

The generic mirror chamber for the European XFEL

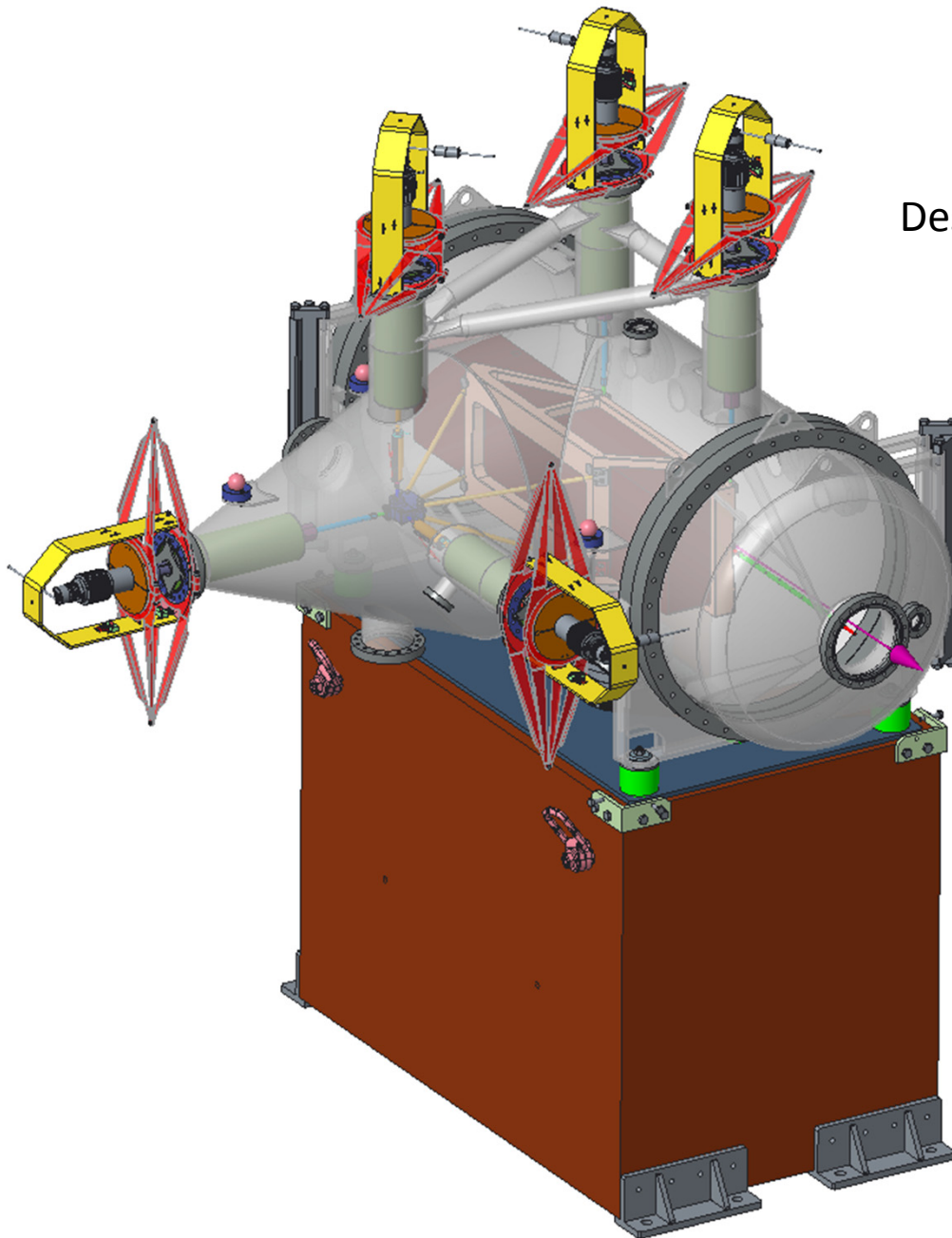
T. Noll^{1,2}, H. Sinn³, A. Trapp³

¹ Max-Born-Institut Berlin, Germany,

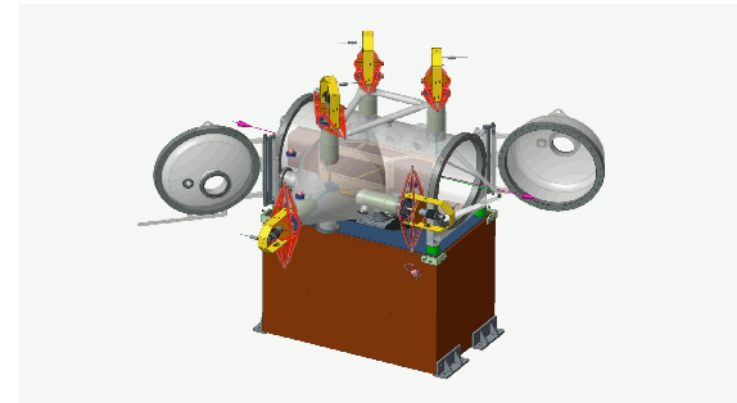
² Helmholtz-Zentrum-Berlin, Germany

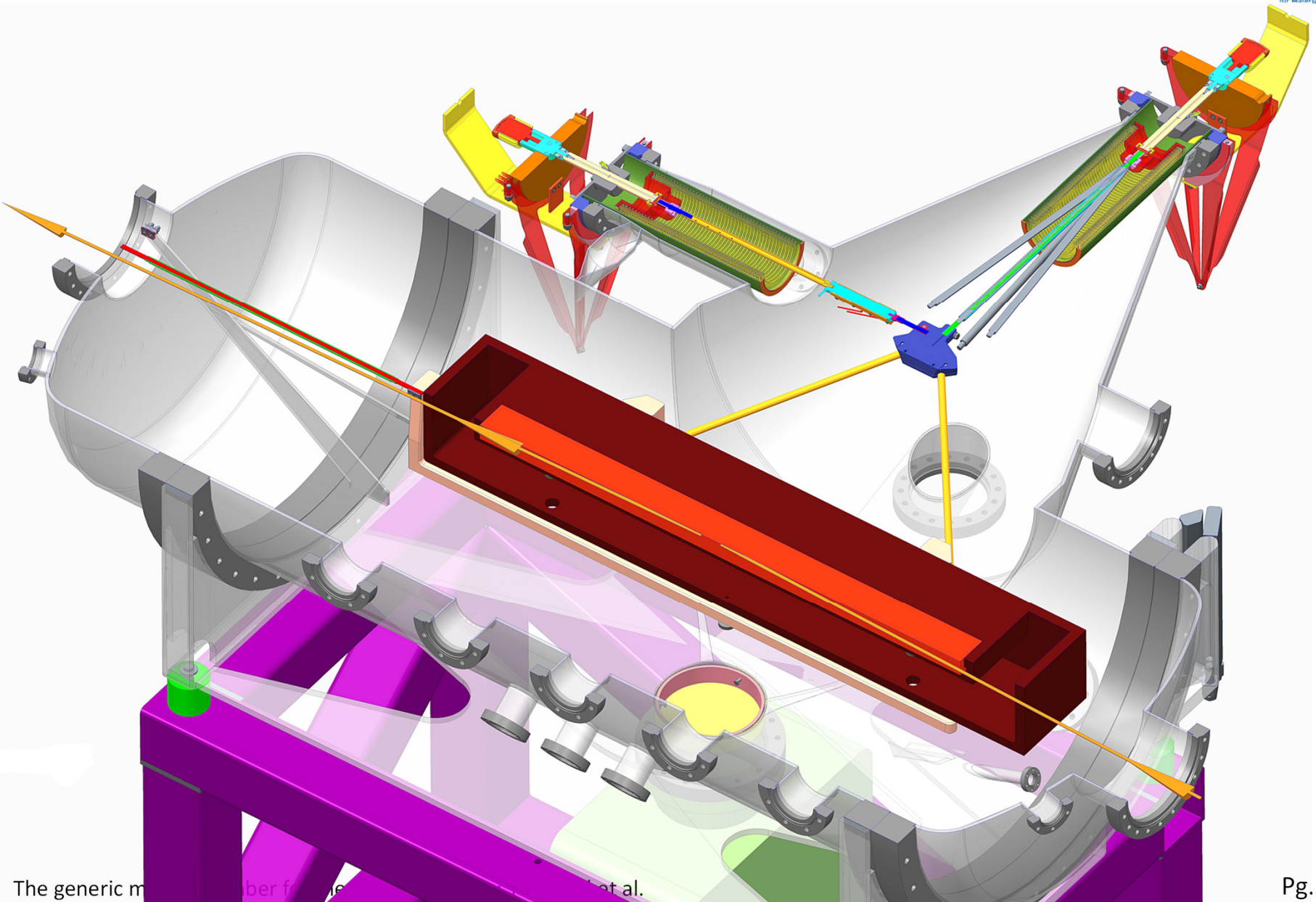
³ European XFEL Schenefeld, Germany

Design overview of the generic mirror unit

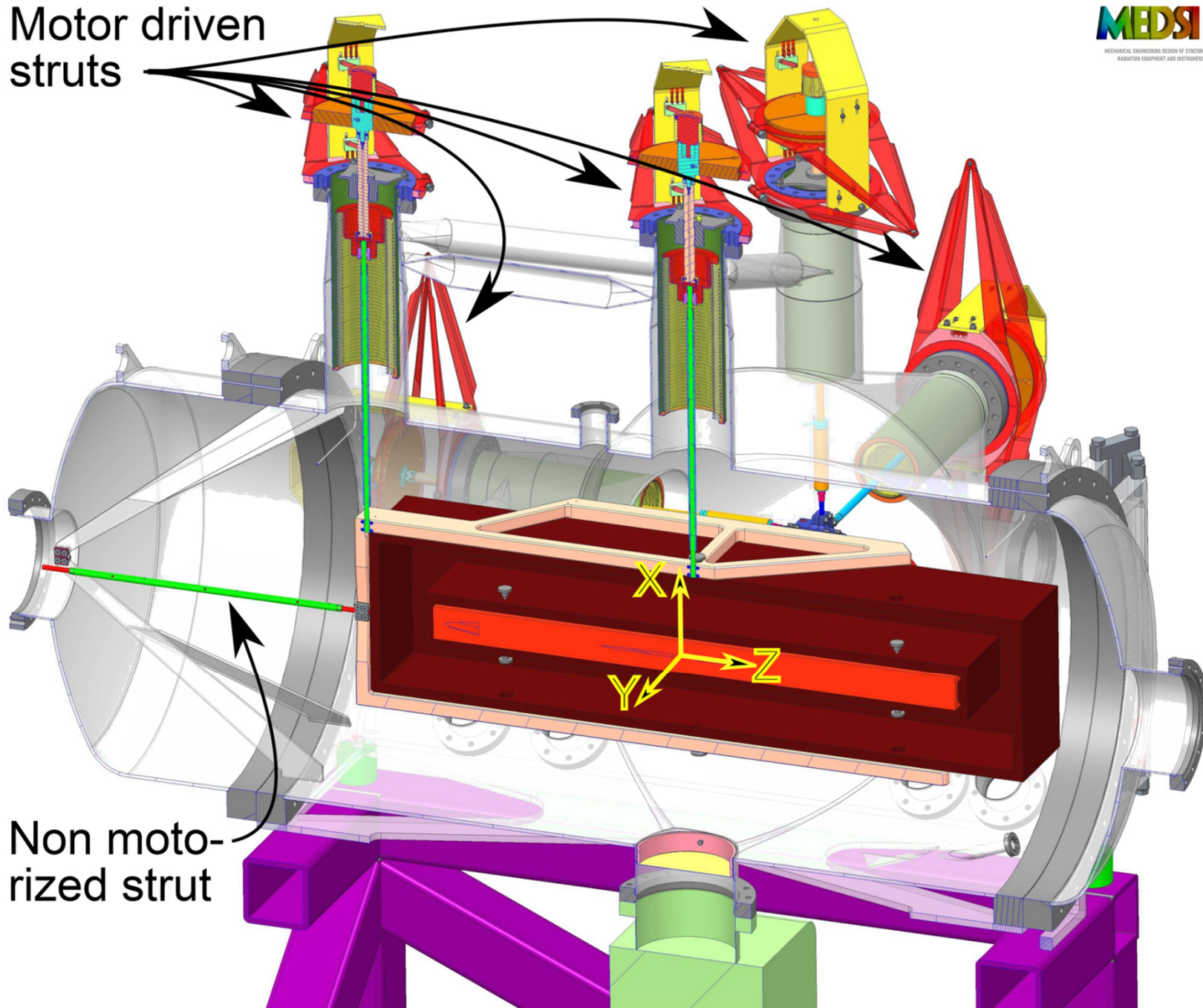


-> 10 derivative units are build

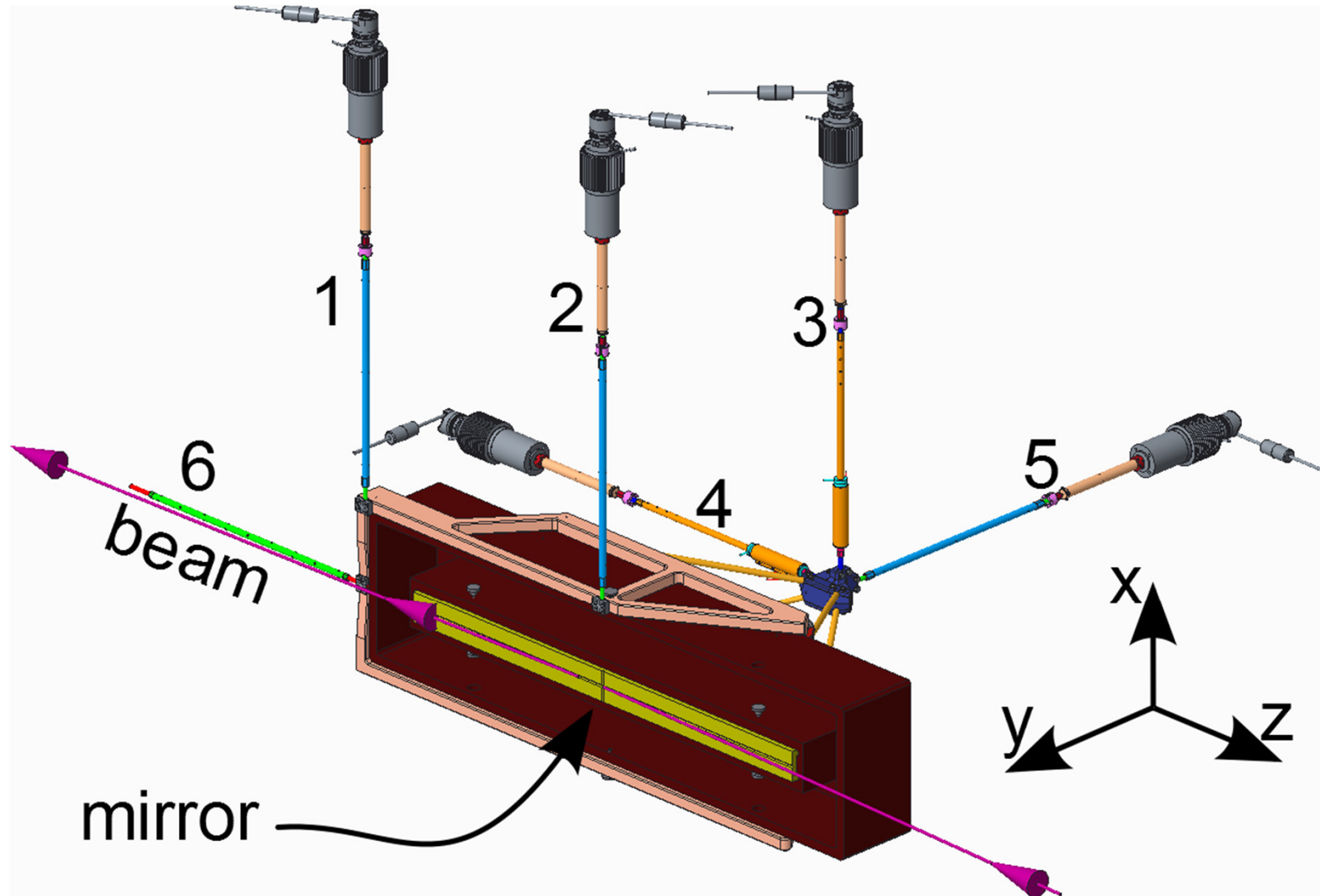




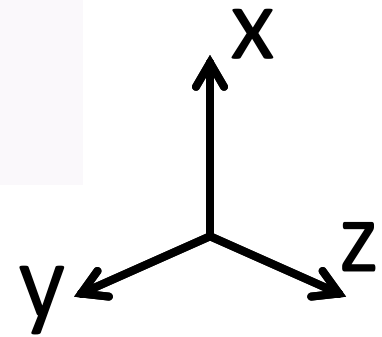
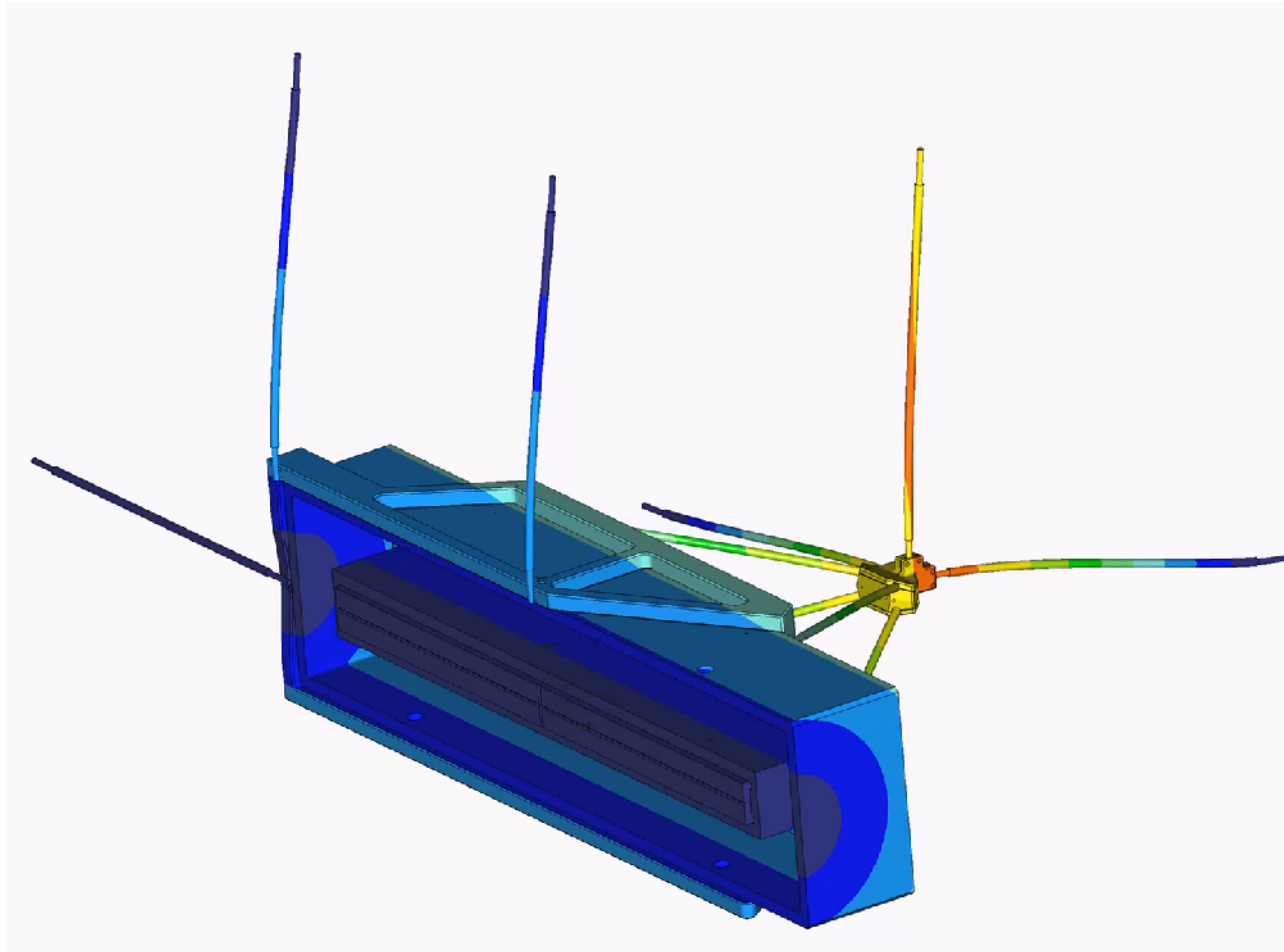
Motor driven
struts



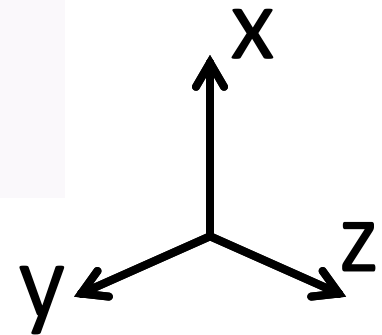
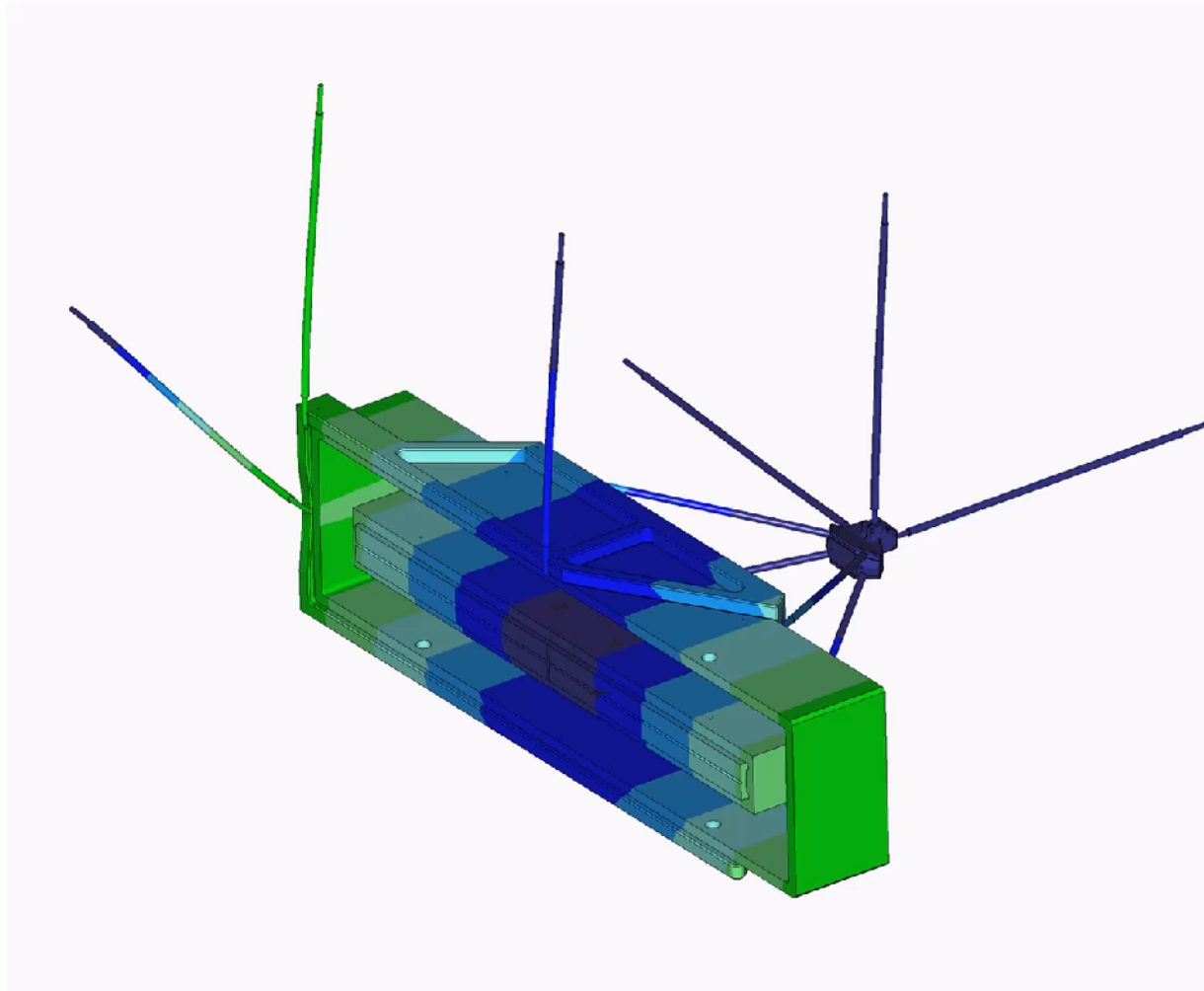
Topology of the Cartesian parallel kinematic



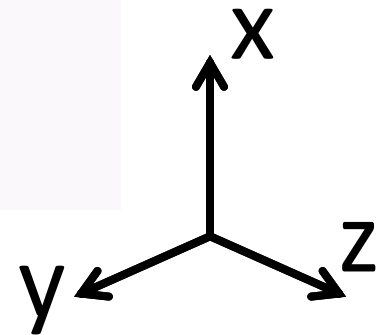
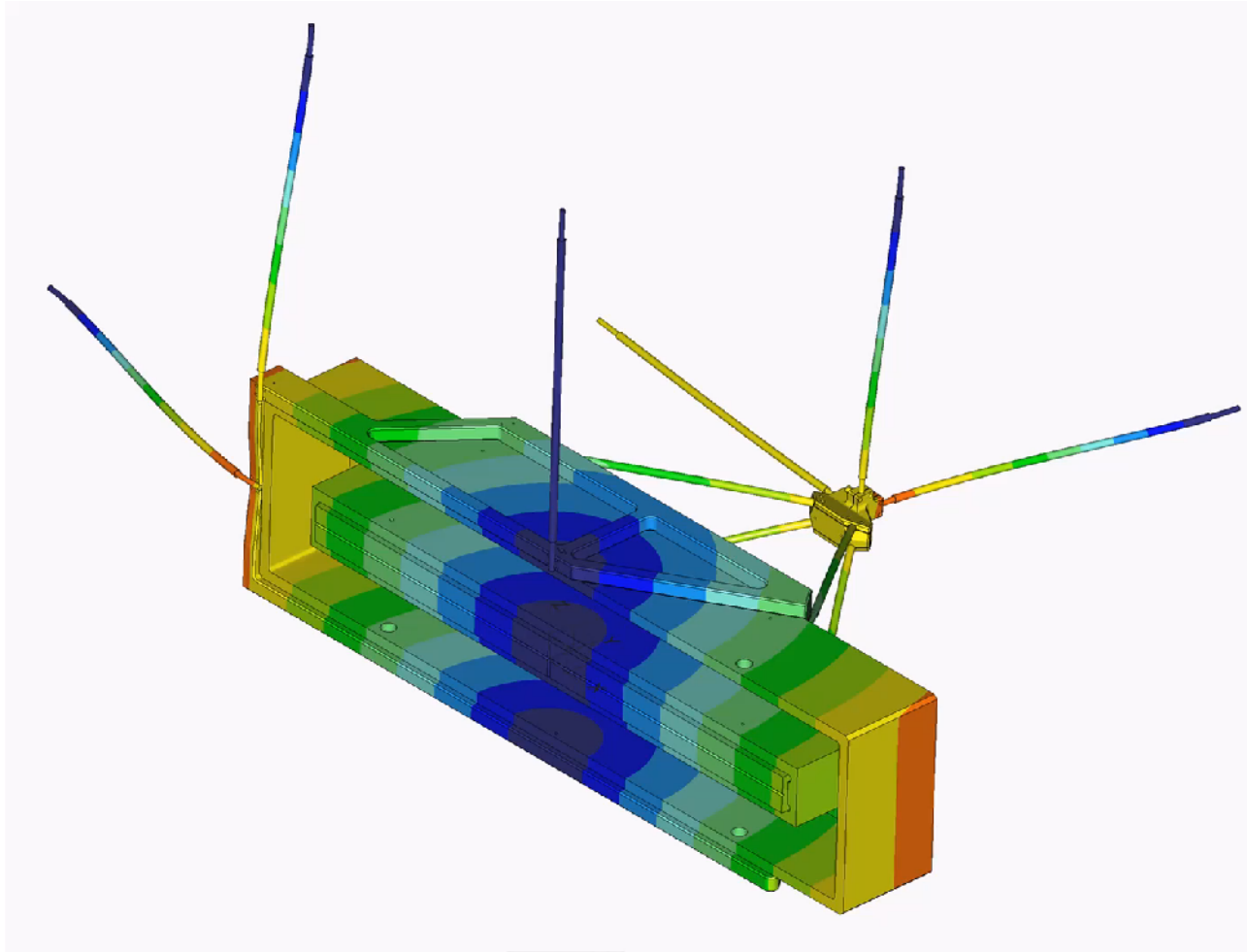
Simulation of the kinematic behaviour
-> rotation around the Z-axis



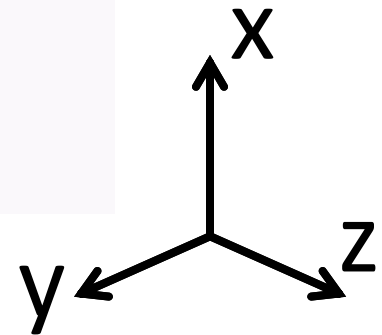
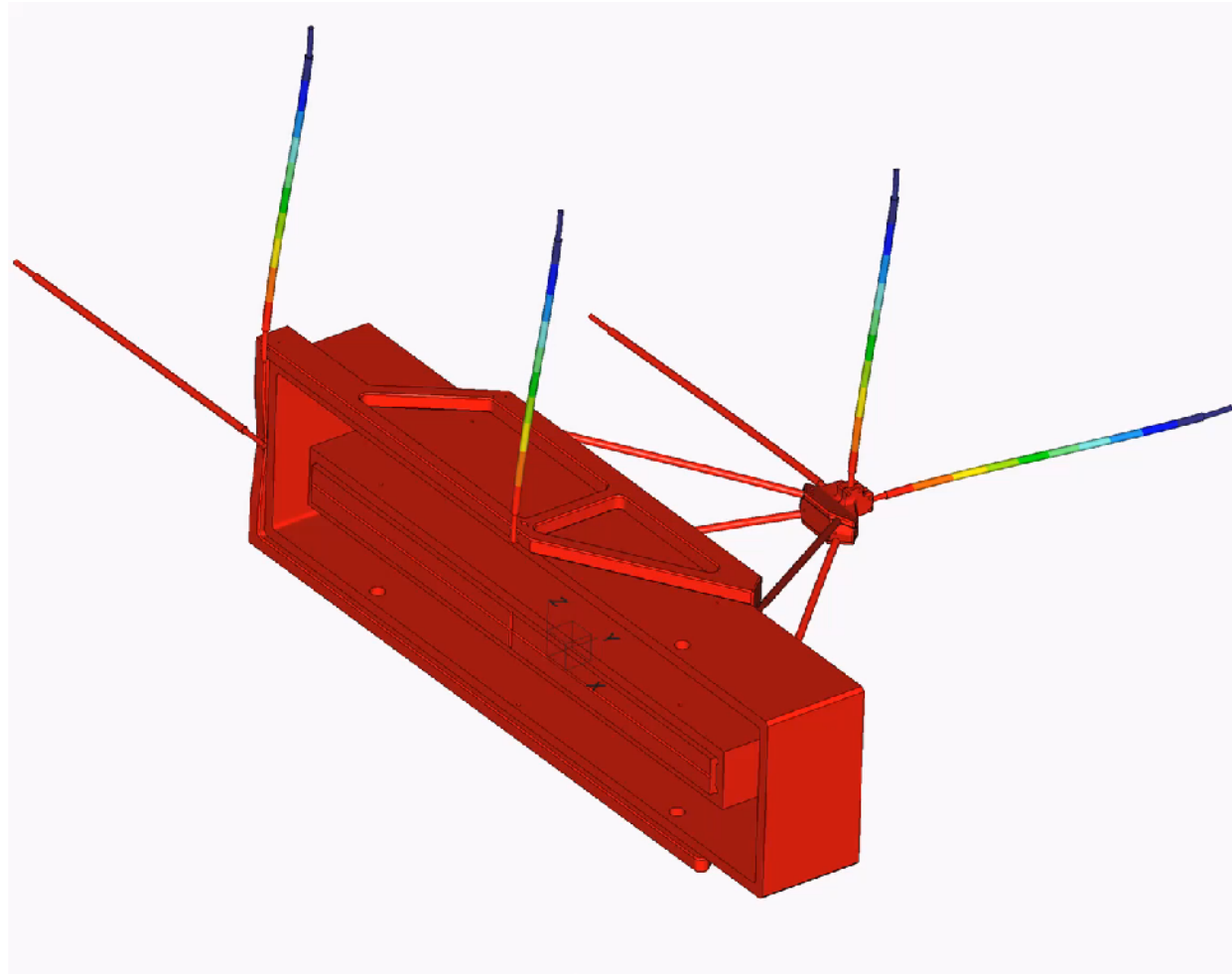
Simulation of the kinematic behaviour
-> rotation around the Y-axis



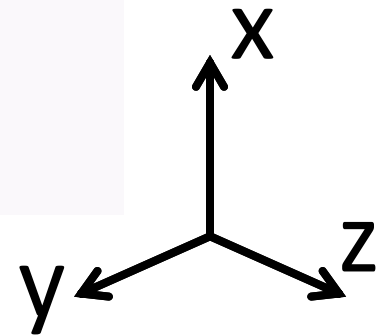
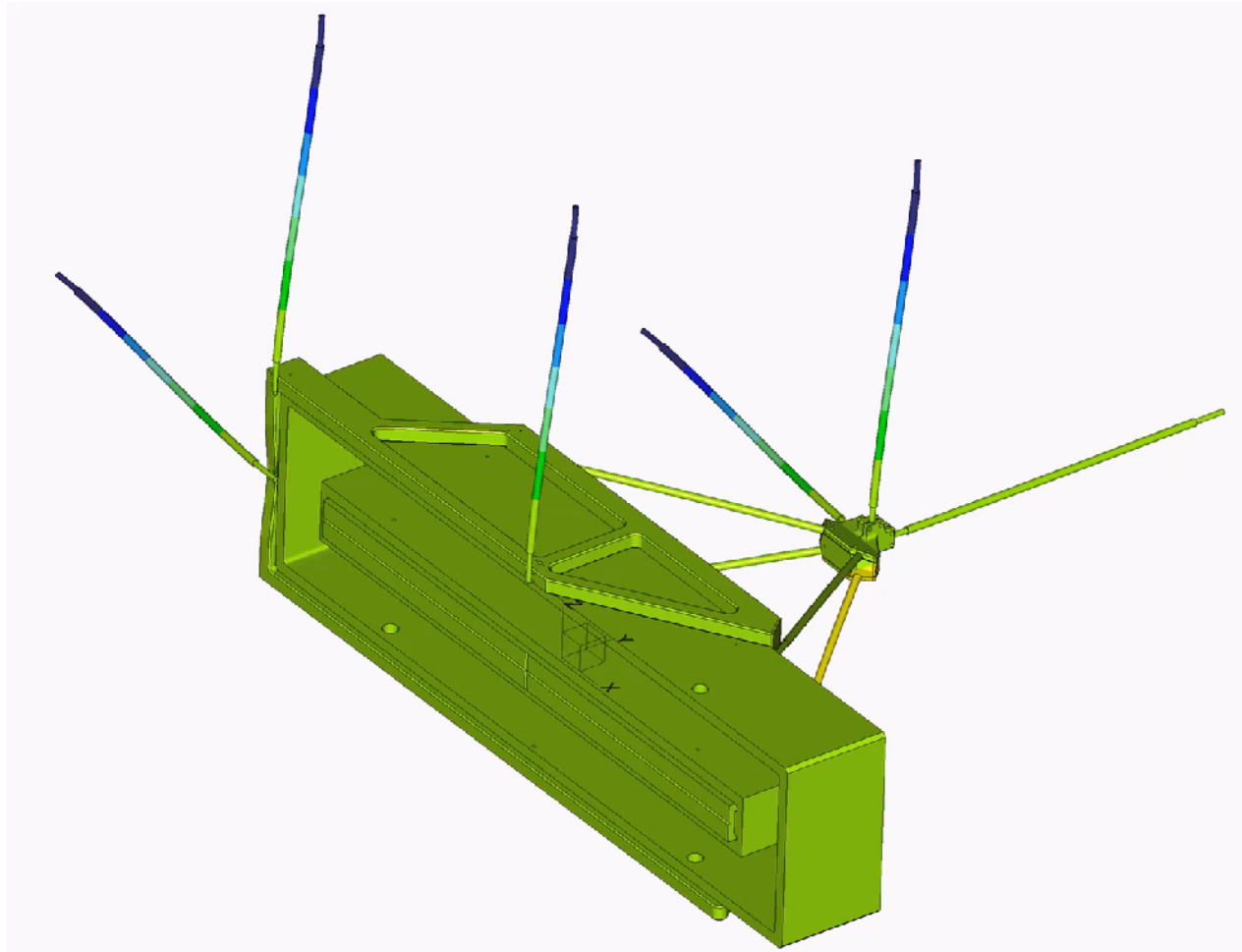
Simulation of the kinematic behaviour
-> rotation around the X-axis



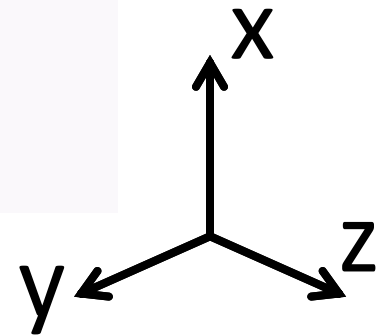
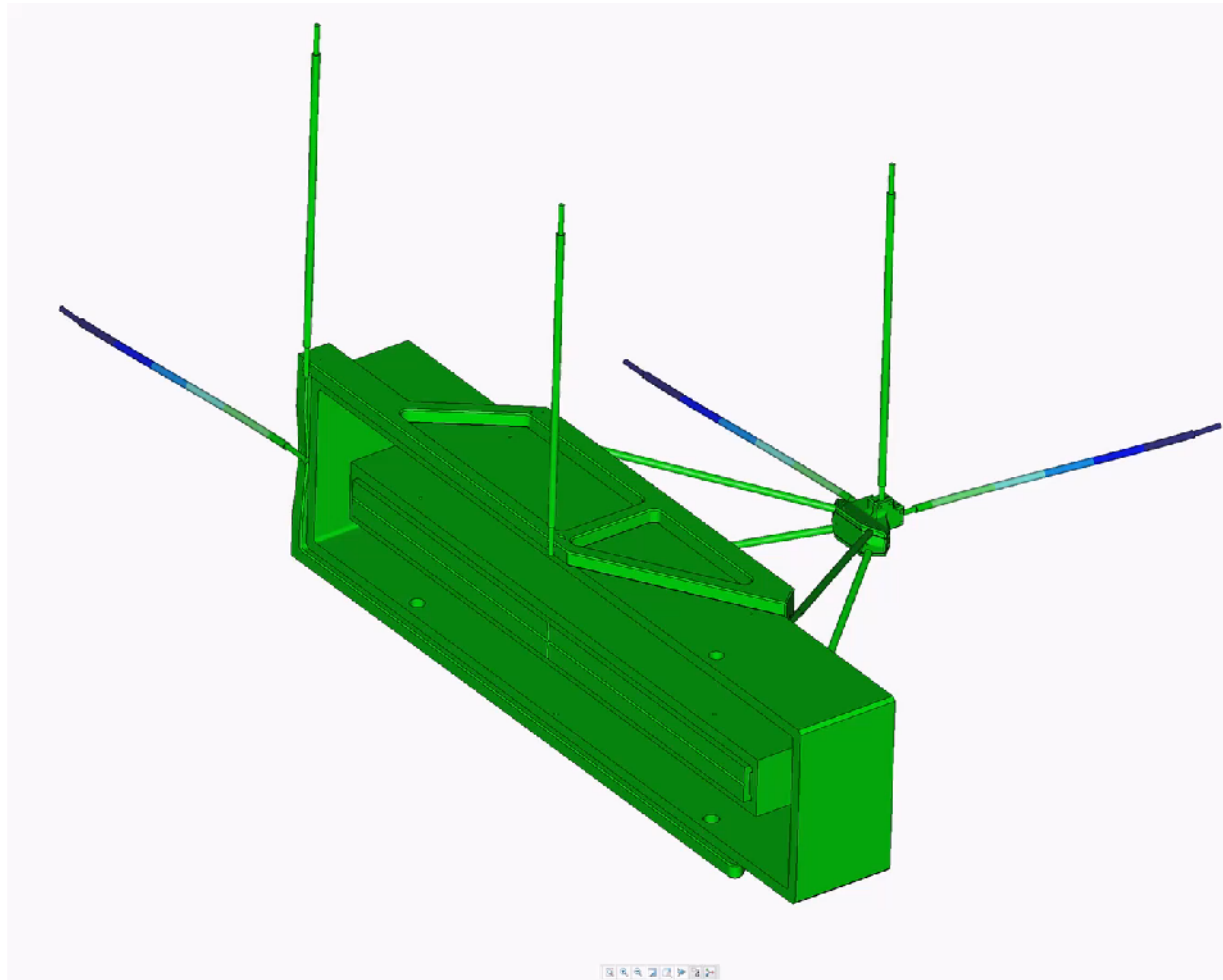
Simulation of the kinematic behaviour
-> translation along the Z-axis



Simulation of the kinematic behaviour
-> translation along the Y-axis



Simulation of the kinematic behaviour
-> translation along the X-axis



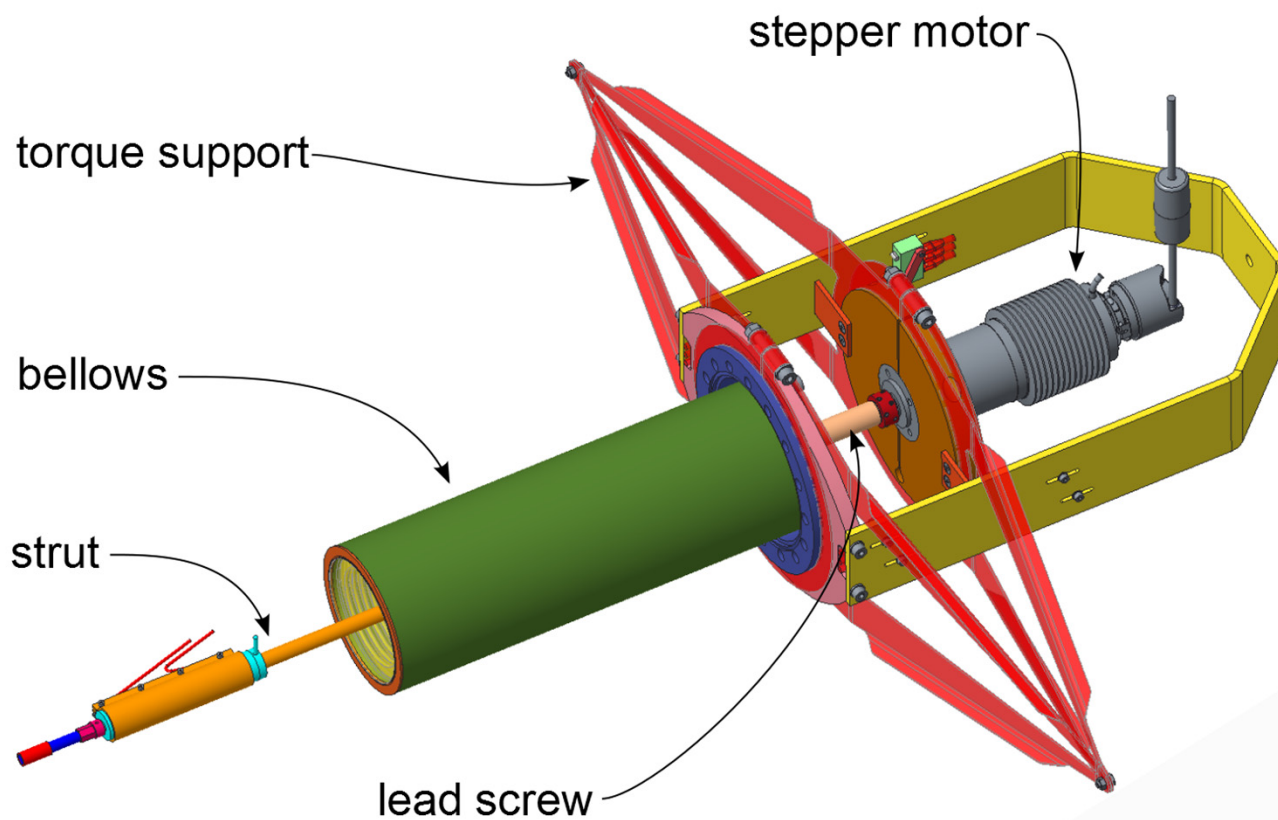
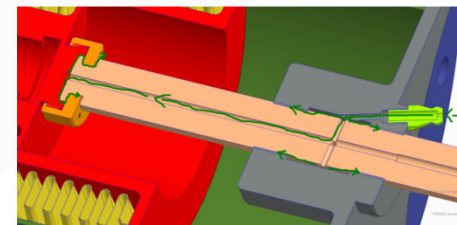
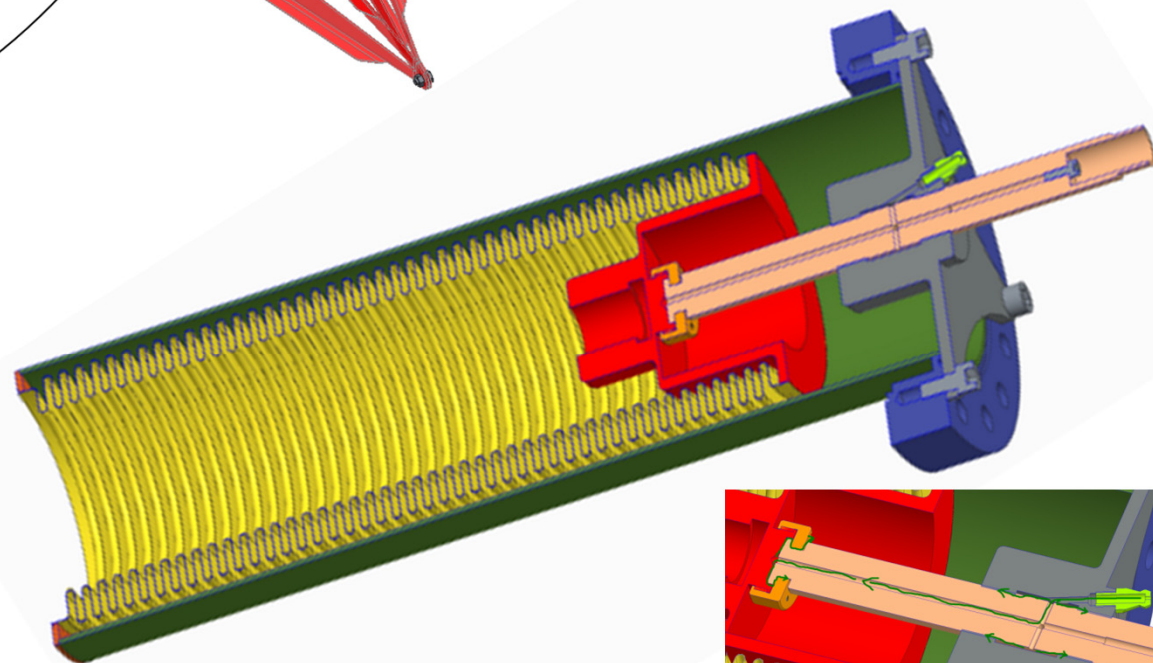
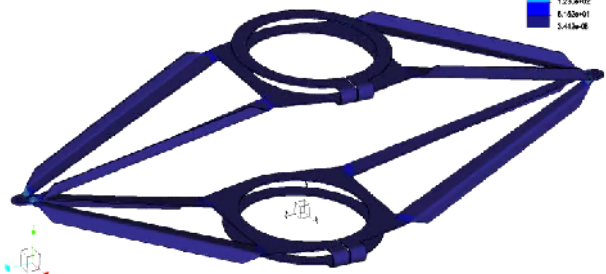
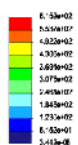
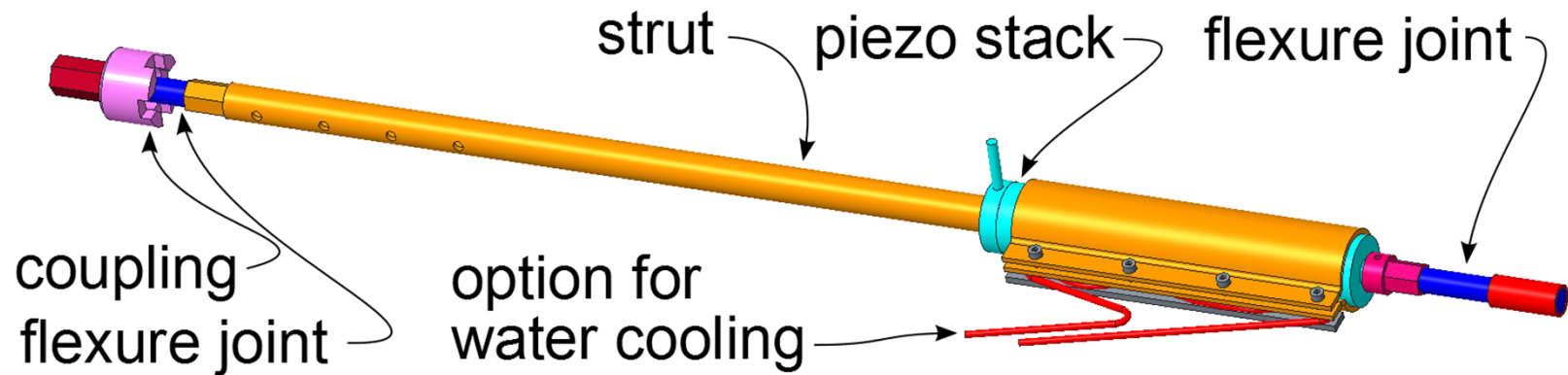


Figure 3-4-28
Stress von Phase (MCA)
[MPa]
Defined
SMB: 1.000E+00



The generic mirror chamber for the European XFEL : Tino Noli

Strut of the Cartesian parallel kinematic with embedded piezo stack drive

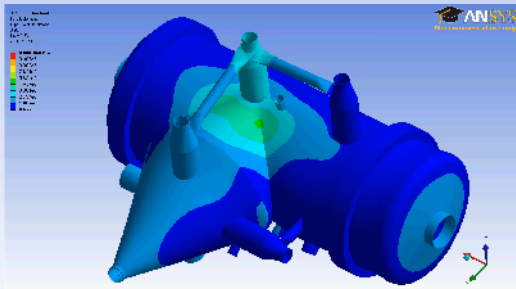
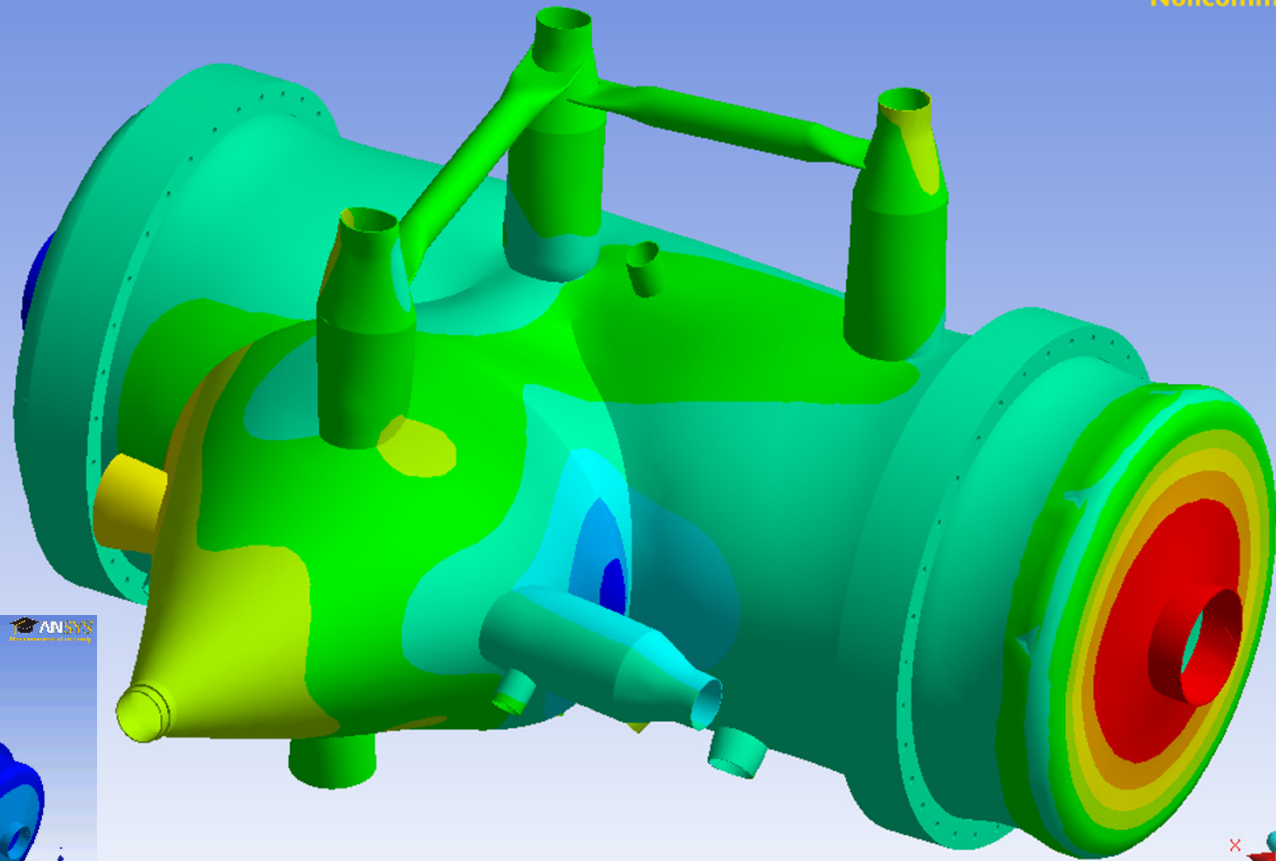


Simulation results of the vacuum chamber under air pressure

-> displacement of the wall

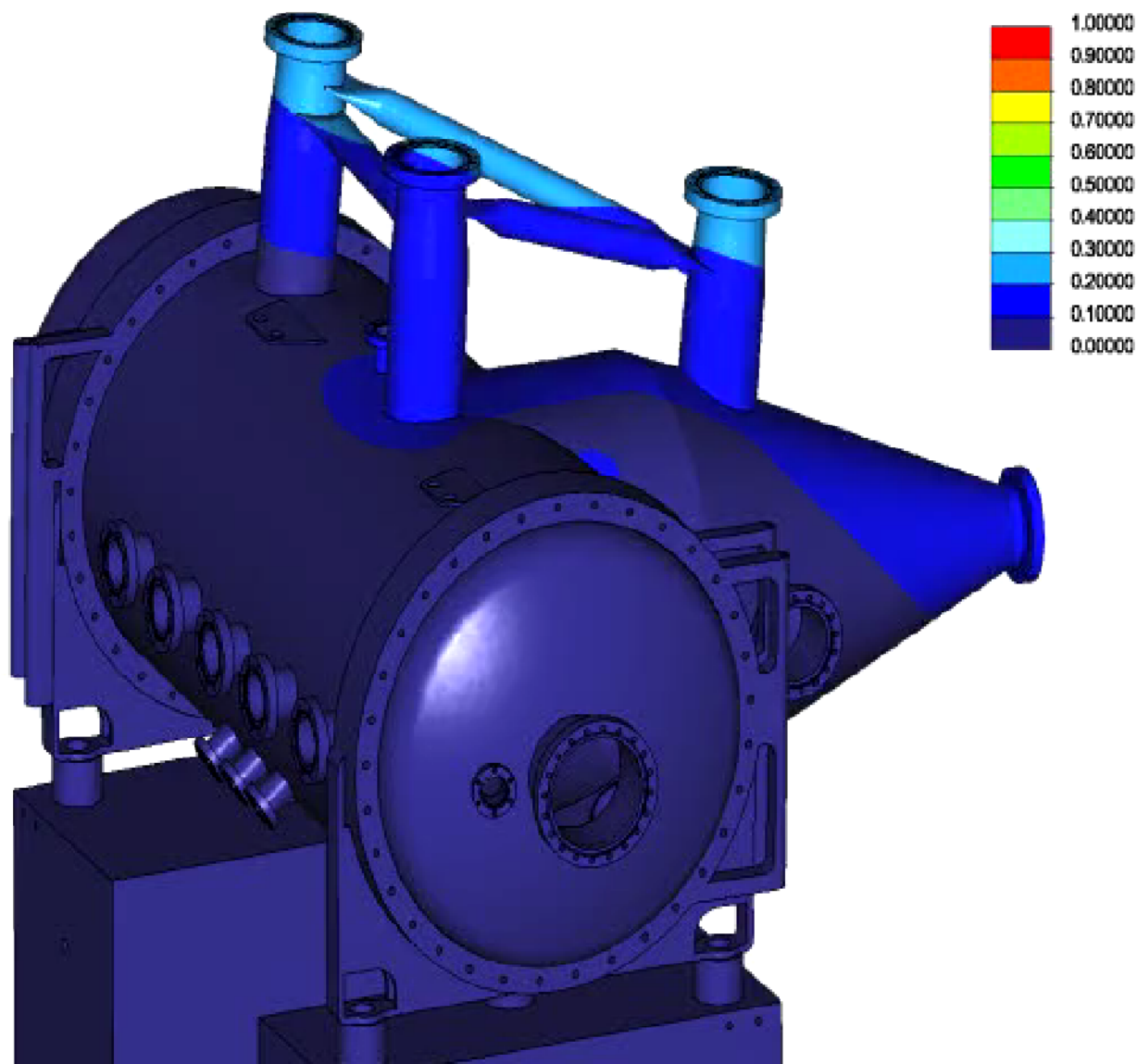
B: Static Structural
Directional Deformation
Type: Directional Deformation (X Axis)
Unit: m
Global Coordinate System
Time: 1
28.03.2012 17:29

4.1632e-5 Max
3.3619e-5
2.5607e-5
1.7595e-5
9.5829e-6
1.5708e-6
-6.4414e-6
-1.4454e-5
-2.2466e-5
-3.0478e-5 Min



Modal analysis of the vacuum chamber with granite base -> 1st eigenfrequency at 98 Hz

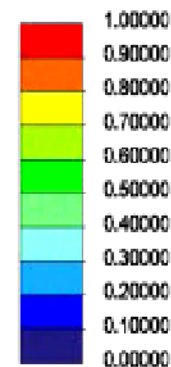
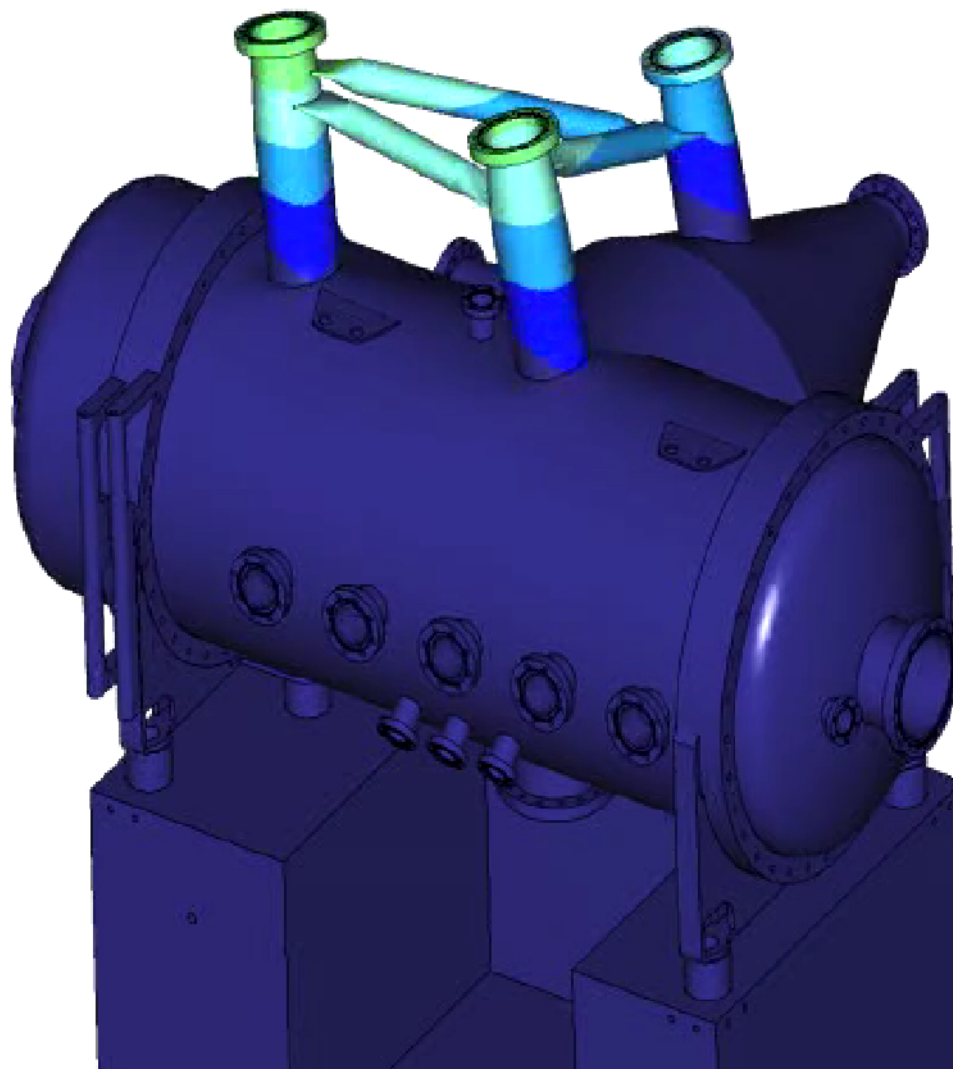
Frame 2 of 24
Displacement Mag (WCS)
(mm)
Deformed
Max Disp 1.0000E+00
Scale 2.0368E+02
Mode 7, +9.8023E+01



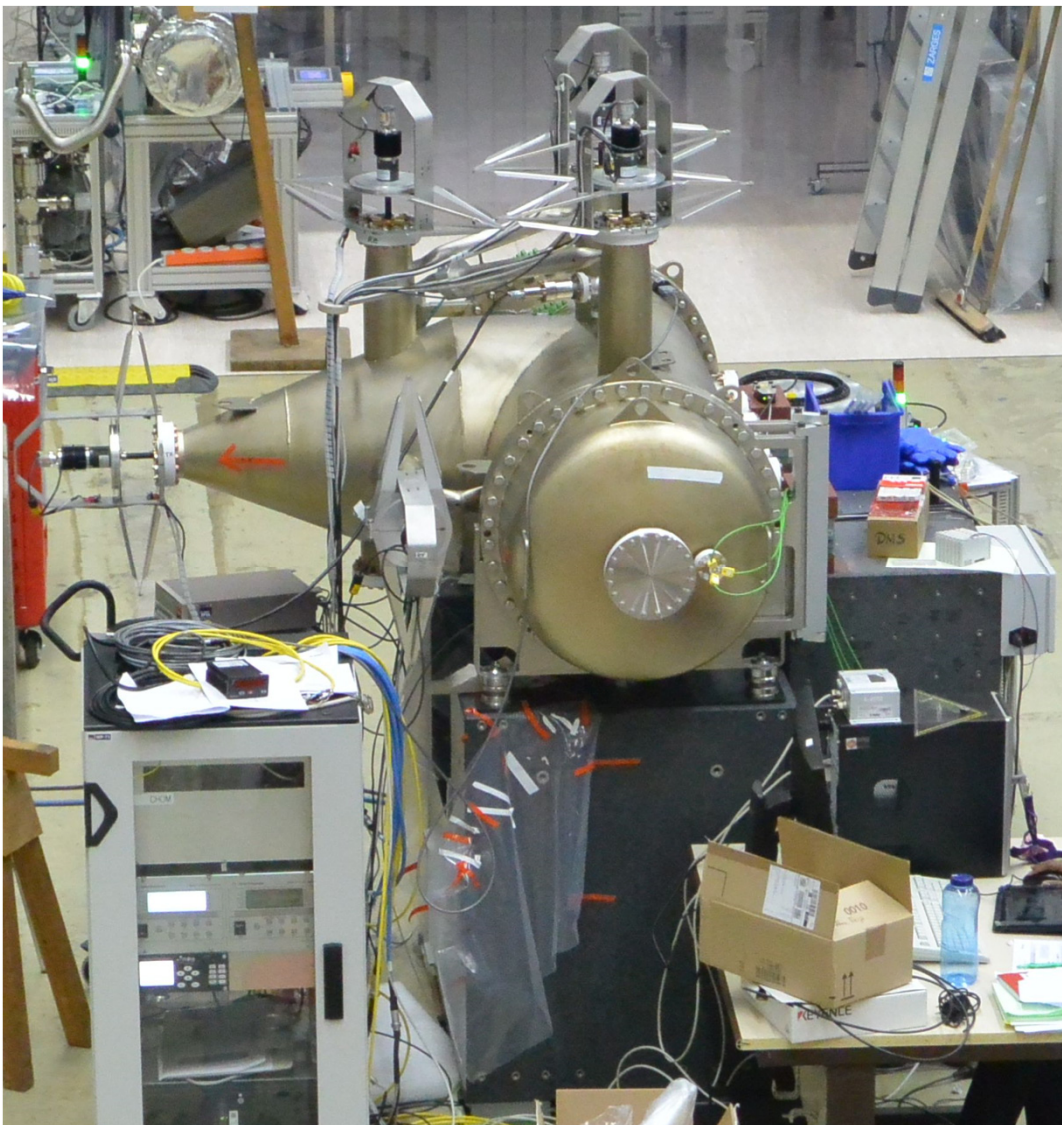
Modal analysis of the vacuum chamber with granite base

-> 2nd eigenfrequency at 114 Hz

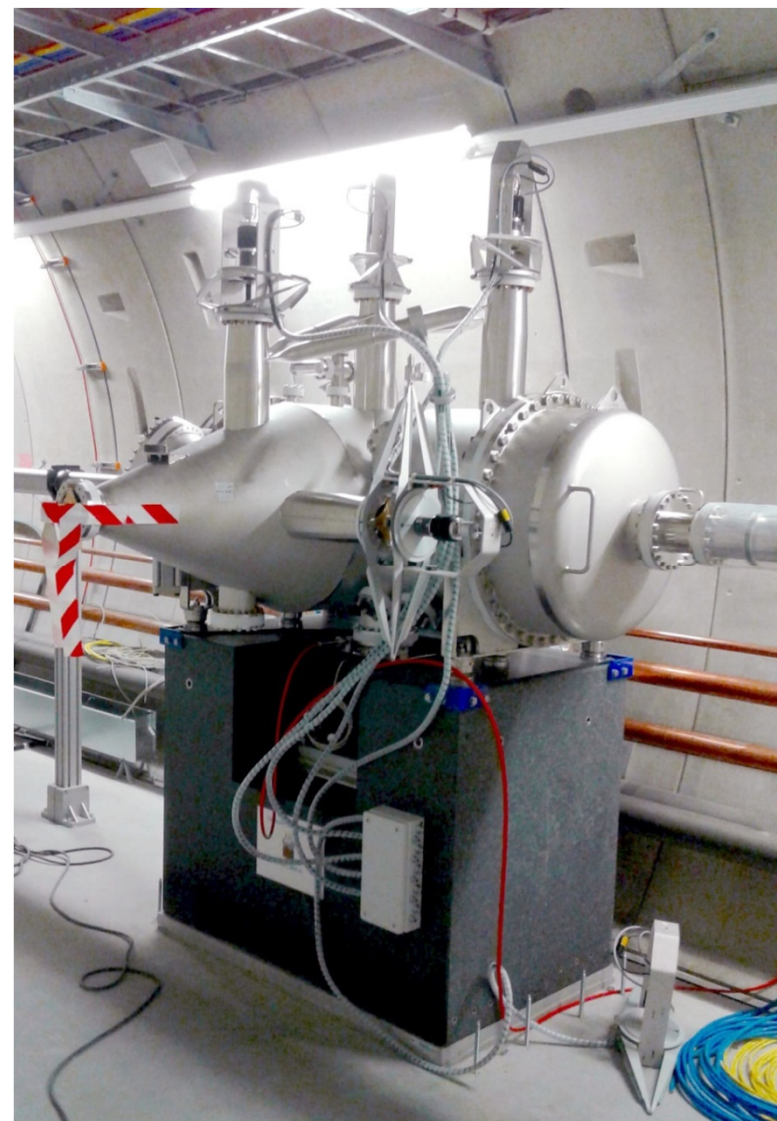
Frame 3 of 24
Displacement Mag (WCS)
(mm)
Deformed
Max Disp 1.0000E+00
Scale 2.0368E+02
Mode 8, +1.1458E+02



The prototype in the lab for characterization



installed in the beam line



The generic mirror chamber for the European XFEL : Tino Noll et al.

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