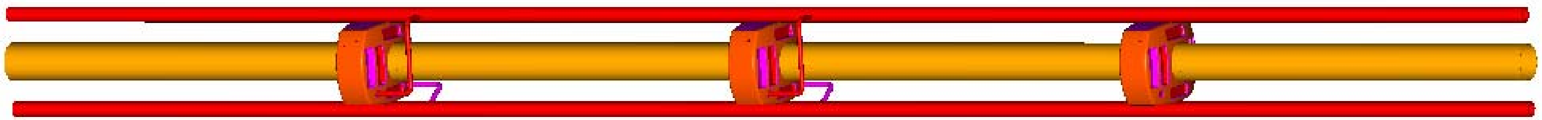
µstation design philosophy

- mechanical positioning and
  vacuum chamber separated
- all parts in beam vacuum



µstation cluster

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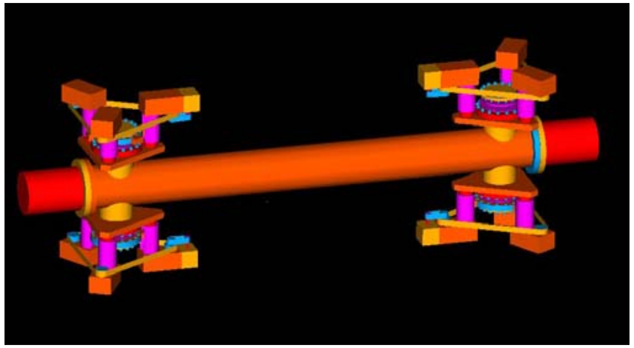
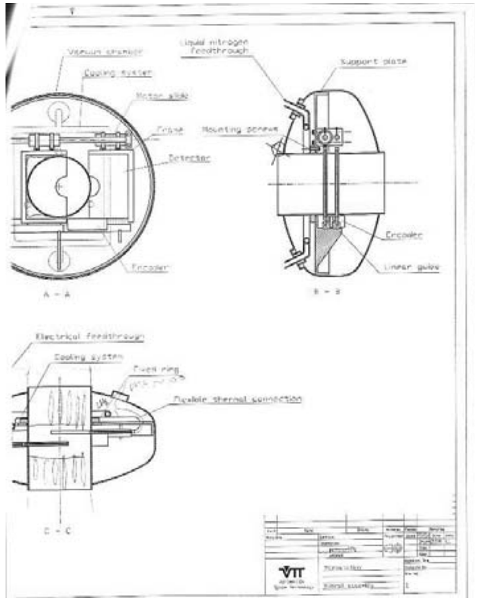
NOKIA

Problem tear down

- Task analysis
- Technical requirements
- Other requirements



Roman Pot cluster



μstation design 2001

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Tasks of the μstation

- To hold a detector on it’s rest position ”far” from the p-beam
- Moving of the detector into the measuring location and keeping it dynamically there by compensating the relative movements between the beam and the support mechanics
- To bring the detector back in the rest position

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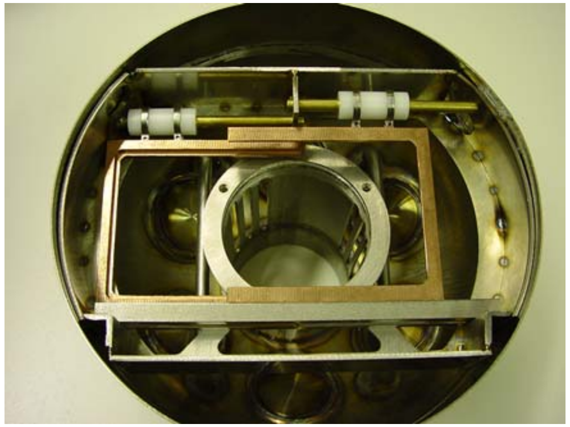
Technical requirements

- Detectors and the measurement itself
- Vacuum
- Beam
- Harsh environment
- Other detectors
- Other measurements



First mock-up

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Detector and measurement itself

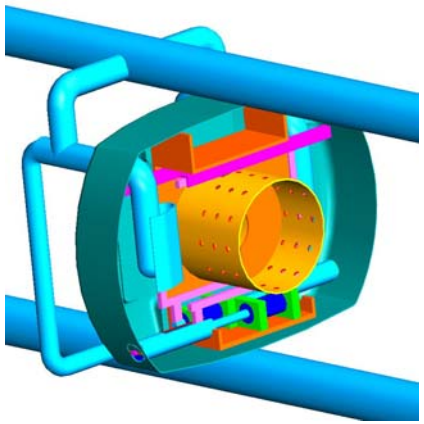
- electric power in
- control data in, measured data out
- stiff detector holder and moving mechanics
- 10 μm dynamical internal positioning accuracy
- stable measuring temperature when power on
- thermal power transportation out
  - (low temperature for detector recovery when power off)

Vacuum

- Compatible materials
  - No polymers
- Minimal mechanical risks
  - All welded structure
  - NEG coating and if needed a NEG pump actually makes this device a vacuum pump

Beam

- rf-fitting
- hot spots, thermal load out
- rf-shielding
- multipacting restriction
  - NEG
  - material selection
  - local magnet fields & geometry



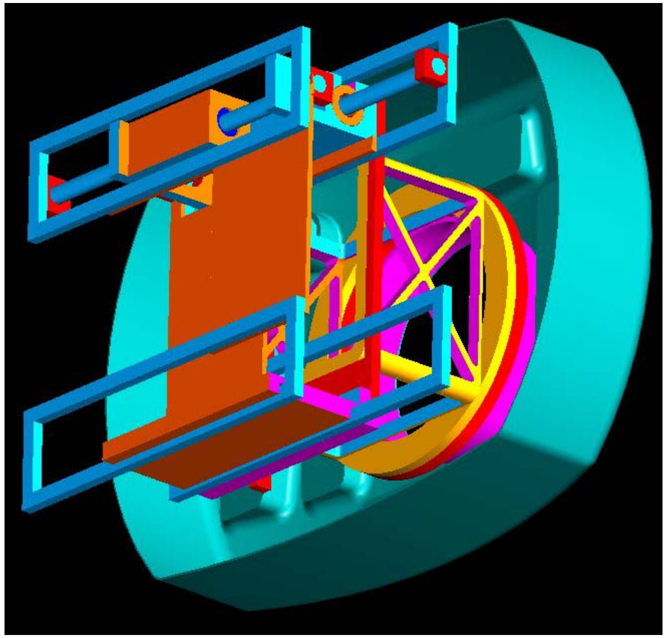
µstation with services

Harsh environment

- high ~ moderate magnet field
- high radiation
  - no polymers, no electro magnetic motors
  - quarts, ceramics, diamond like carbon
  - austenitic steel, copper, titanium
  - recovery of functional ceramics

Mechanical restrictions of the experiment architecture

- restricted size
- restricted mass
- restricted maintenance



Other requirements

- Ultimate reliability - newer disturb other measurements
  - no bellows (excluding emergency actuator)
  - all welded construction
  - emergency actuator
  - traditional solutions should be used,
    - easy risk analysis
- Flexible for further development

Components

- Motors (Burleigh)
- Encoders (Heidenhein not yet completely feasibe, custom), may not be needed
- Detectors (custom), other electronics e.g. optical data link
- Electrical and optical feed troughs (Ceramaseal)
- Cables (custom)
- Heat link (custom)
- Heat exchanger (custom)
- Emergency actuator (custom)
- Impedance fitting (custom)
- Component support (custom)
- Chamber (deep drawn, TIG, EB, and LASER welded)

Components

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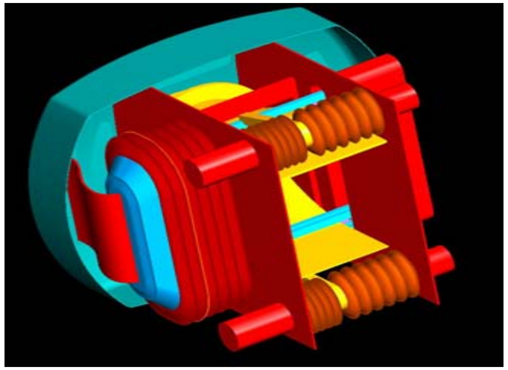
- Encoders (Heidenhein not yet completely feasibe, custom), may not be needed
- Detectors (custom), other electronics e.g. optical data link
- Electrical and optical feed troughs (Ceramaseal) <=
- Cables (custom) <=
- Heat link (custom) <=
- Heat exchanger (custom) <=
- Emergency actuator (custom)
- Impedance fitting (custom)
- Component support (custom)
- Chamber (deep drawn, TIG, EB, and LASER welded)

Easy environment obtion
Moving mechanics in fore vacuum

- ~ traditional approach
- Changeable detectors in
  in easy locations



μstation with fore vacuum

- No benefit seen in the ultimate detector locations
- Technically more difficult

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