Towards the final design of the beta=1 cavity

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+ discussions with CEA and CNRS colleagues

Introduction

- SPL workplan for beta = 1 cavities revised (Wolfgang's presentation)

- Beta = 1 cavity to be provided by CERN:
  - 2 to 3 copper cavities by end of 2010
  - 4 cavities by end of 2011 (to be done by industry)
  - 4 cavities by end of 2013 (part industry, part CERN)

Introduction

- Design considerations – discussions took place at Saclay on 22nd of March concerning
  - Maximum allowed pressure at cold and warm for cavity beta =1 and beta =0.65 design
  - Beta=1 Cavity
    - Mechanical calculations
    - Position of HOM ports
  - Beta=1 Helium tank
    - Interface with main coupler
    - Interface with tuner
  - Beta=0.65 cavity design
  - Flanges

Design considerations

- Design considerations – discussions took place at Saclay on 22nd of March concerning

  - Maximum allowed pressure at cold and warm for cavity beta =1 and beta =0.65 design
    - As agreed with cryogenic people, the maximum pressure at warm is lowered at 1.5 bars and thus we will have:
      - Max pressure at 300 K : 1.5 bars
      - Max pressure at 2K: 2 bars

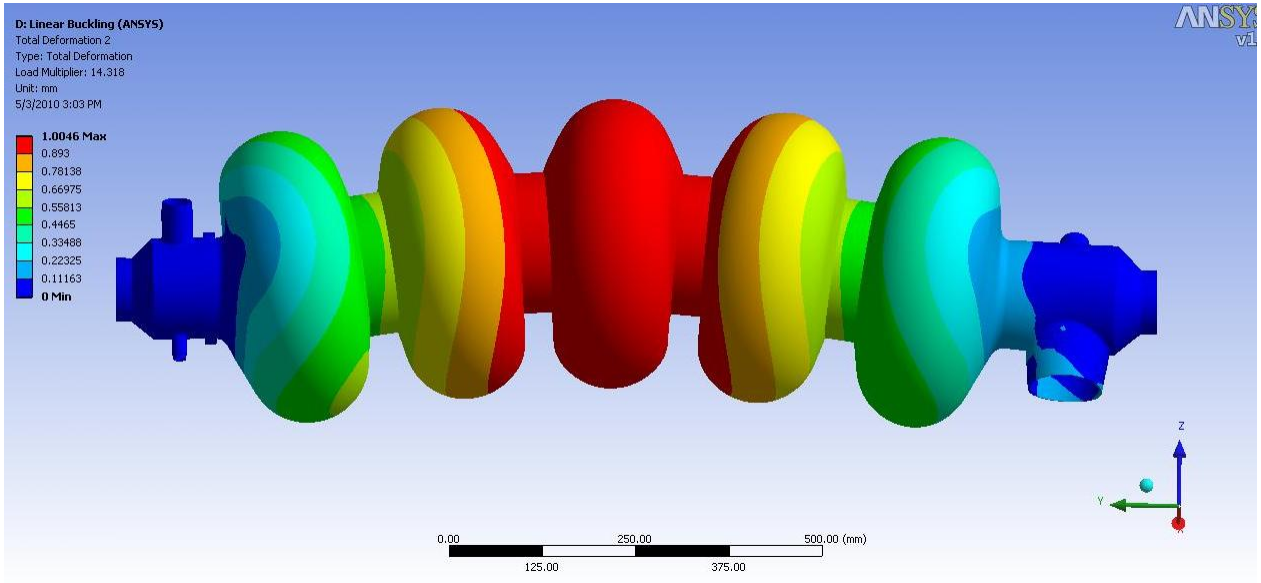
    Rmq: the maximum pressure at warm was decreased in order to help with mechanical design of cavities in particular beta=0.65

Design considerations

- Design considerations – discussions took place at Saclay on 22nd of March concerning
  - Beta=1 Cavity
    - Mechanical calculations
      - The several mechanical calculation were compared,
        - Some had slightly different BC or model differences =>
        - Globally the results were coherent
        - Results lower than the allowable limits at cold temperature
- Since the meeting at Paris, additional calculations were performed at CERN, to check the beta=1 cavity design with respect to buckling behaviour

Design considerations

- Beta=1 cavity buckling calculations
  - Cavity with e=2.5 mm thickness (worst case); boundary conditions fixed-fixed (best case); external pressure loading:
    - 1st buckling mode (security factor of 14 with respect to the p=2bars loading)

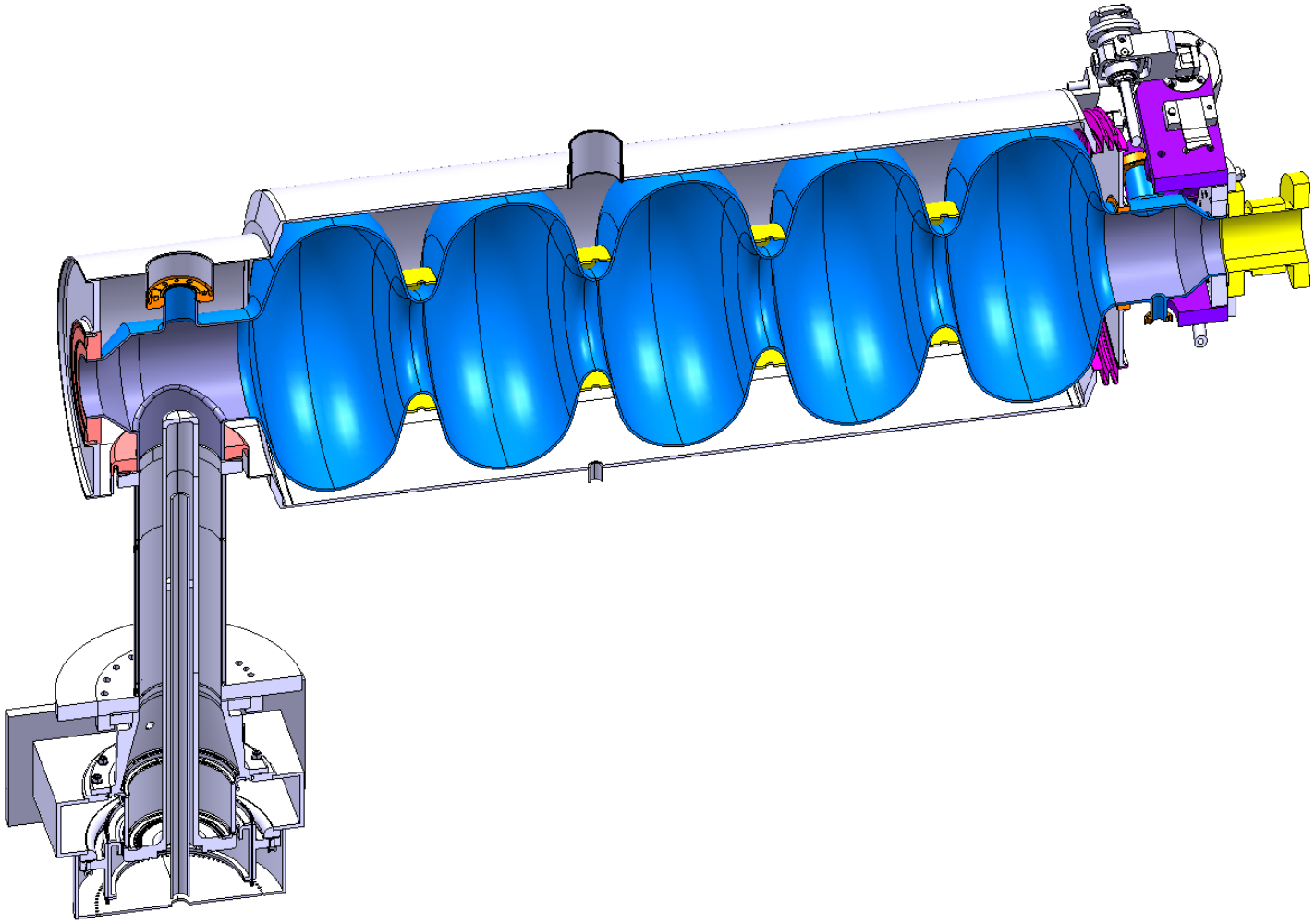


Design considerations

- Design considerations – discussions took place at Saclay on 22nd of March concerning
  - Beta=1 Cavity
    - Position of HOM ports
      - For considerations of mechanical design and manufacturability, the HOM port on main power coupler will be symmetrical to the power coupler
      - The HOM has to be vertical for possible future cooling considerations => the Power coupler will be downwards
      - The other HOM port will be positioned at 60 deg / vertical
      - The pick-up port downwards

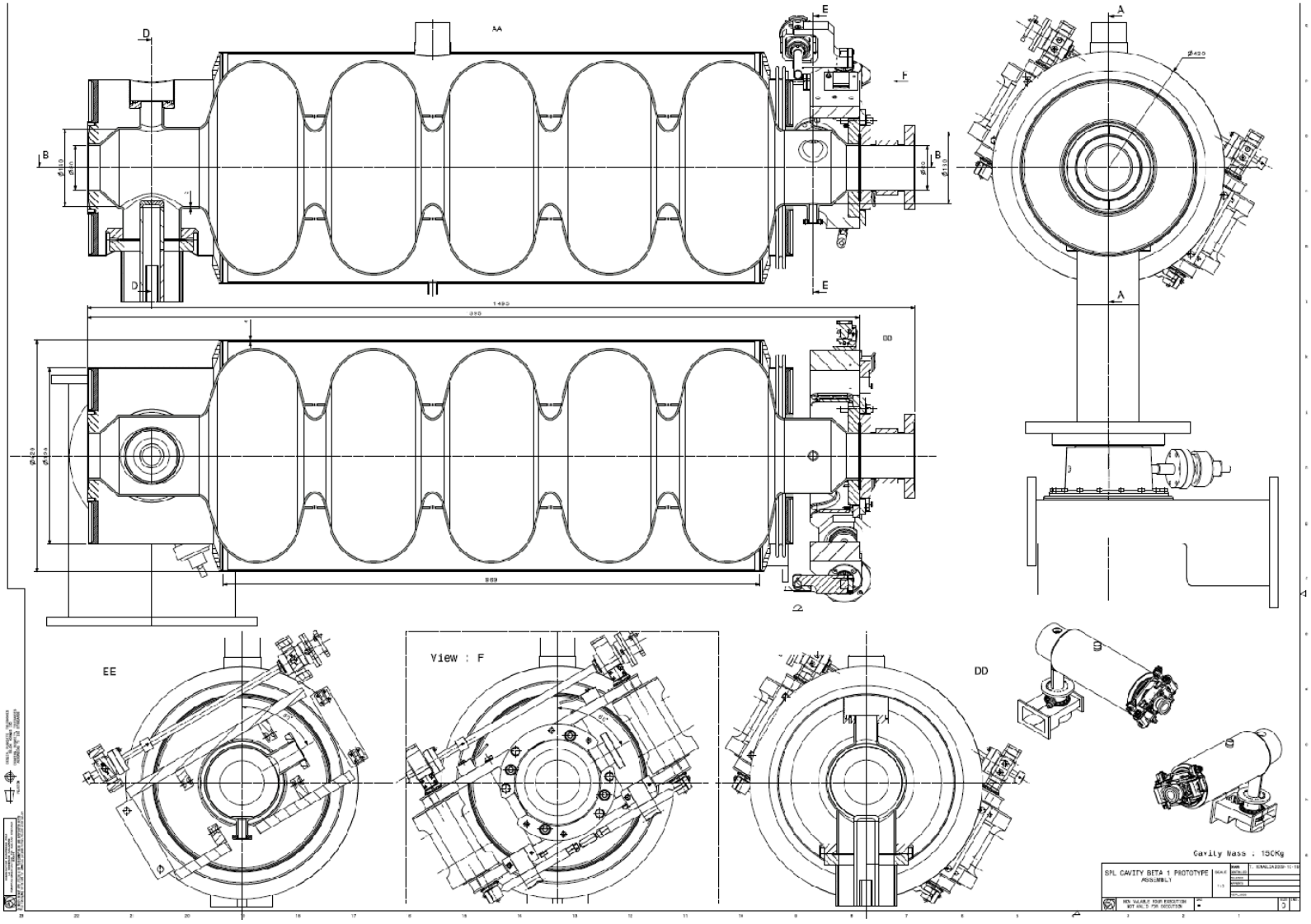
Design considerations

- Position of HOM ports and main coupler



Design considerations

- Position of HOM ports and main coupler



Introduction

- Design considerations – discussions took place at Saclay on 22nd of March concerning
  - Beta=1 Helium tank
    - Interface with main coupler
    - Interface with tuner
    - CERN in principle agrees with the CEA proposal for helium tank modifications; The CEA proposal needs more calculations; when finalized they will be sent to CERN together with the modification of the tuner

Info CERN: concerning the companies visited by CERN for spinning, none of them had succeeded in spinning of Titanium grade 2

Introduction

- Design considerations – discussions took place at Saclay on 22nd of March concerning
  - Beta=0.65 cavity design
    - CNRS colleagues decided to make for beat=0.65 the same end cavities as for beta=1 and to modify the inner design

Design considerations

- Flanges

	Main coupler port	HOM 1 port	HOM 2 port	Inter cavities (both sides)	Pick-up	Tank / ext down	Tank / ext up
Flange + joint	**NbTi + Copper joint (CERN) – to be tested !**	**NbTi CF + copper as CF (TBC) – exper LEP ?**	**NbTi CF + copper as CF (TBC) – exper LEP ?**	**NbTi + Al joint (DESY)**	**NbTi CF + copper as CF (TBC) – exper LEP ?**	**Bimetallic or NbTi CF**	**Bimetallic or NbTi CF**