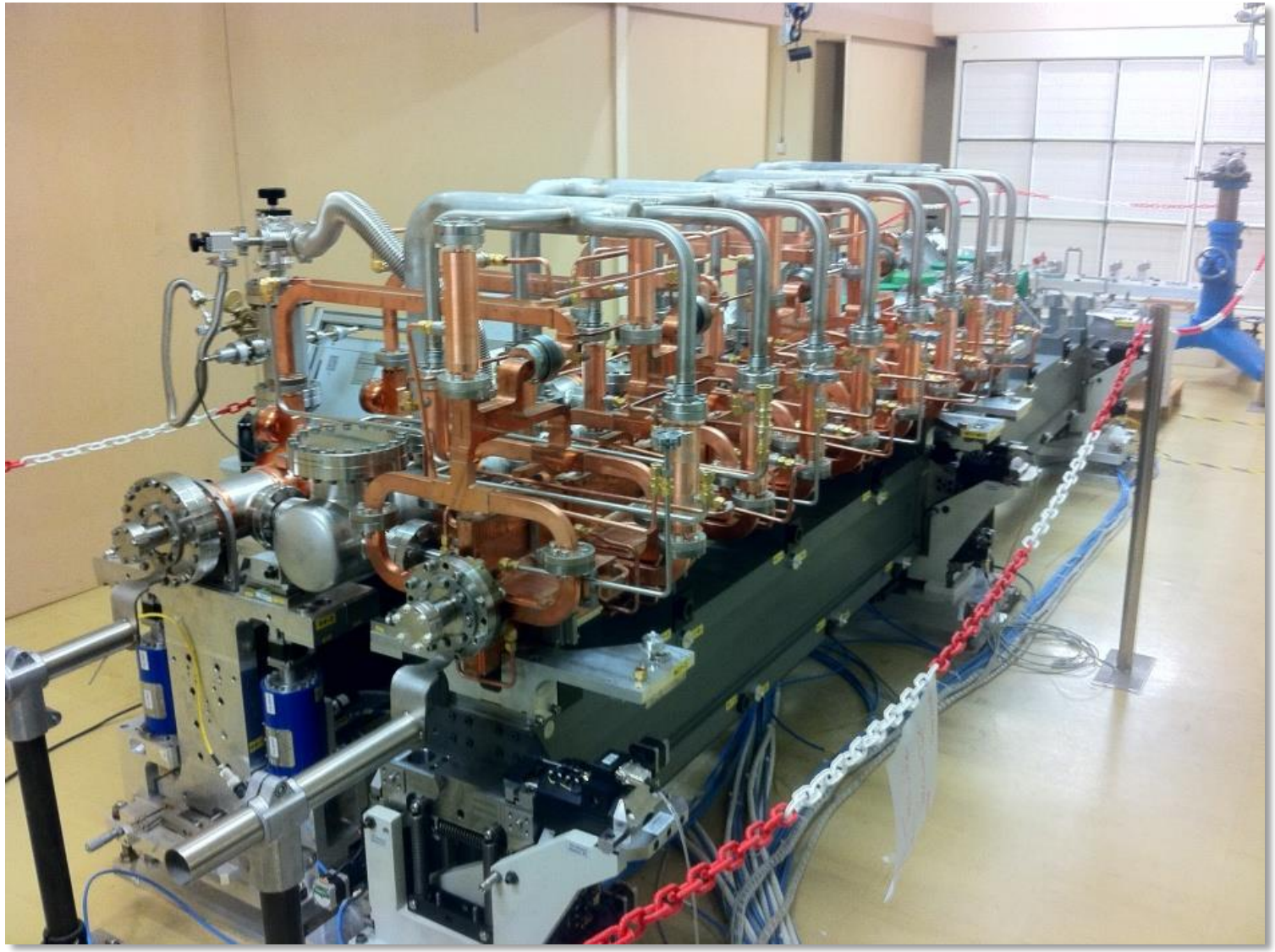
List of changes and improvements for the next generation CLIC module

RF-unit:
Currently double PETS + 2 superstructures, no flanges, is this really feasible, reasonable ?

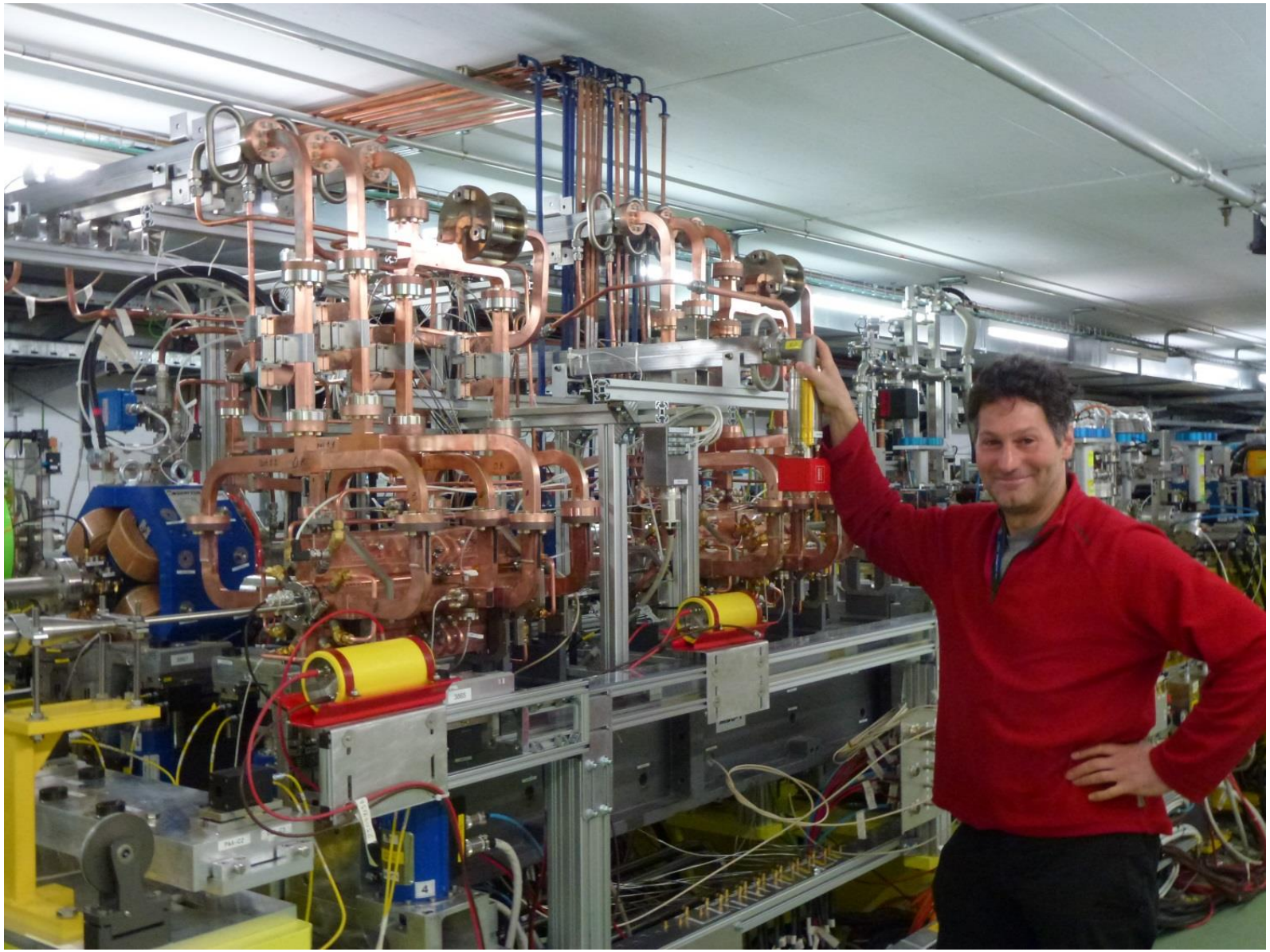
SAS-design:
Mechanical design of outer part should be driven by module requirements:
Support interfaces, deformability, alignment features, simplify vacuum and water cooling interfaces,
Integrate double feed coupler to have only one rf flange, can we integrate high power load as well.
High power load needs urgent validation in any case.
Superstructure concept, valid ?, How long can we go
Structure straightness not validated

General:
- 380 GeV configuration what changes, length , quad distance, to we have final numbers ?
- Module type distribution
- Operation temperature, cooling scenario
- No experience with nm-BPM on main beam side, support, alignment, environment

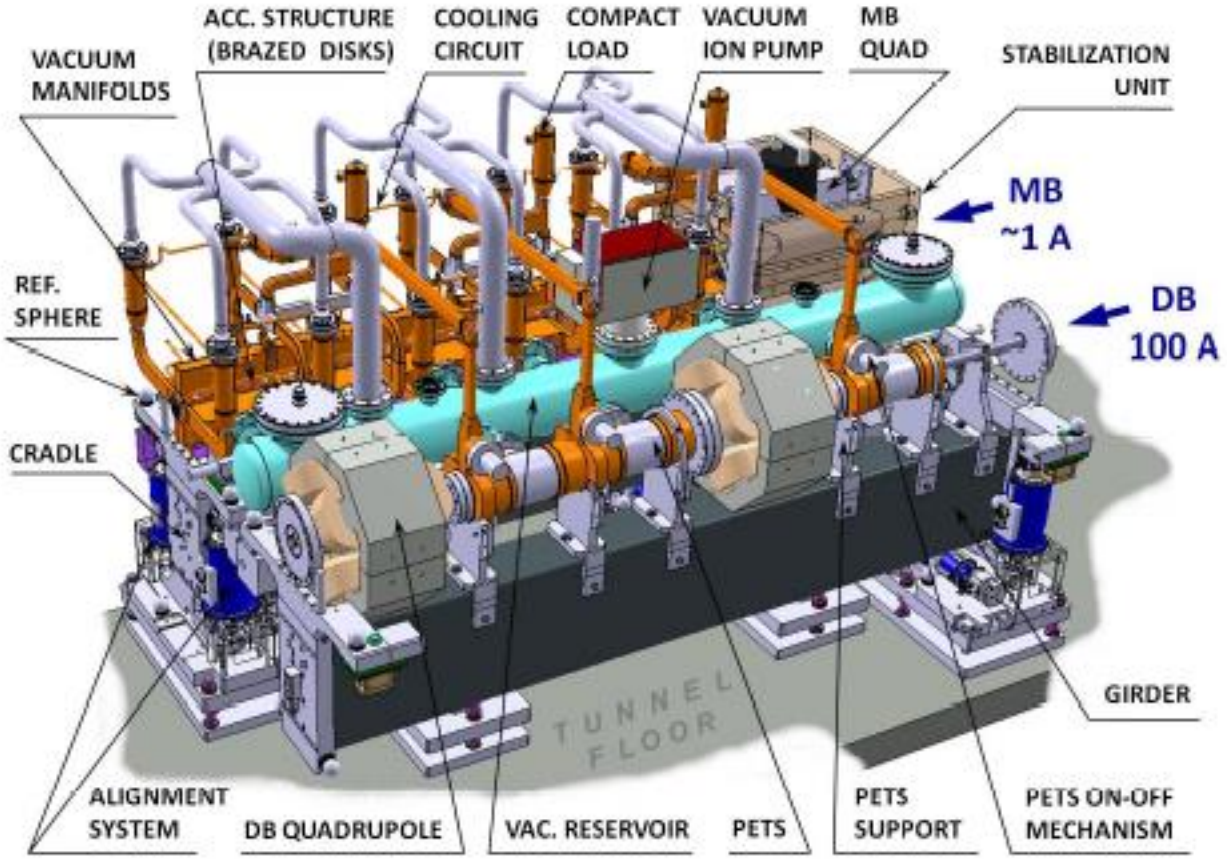
T0 module in the lab



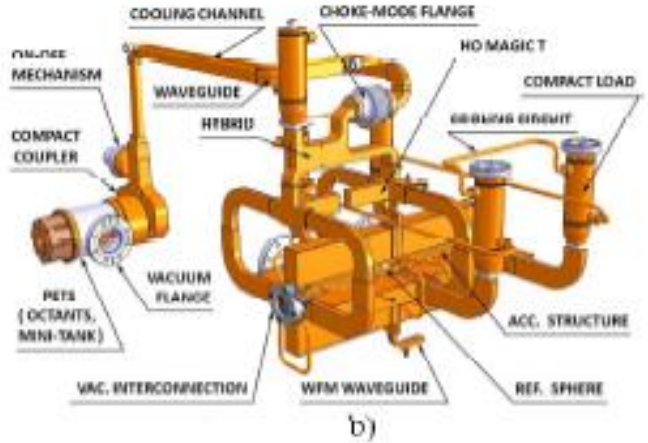
CLIC module in CLEX, clearly needs simplification of waveguide and vacuum system



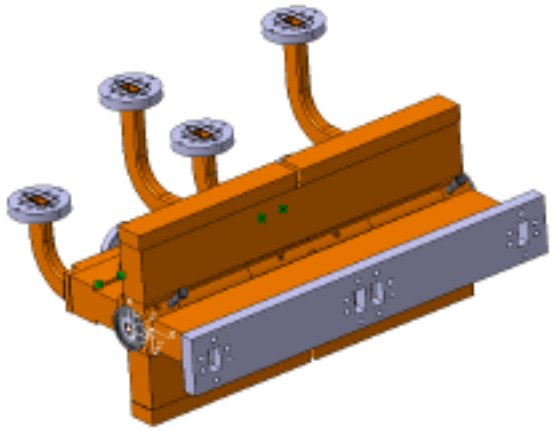
What is actually presently our rf unit ?



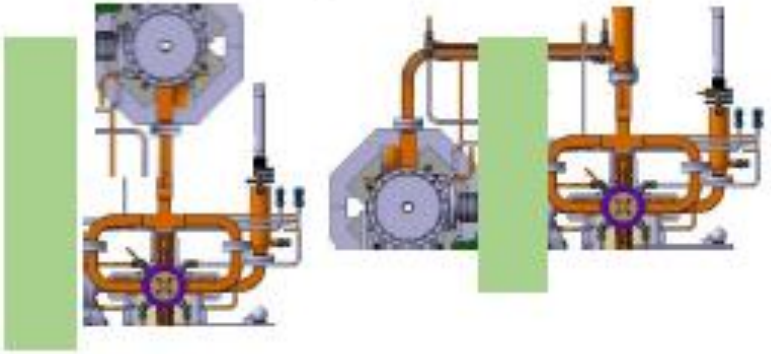
2x this!!



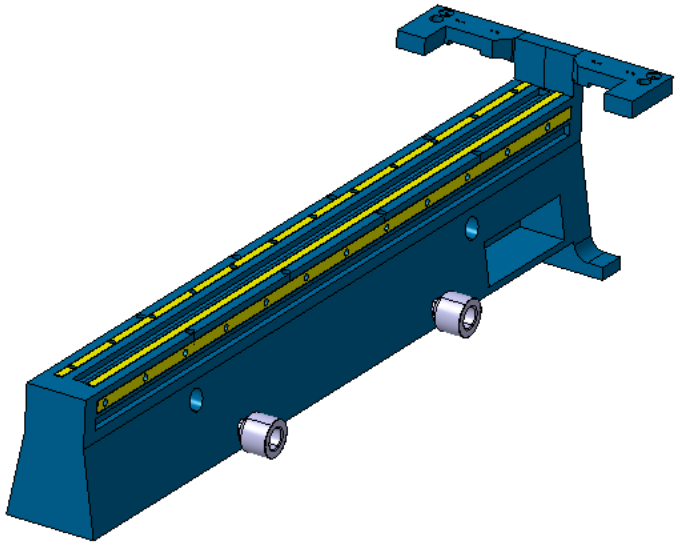
Some visionary sketches from the module crew



Vertical girder

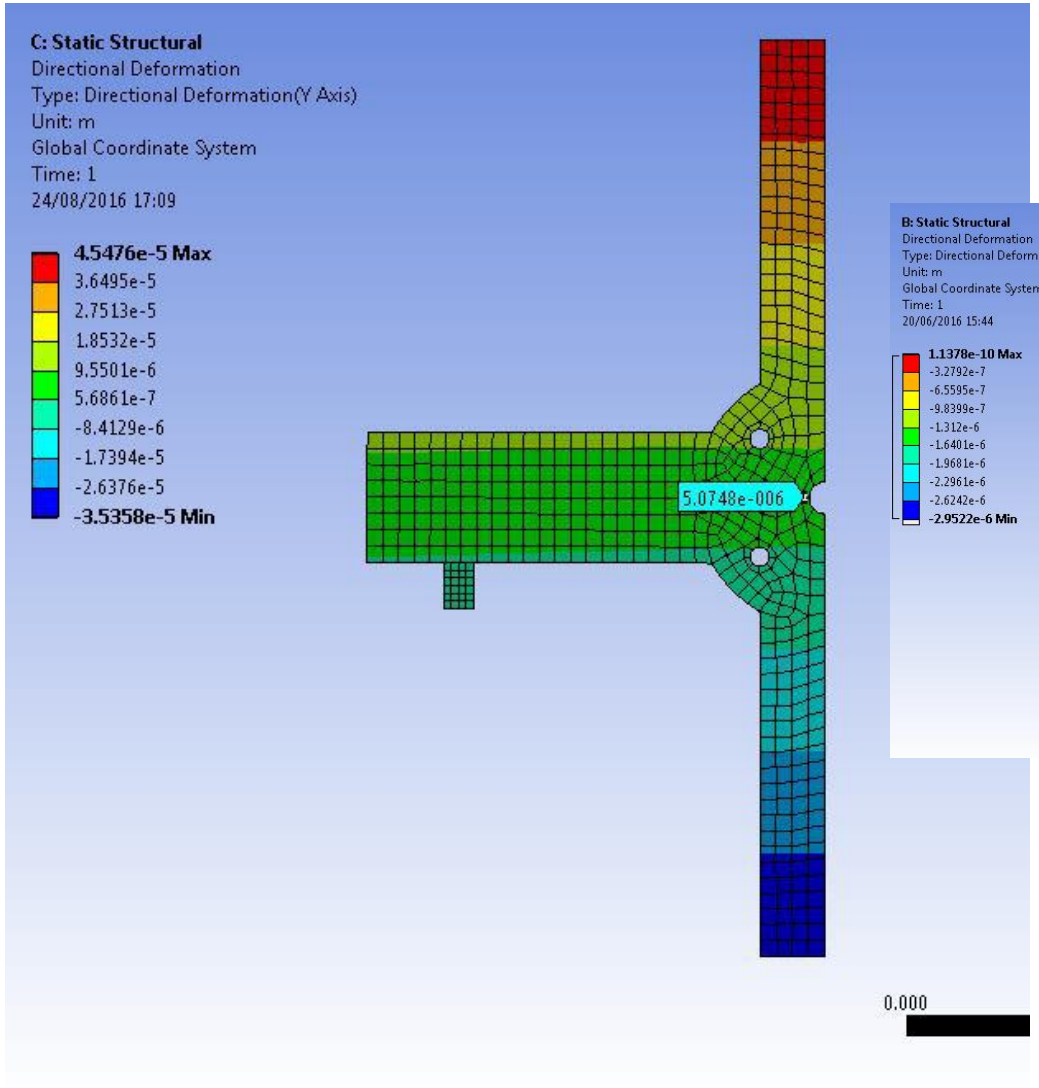


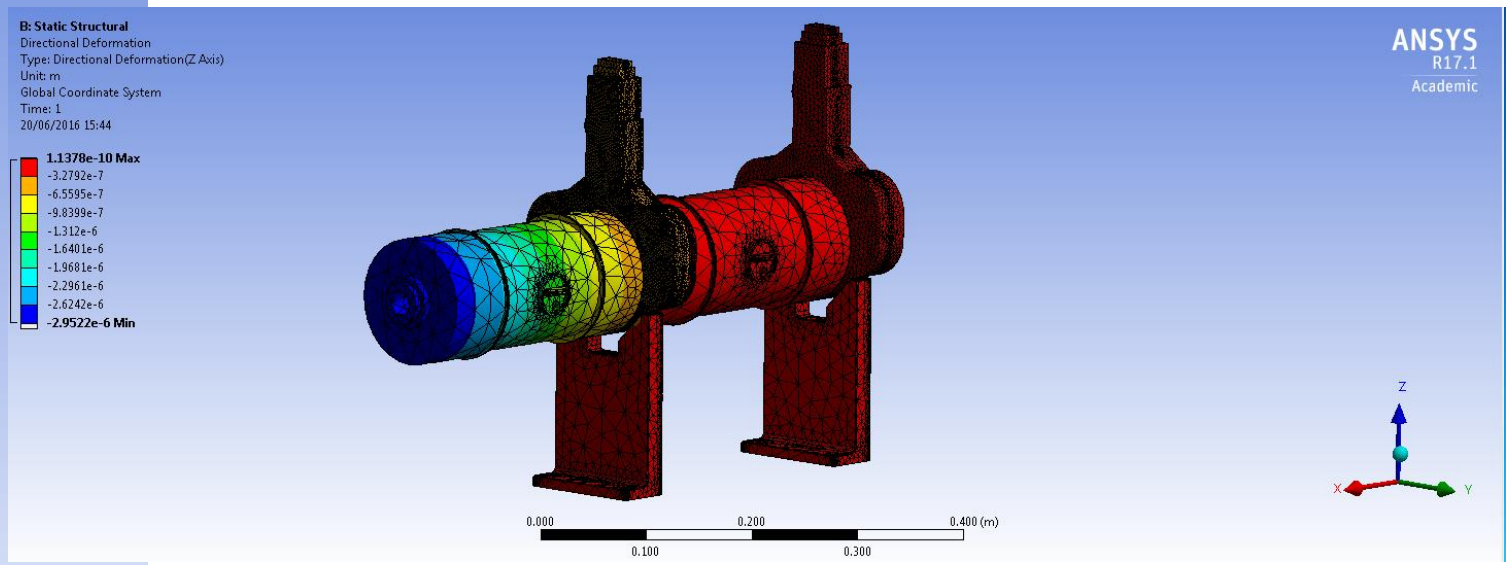
L-Shape girder



Alex, Markus, Petri

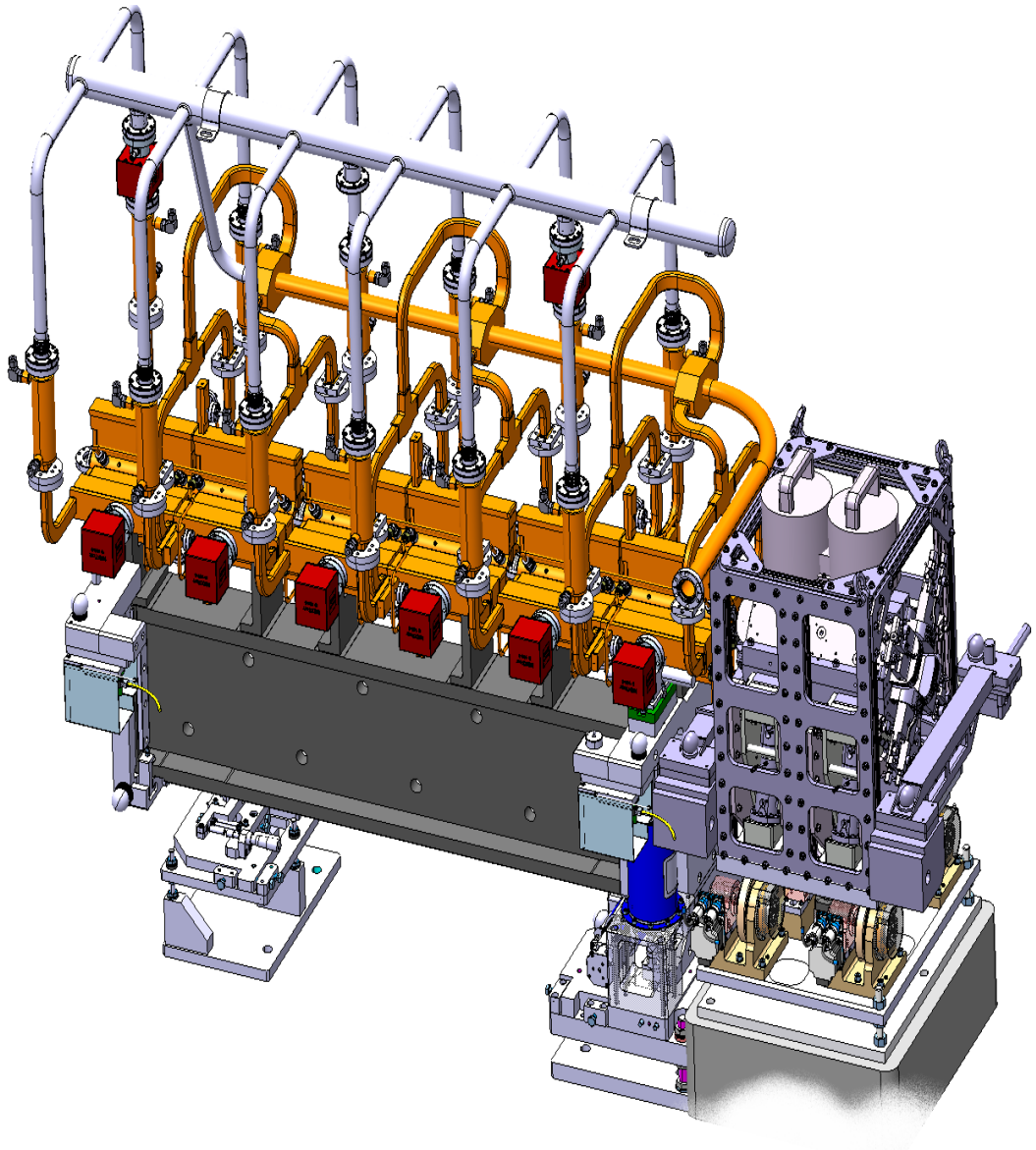
More detailed analysis is needed, large potential for improvements





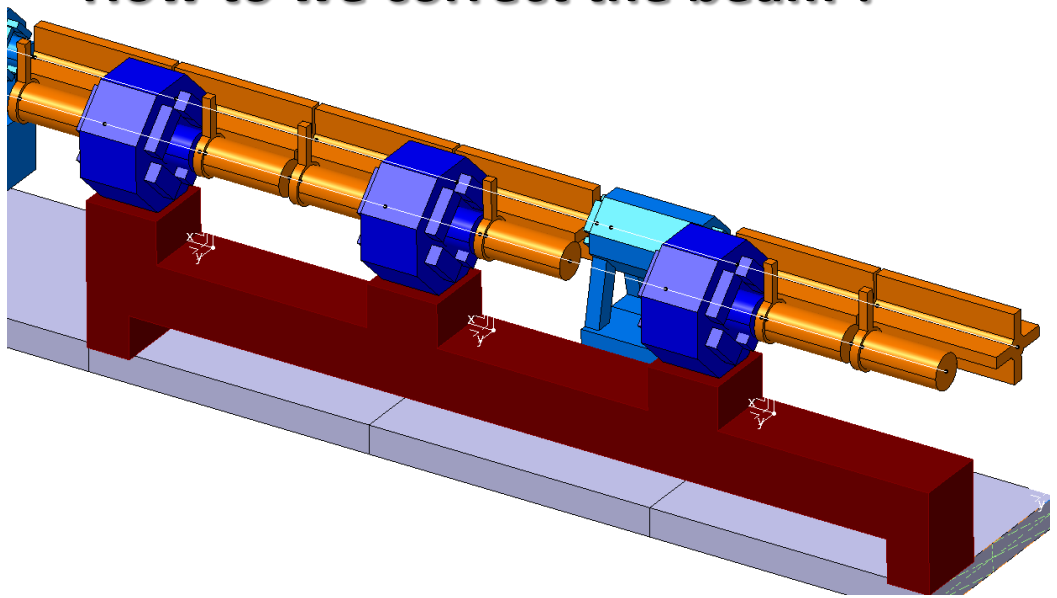
Alex, Antti

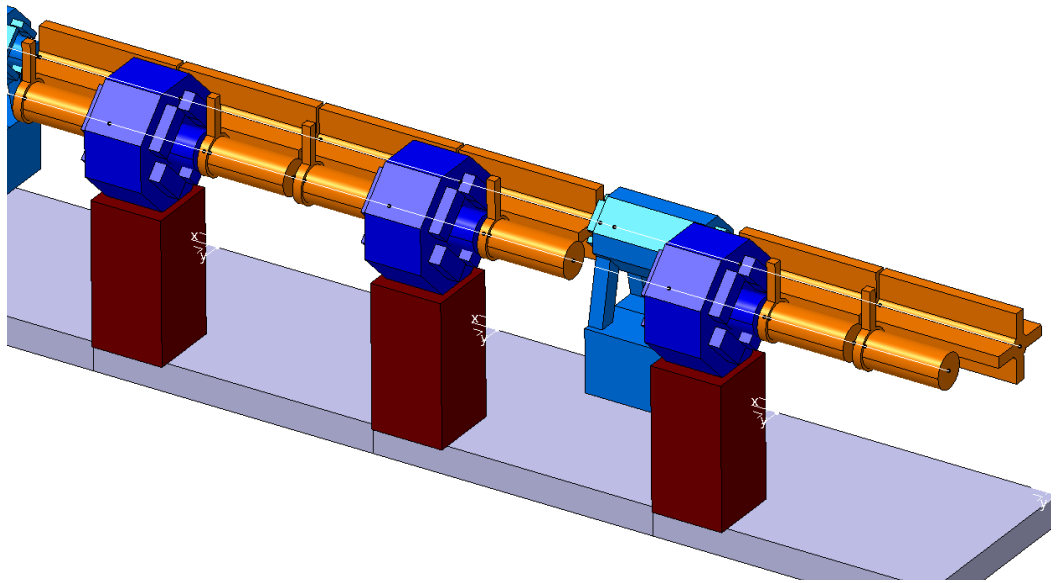
Klystron based CLIC module



Alexandre

Independent DB quad supports
How to we correct the beam ?





Alex Vamvakas

How could a new concept look like ?
Just thoughts, definitely not worked out yet, more a design goal

- Precise pre-alignment in the tunnel after transport, laser tracker
- One integrated support, possibly longer, less movers, less sensors, this is our module unit
  Likely independent supports for DB Quads
- Introduce shorter vacuum sectors, 900 m unrealistic
- Rough pre-alignment and assembly on surface in dedicated facility, ‘clean area’. Main point of quality control and acceptance test, likely at CERN
- Produce, measure, test, fiducialise individual components, Quads, PETS*, SAS*
  more competition in production, more flexibility for tests, better quality control, likely cheaper
- Rf high power test would be best on assembled module, how ? Define better rf-unit
- Re design structures and PETS for future assembly into the modules