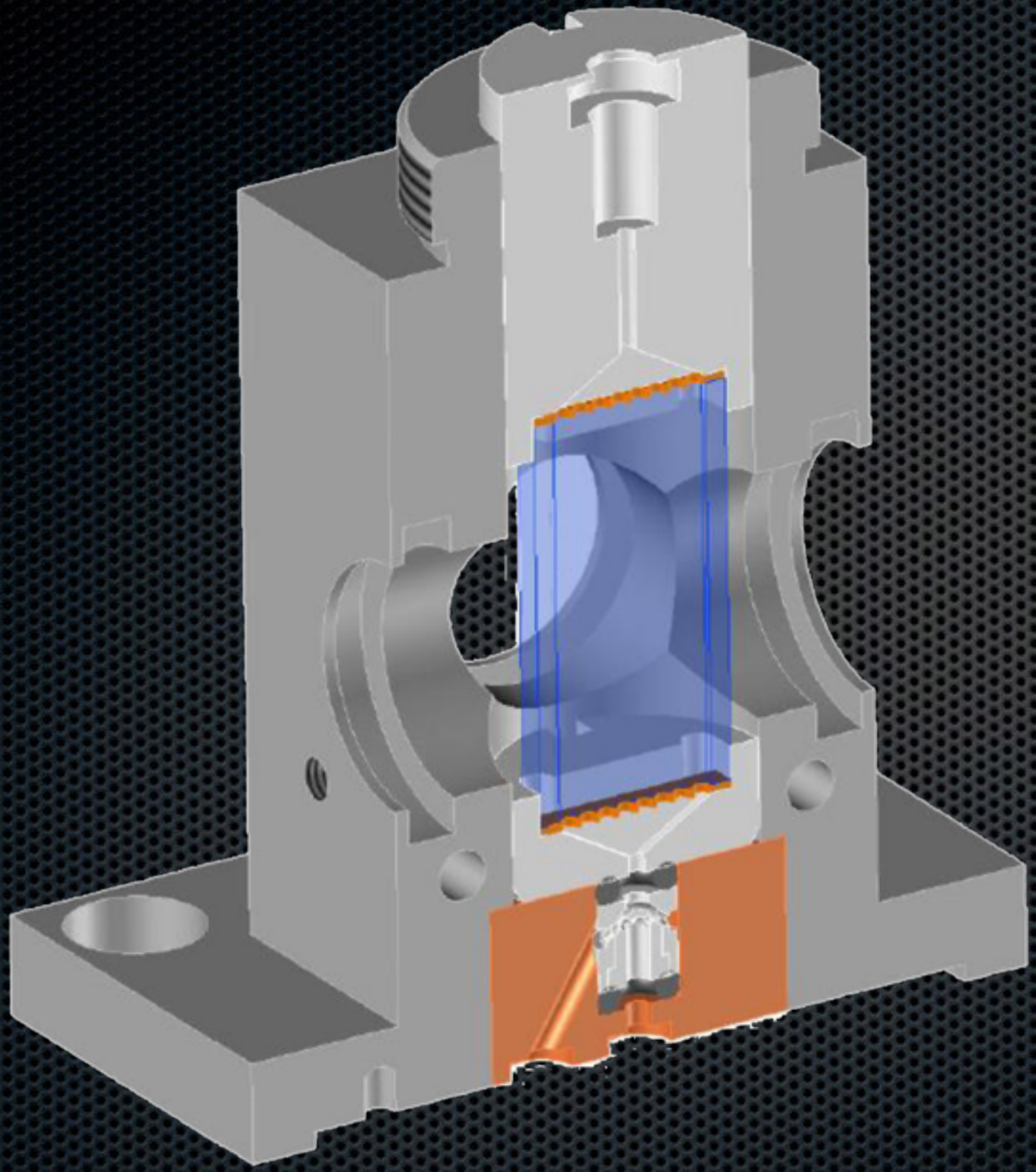
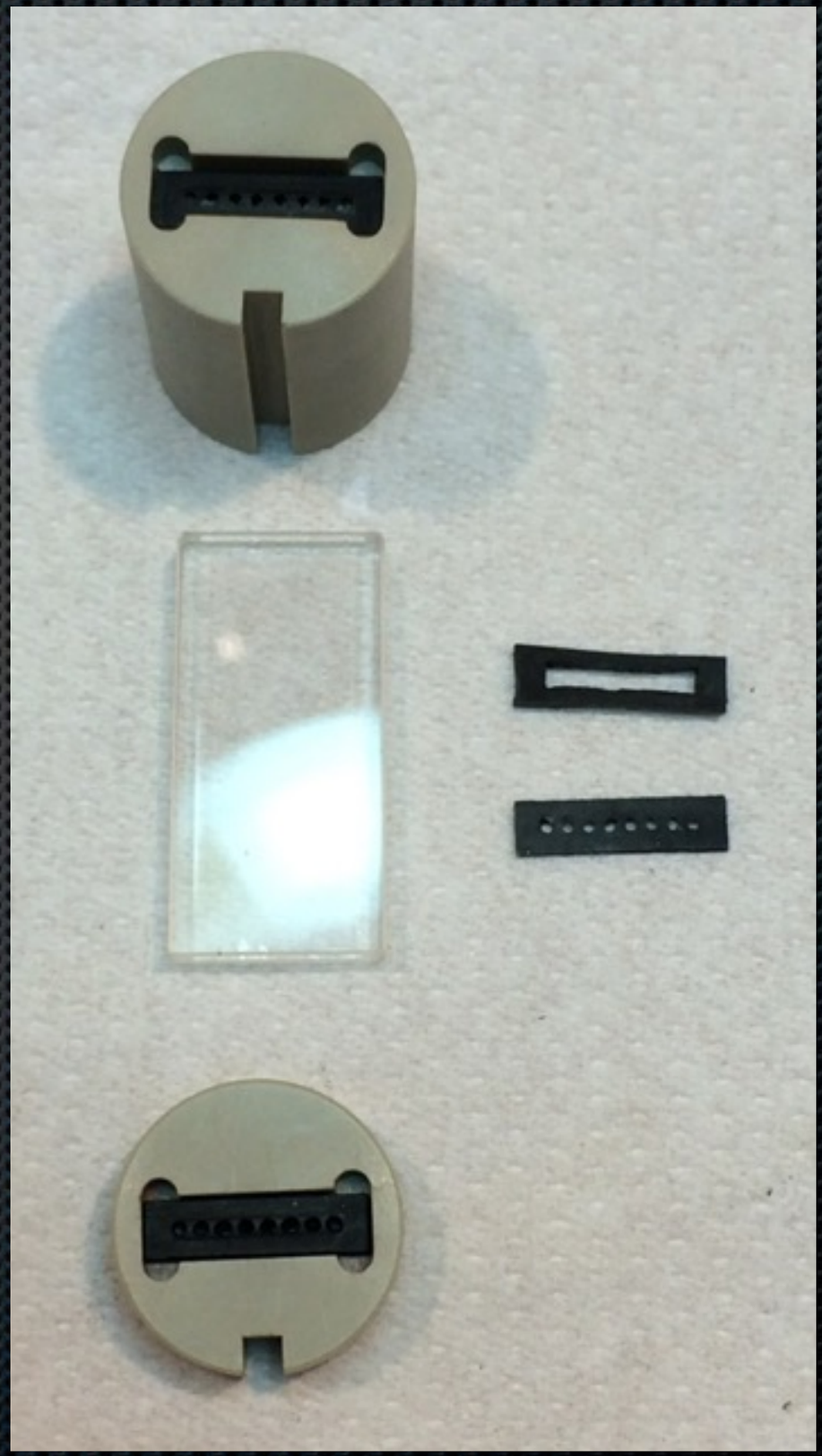
SBM-JRA Meeting

Stopped-Flow Chamber

Stop-Flow for SANS

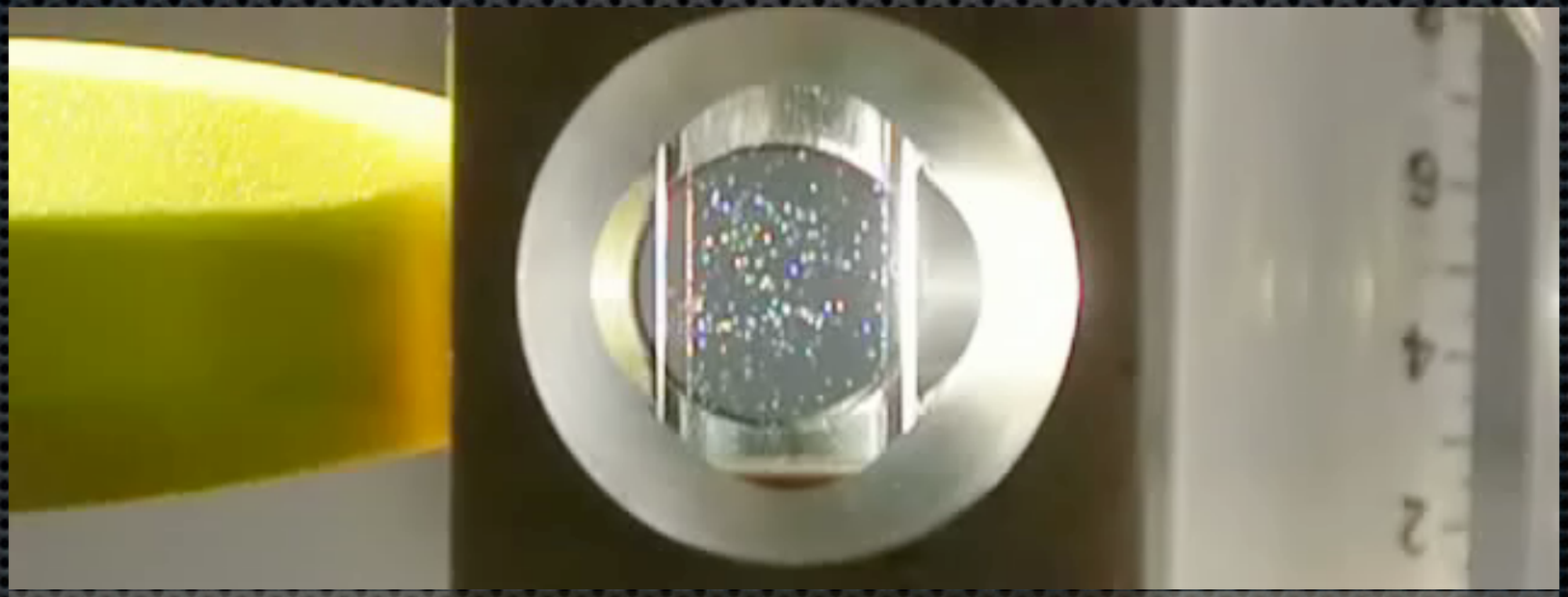
- Today on D11, D22 and D33:
  - 10 x 25 x 1 mm^3 Hellma cells i.e. 250 µL,
  - Typical counting time of a few minutes,
  - Sample replaced in 50-200 ms with 600-800 µL,
  - Measurements repeated until sufficient statistics
- Goals: reduce wasted sample to minimise preparation time & costs, improve temperature stability (0.1 K), allow temperature steps.





Observation Head Design ?

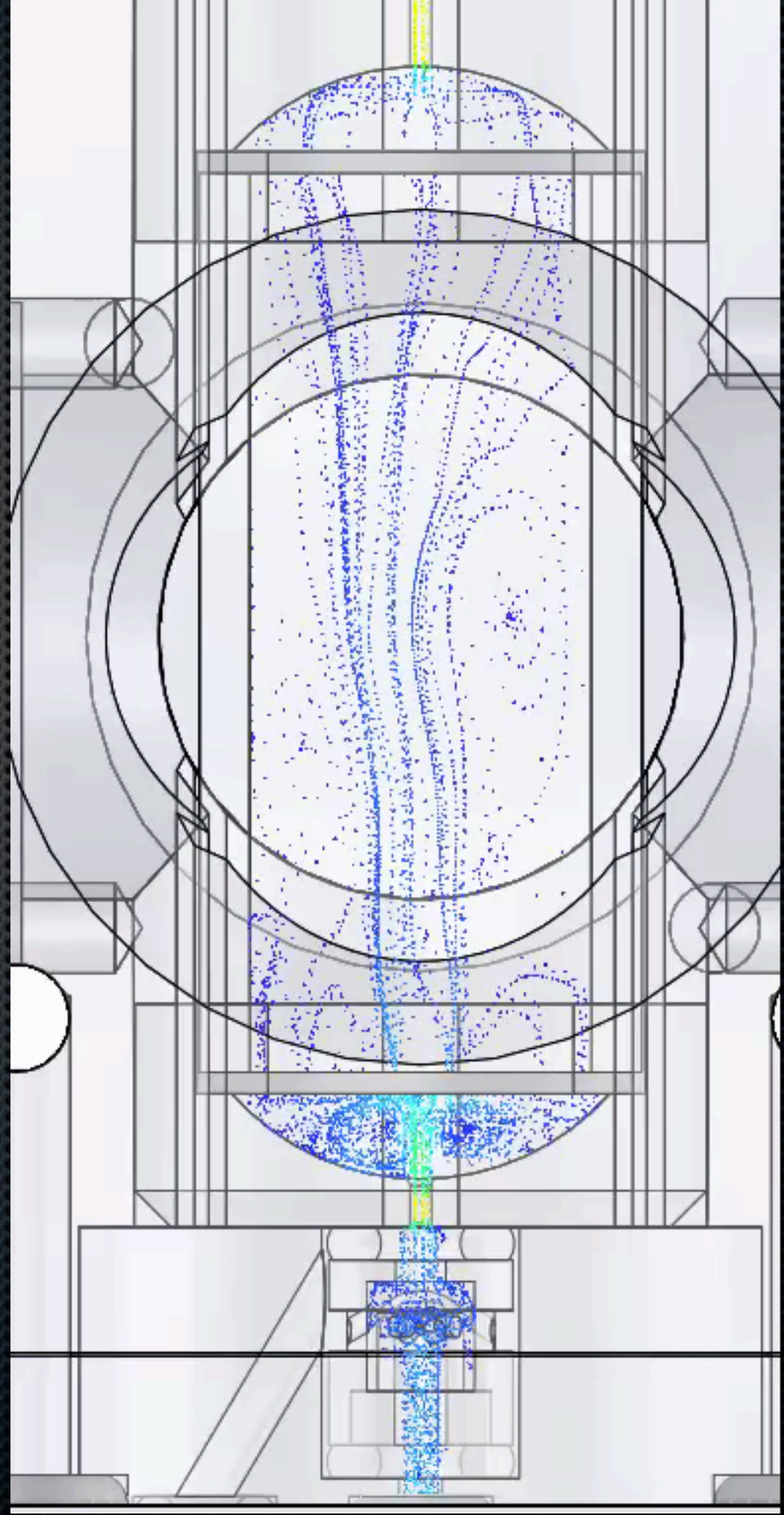
503 µL injected at 1 mL/s

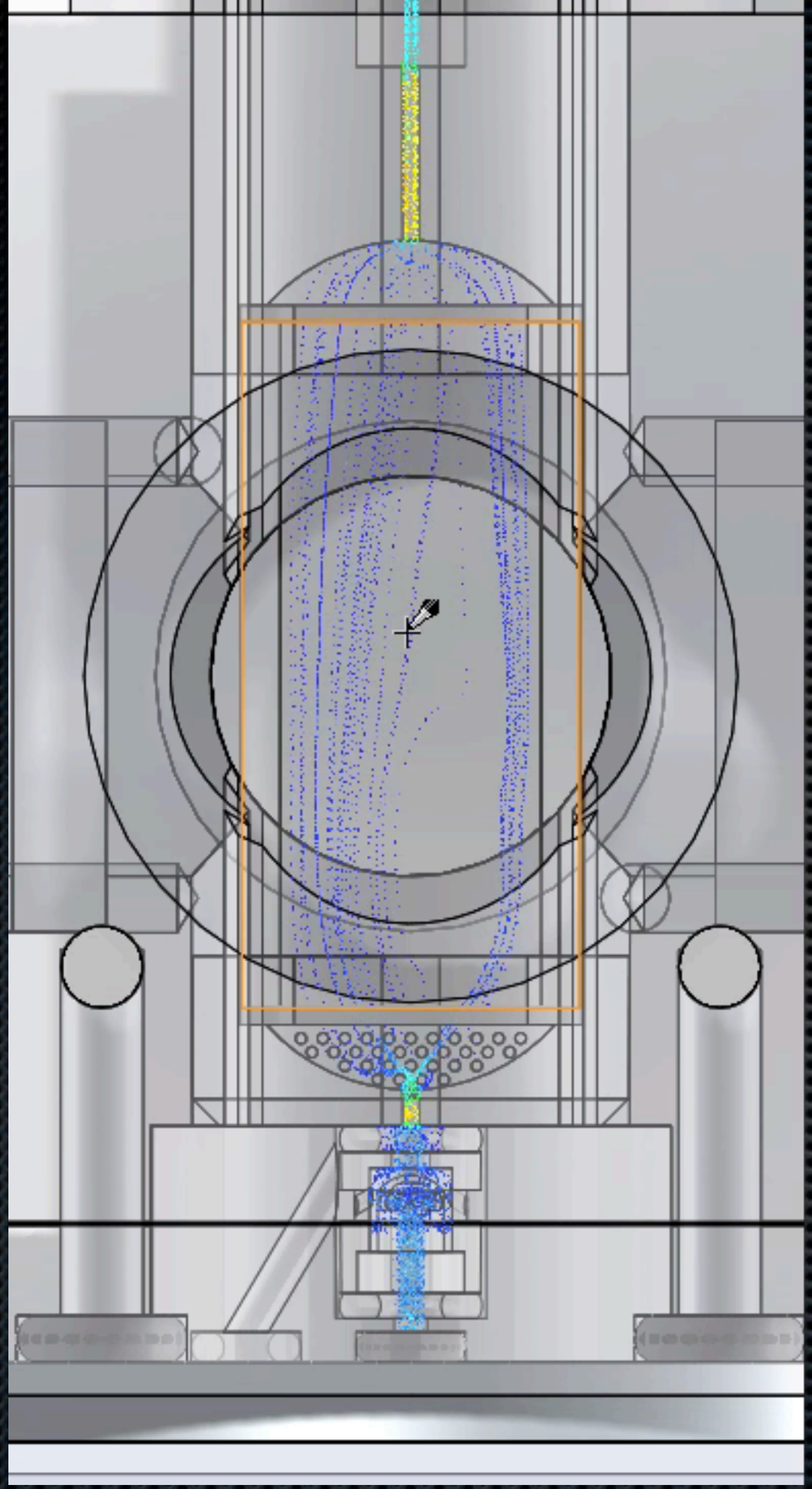


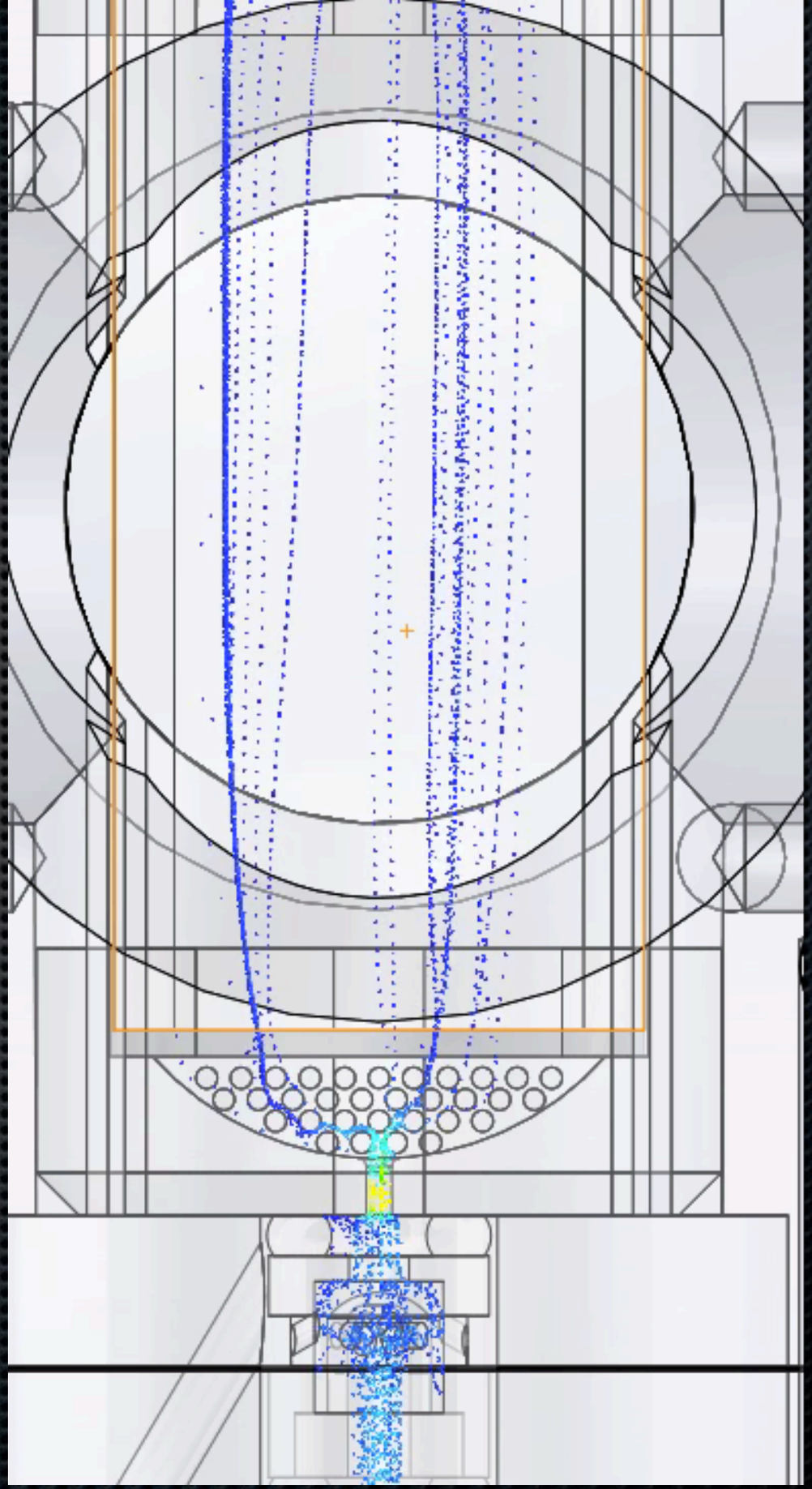
x40 real time

Observation Heads Design ?

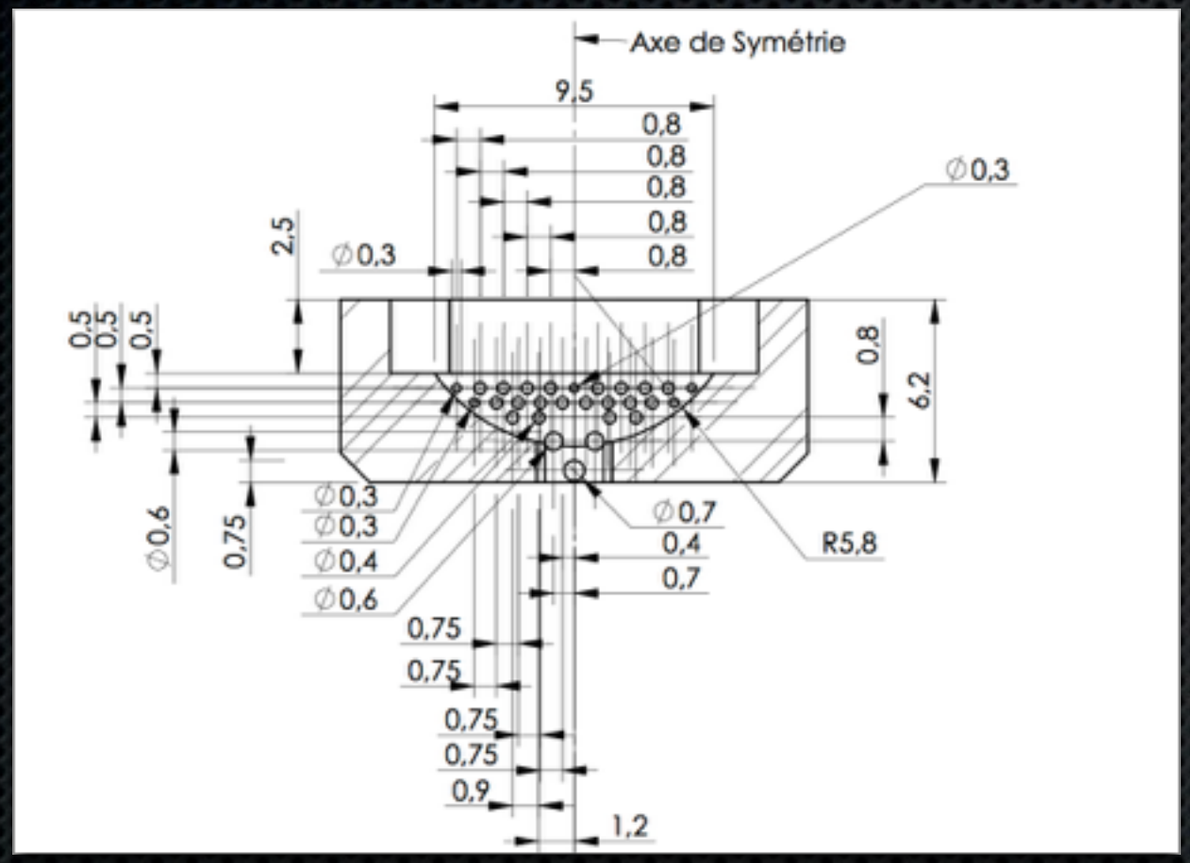
- Actual chamber:
  - Non-homogeneous sample change with standard seal
  - Better with seal made of holes but still difficult to replace the sample
  - x3 cell volume required
  - Simulations reveal vortices

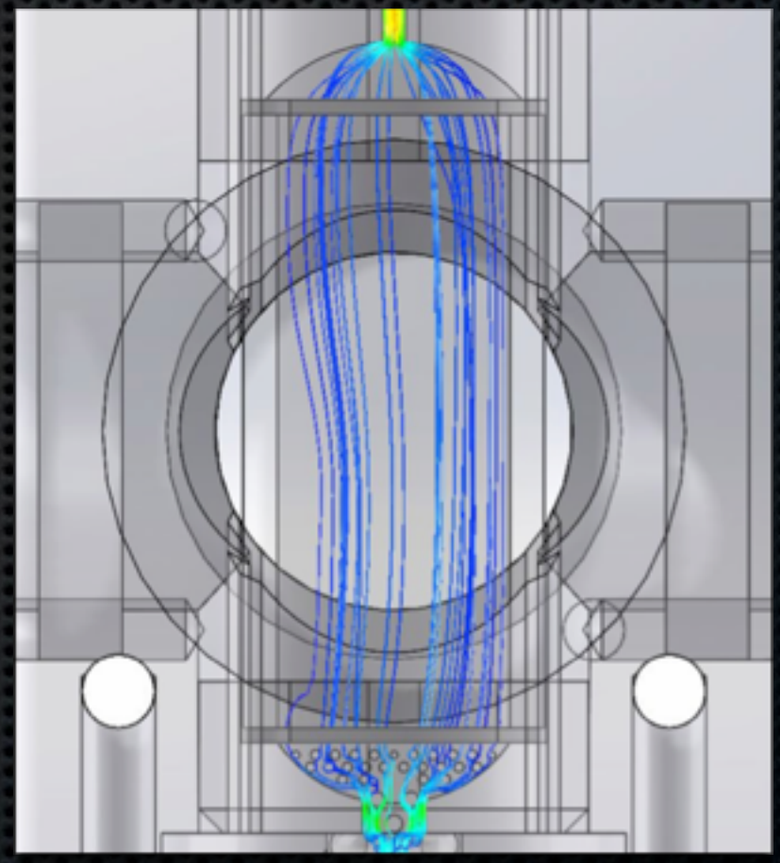






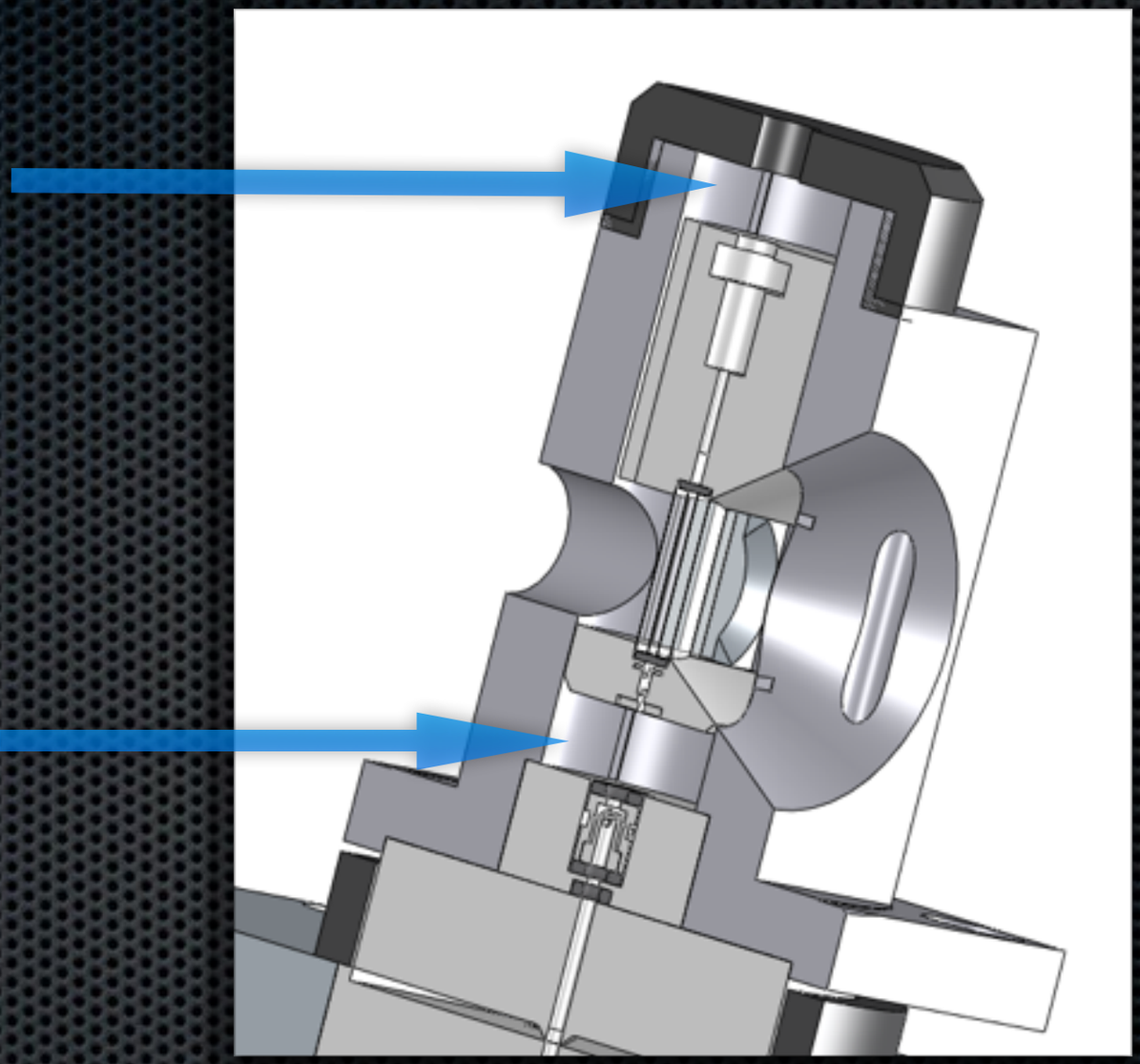
Design





Toward a laminar flow…
determination of number & sizes of rods
of a damping grid

Opportunities…

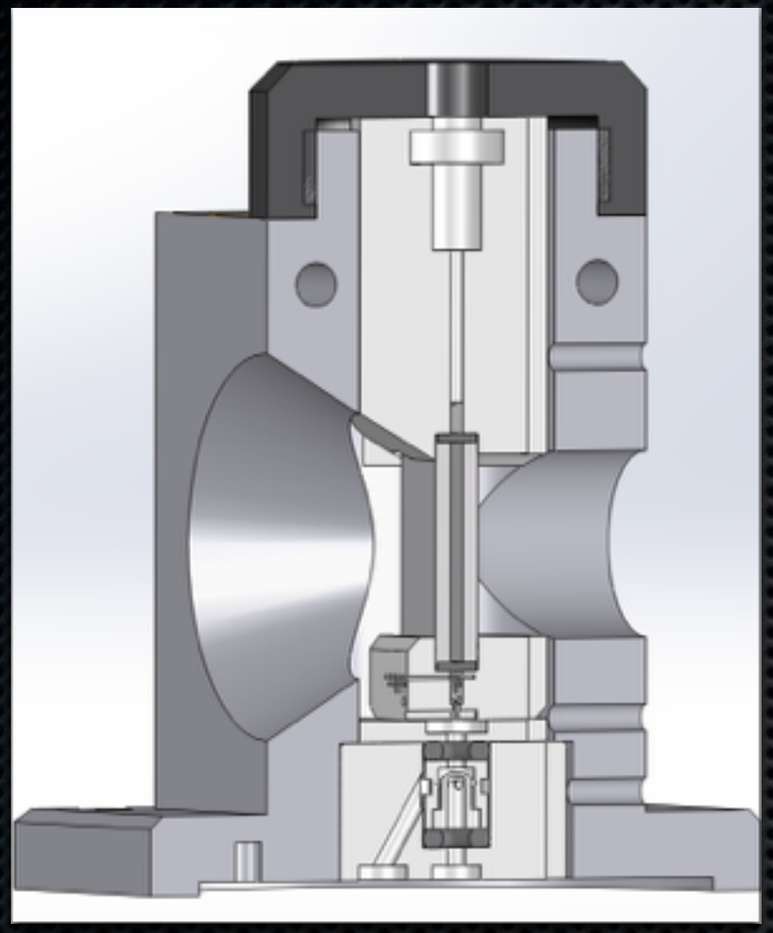


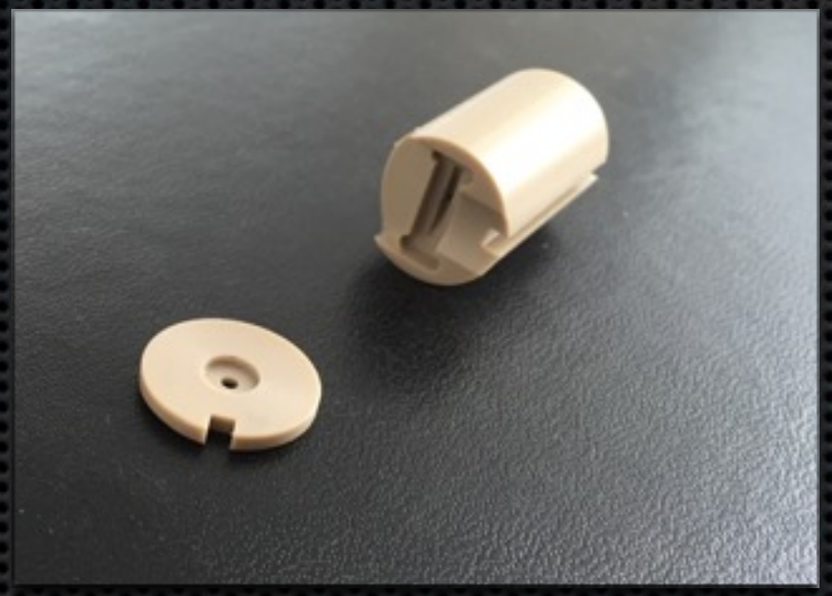
New parts or additional parts ?

What's up today ?

- Novel damping grid designed toward laminar flow
  - Simulations, final drawings completed at ILL
  - prototype built at ISIS — Big thanks!
    - Construction and glass rods assembly done
- Commissioning in June
  - Time for temperature equilibrium & stability
  - Different flow & speed tests through the cell

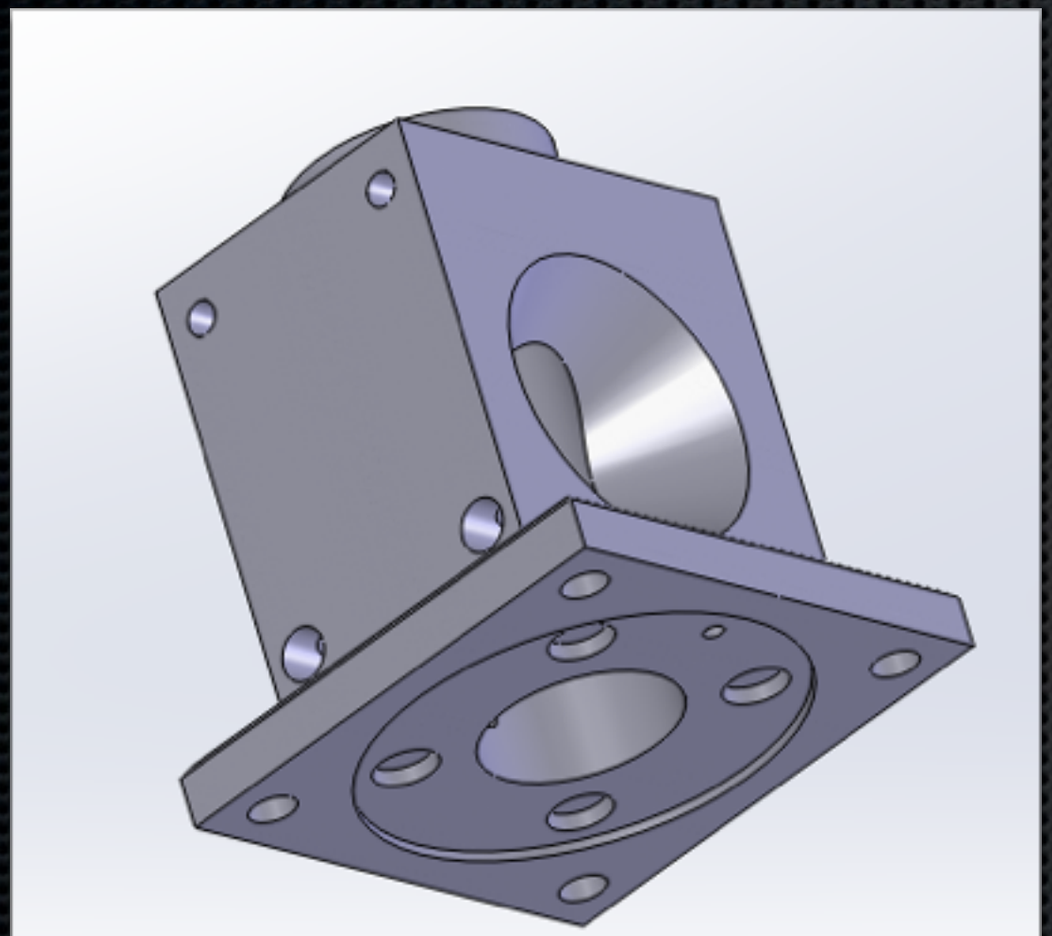
Final design

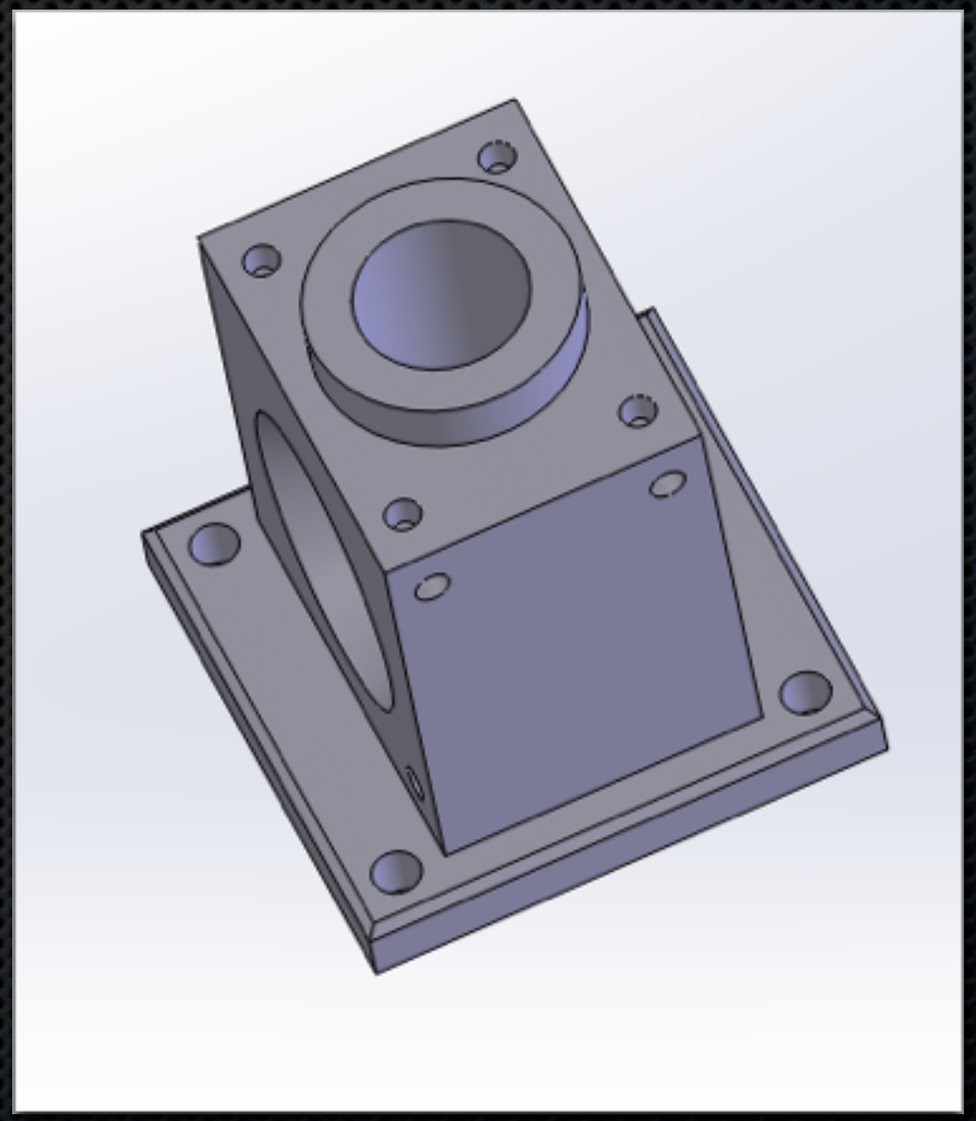




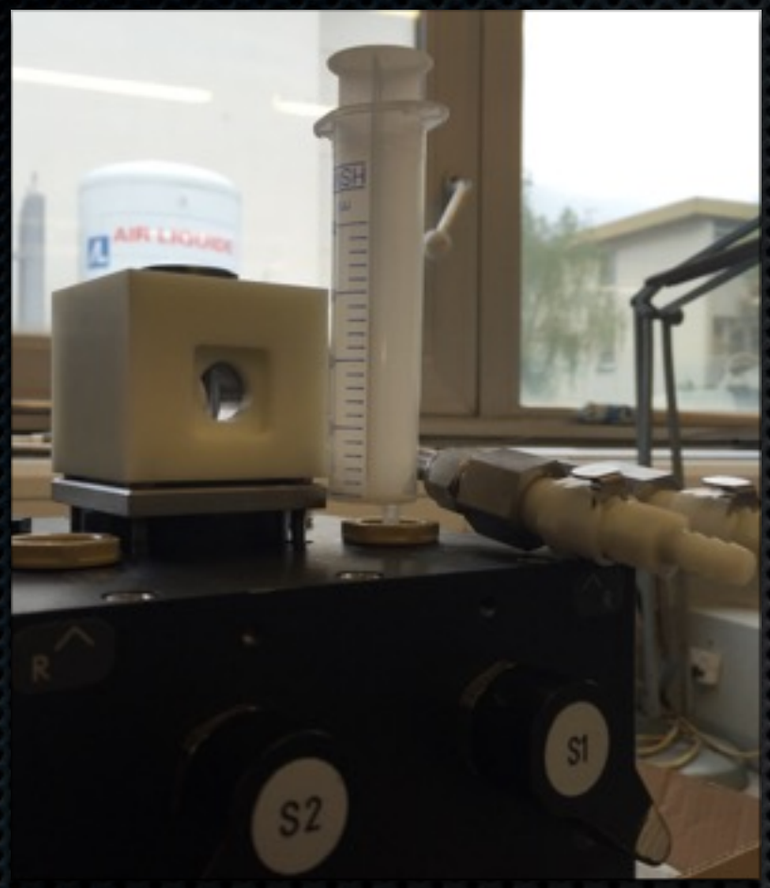
- Damping grid with same height for use with std & cut cells
- Longest top part for use with cut cells
- Spacer to compensate reduced height

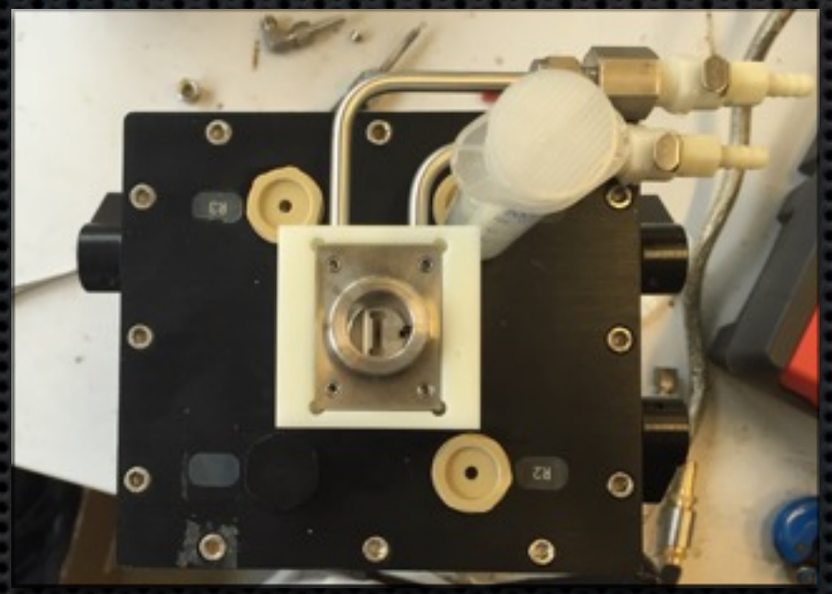
Fluid circulation

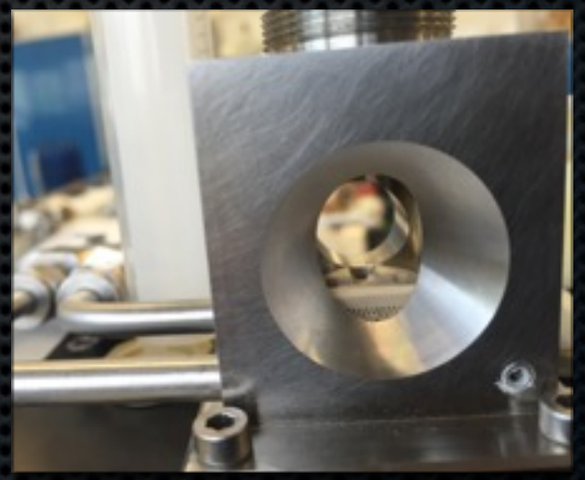




Assembly

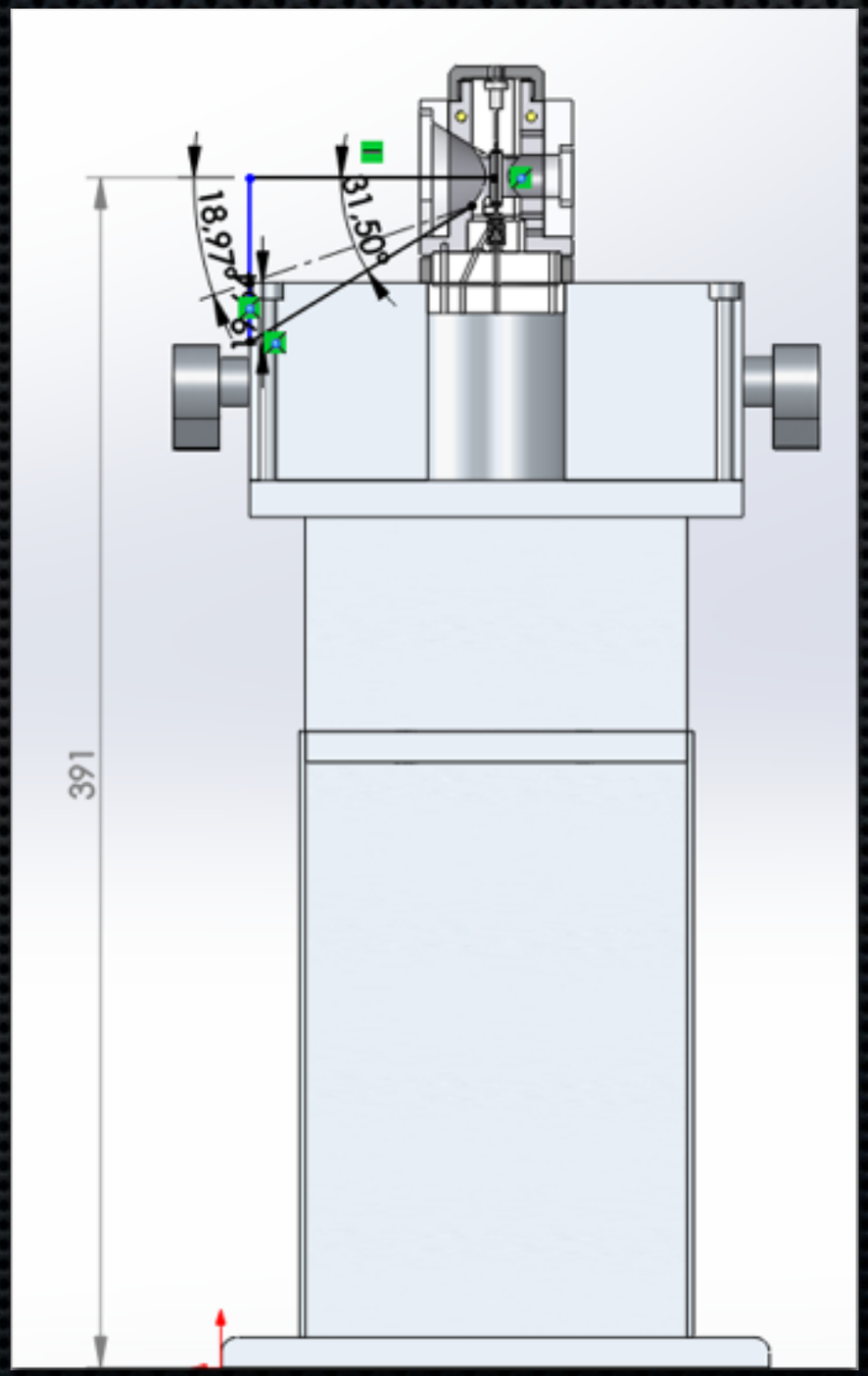




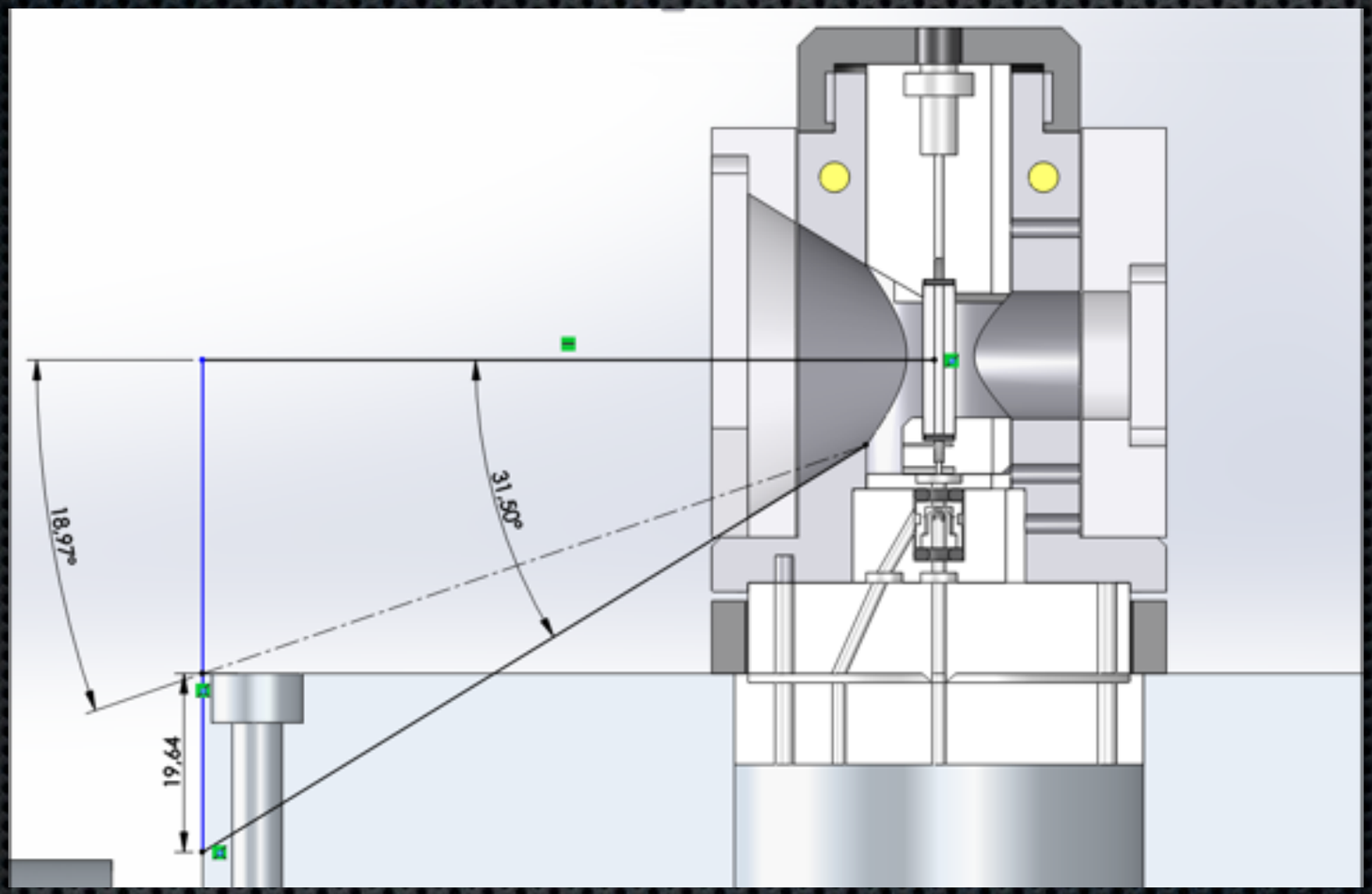


- Separate circuits for cooling and heating
- Fluid circulation in most edges
- Extra insulation with provision for neutron windows

Height compatible with all SANS



Design with compromises



Scattering angle cut by stopped-flow system

Summary

- Cell height reduced from 25 mm to 16.5 mm
- Still compatible with existing cells
- Glass rods for sample compatibility
- Guides for aligning the components
- « BioLogic » compatible
- Efficient thermalisation with « real » circuit
- Possibility to separate chillers for head and syringes

Thank you

Soon available to users