

# XFEL Bunch Compressor BC1 and BC2 Vacuum Issues

Nils Mildner, Torsten Wohlenberg, Kirsten Zapfe  
XFEL Beam Dynamic Meeting

# Bunch compressor section BC1 and BC2

## General remarks

### Lengths of the vacuum system BC1 and BC2:

BC1: total length ~ 69m → chicane length ~ 27m → deflection of the chicane ~ 0.68m

BC2: total length ~ 90m → chicane length ~ 25m → deflection of the chicane ~ 0.33m

### Vacuum requirements:

- Pressure needs to be in the range of  $10^{-10}$  mbar (next to cold sections)
- Pump system: sputter ion pumps and titan sublimations pumps

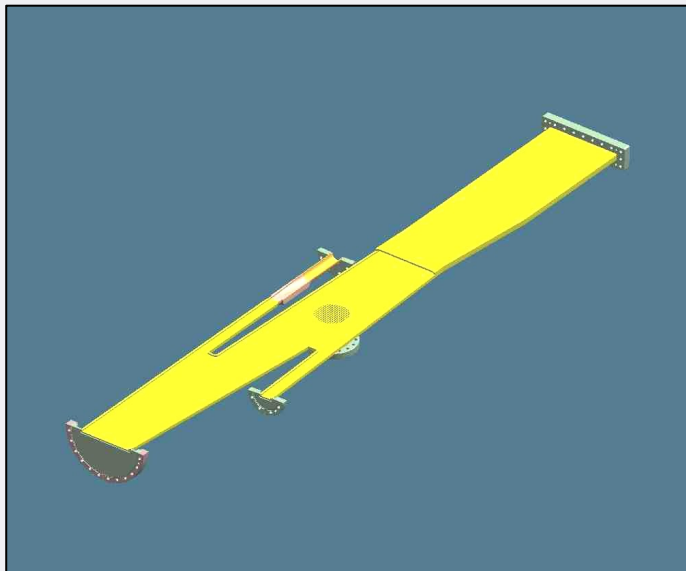
### Both sections are particle free :

- The design of **all vacuum components** needs to be according to the particle free conditions. Early discussion of concept of **all components including beam diagnostic** is necessary!
- All vacuum components have to be cleaned under particle free condition (clean room).
- Installations needs to be done under local clean room conditions.

# Bunch compressor section BC1 and BC2

## General remarks

- From the point of view of vacuum technology both BC sections should be treated similar. This should be valid for the aspect of material choice, joining technology, support for the chambers etc..
- The design concept for the flat chamber in the chicane is similar to FLASH!



## Bunch compressor section BC1 and BC2

### Girder, frames and support

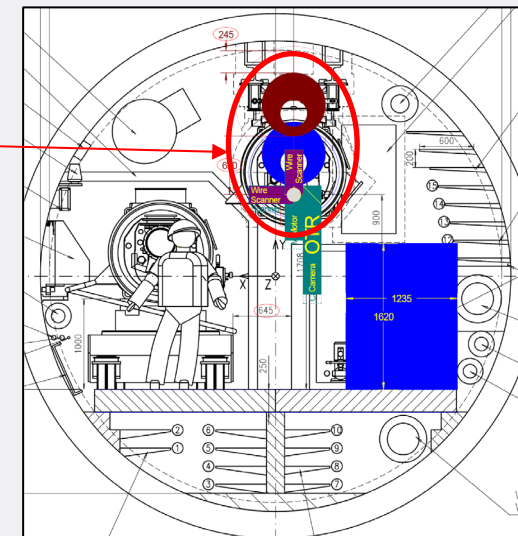
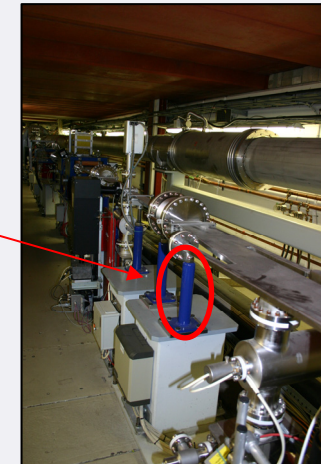
#### Mounting Concept:

- 1st remark: The frames and the girder have to be mounted around the helium transfer line! → **very difficult!**
- 2nd remark: Working at high level under local clean room conditions! → **very difficult, very little space**
- 3rd remark: Installation of the BC sections can not start before the helium transfer line is completely installed!
- Vacuum chamber and other components will be mounted first on the girder and will be aligned on the girder. This will be done on the floor. Then the complete unit will be mounted into the frame and connected under local clean room conditions. After completion the whole system needs to be aligned.
- A well thought out alignment concept is needed!
- The installation of the complete system will take several months.

## Bunch compressor section BC1 and BC2

### Girder, frames and support

- Support for the vacuum chambers will be designed by the vacuum group.
- In the concept to mount the BC from the top, all girders and frames should be designed by the group MPL(?).
- An examination with respect to stability, oscillation behavior etc. must be done!
- A well deliberated girder and frame concept will be needed regarding the **helium transfer line**, **the length max. 6m(!) units** and with respect to **periodical iteration (how many type of girders do we need?)!**



## Bunch compressor section BC1 and BC2

### Schedule

#### Draft:

- Components layout + girder and frames concept including electronics/diagnostics units concept ~ 1 year
- Design of BC1 and BC2 ~ 1 year
- Fabrication of all components ~ 1.5 years
  
- 2007, A **rough concept** should be settled for the girders/frames concept including electronics and diagnostics as well as part of the layout of the components. → layout for the arrangement of the components should be available!
- 2008, **The detailed concept** for the layout of the components, electronic concept and the girder and frames concept should be finished.

## Bunch compressor section BC1 and BC2 open issues

- Do we have the BC's chicane to be installed vertically or horizontally? → we prefer vertical installation!
- Do all components need to be copper coated in both BC's?
- Can the RF-shielding remain the same as for FLASH or do we have to design a new concept for the flange connections, bellows, valves and pump connections?
- Is a massive lead shielding necessary ?  
→ need to be included into the girder and frame design!
- How does the dump section for BC1 and BC2 look like?
- What diagnostic installations will be needed next to the beam line?

## Bunch compressor section BC1 and BC2

**Thank you for your attention!**