

# Plan for the summer

Nobuhiro Terunuma, KEK

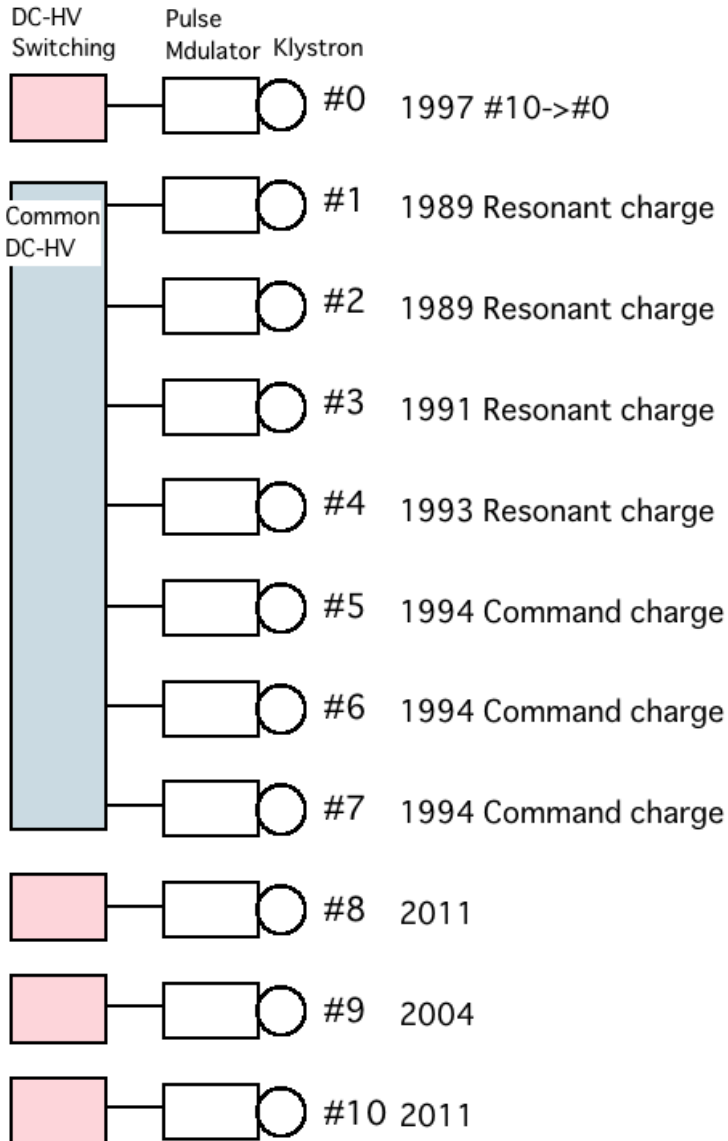
ATF day: ATF Collaboration Meeting  
European Linear Collider Workshop ECFA LC2013, May 28, 2013

# Major works in summer

- **For the stable beam injection**
  - **Stabilize the LINAC**
    - **Klystron Modulators**
    - **Refrigerator for the RF cooling water system**
  - **Stabilize the DR**
    - **Checkout of power supplies, Air, Cooling water, ...**
- **For Goal-2**
  - **ATF2 IP**
- **For low emittance (2pm)**
  - **Laser Wire Monitor in DR**



# Renewal of the klystron PS(1)

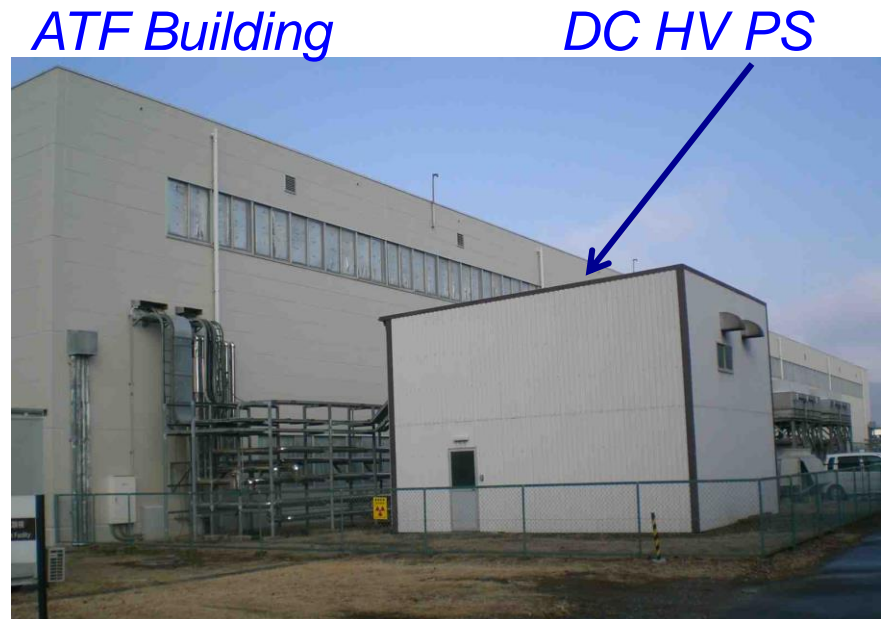


*Stabilization of the klystron power supply is key issue for the stable beam.*

*Each klystron power supply has different history and different hardware.*

*Especially, the common DC High Voltage power supply (common DC HV PS) is located outside of the building, which made many troubles.*

*The replacement of the power supplies from the common DC HV PS to the switching HV PS is now in progress.*

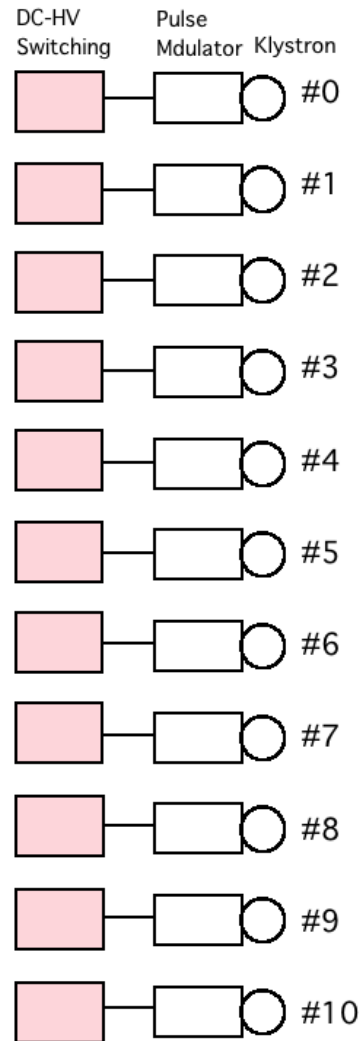
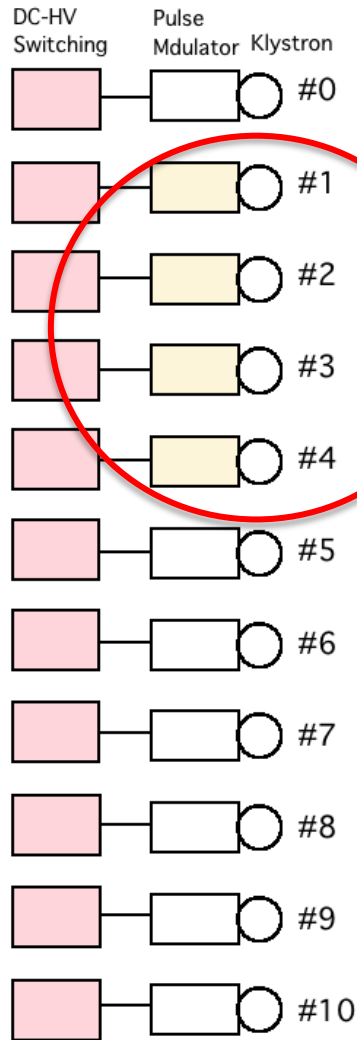




# Renewal of the klystron PS(2)

Apr/2013  
All switching PS

Oct/2013  
All compact modulator



□ Compact modulator    ■ Old type modulator



Old type modulator



Compact modulator



# Renewal of the LINAC cooling water system



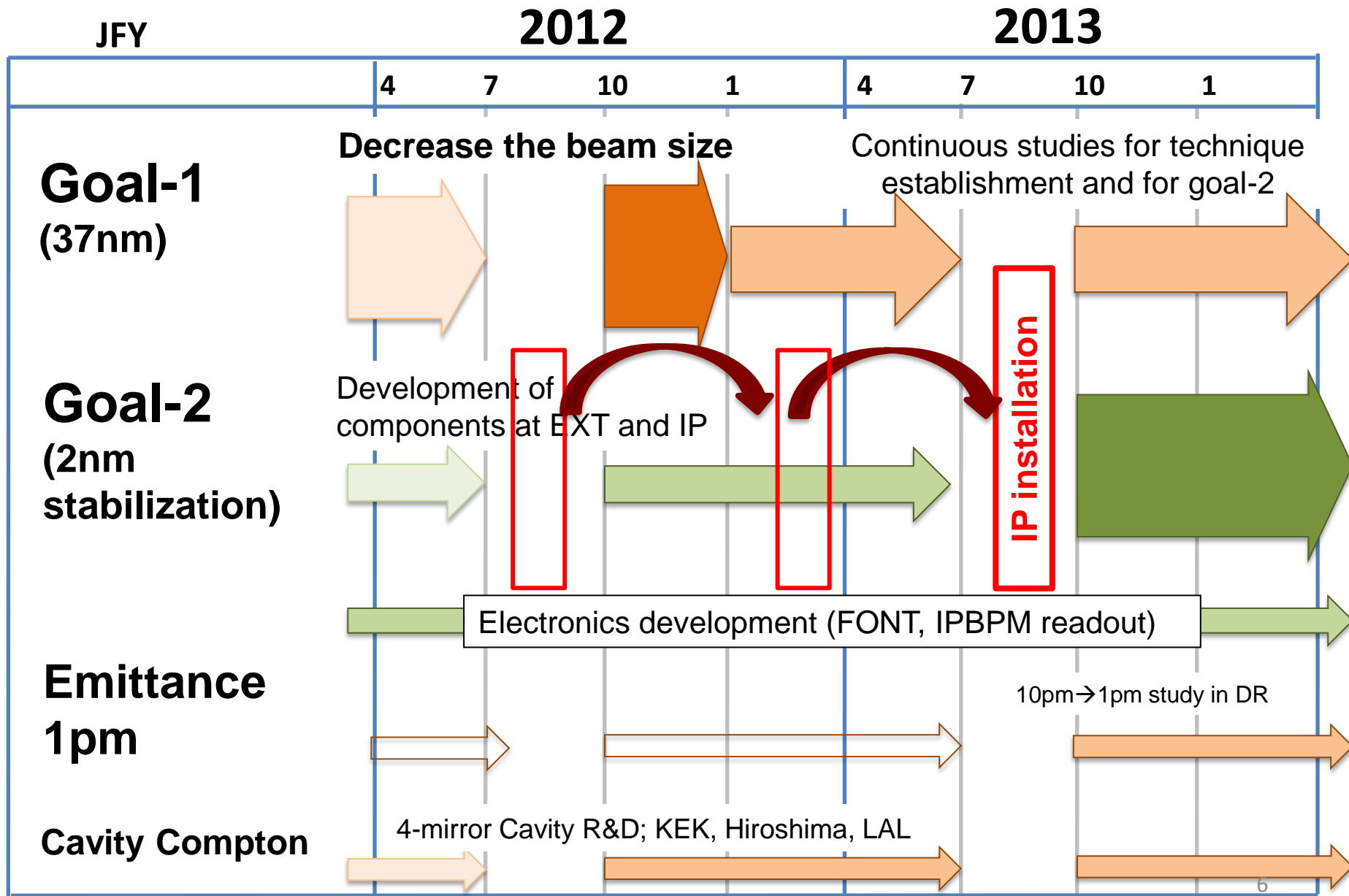
## Present refrigerator

- decreased performance
  - Assembled in 1990
  - broken fins for heat exchange
- No intelligent power control (ON/OFF only)
  - sudden change of a temperature
  - unstable RF

## New refrigerator in this summer

- brand-new
- linear power control (automatic)
  - stable temperature
  - stable RF → **stable beam injection**

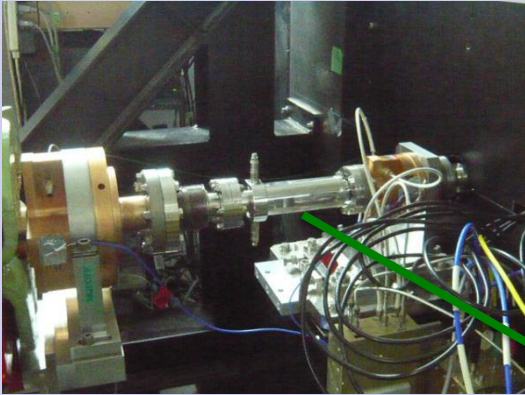
# Schedule in 2012-2013



# ATF2 goal 2 : nm-beam position stabilization

## New FONT-kicker

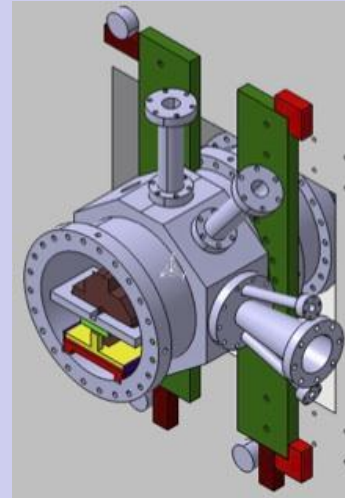
Installed near the ATF2-IP  
Used since autumn 2012



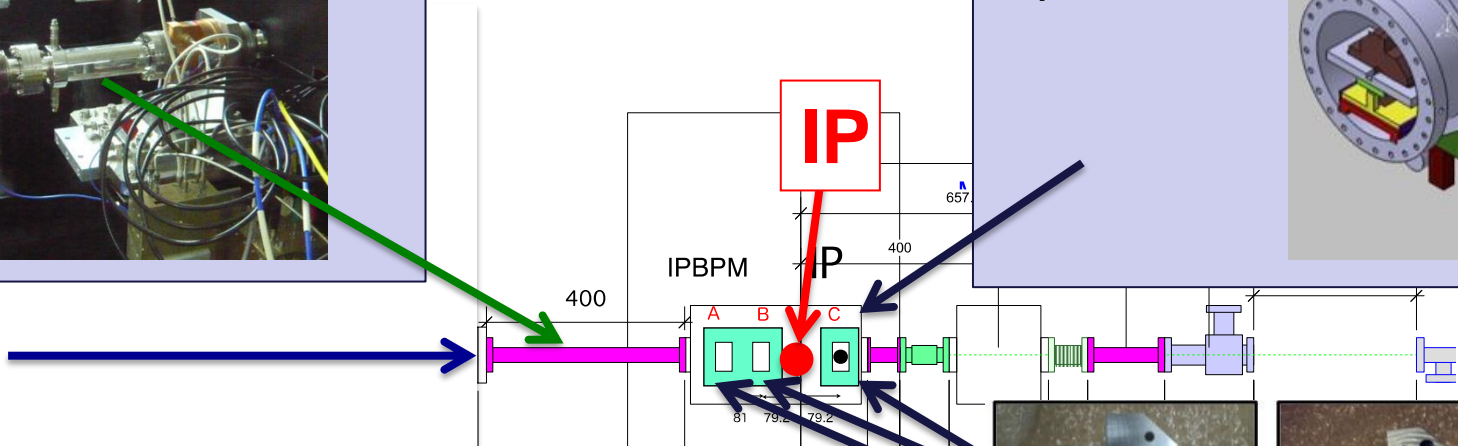
KEK  
KNU  
LAL  
JAI/Oxford

## New vacuum chamber

Precise positioning of IPBPM triplet

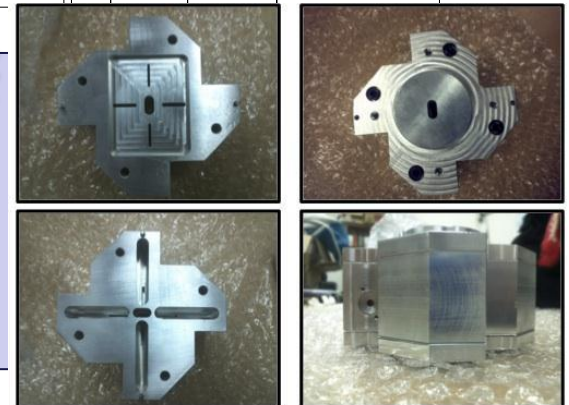


Beam



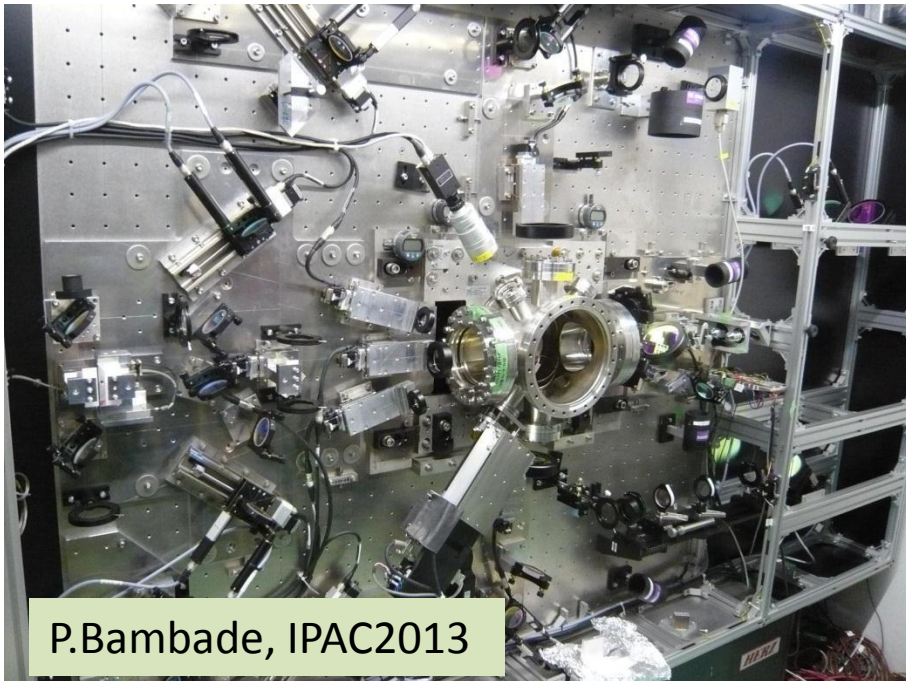
## Triplet of New IPBPM

Low-Q short gap cavity light weight BPM  
Sensitivity tested at ATF LINAC  
Readout electronics tested at ATF2



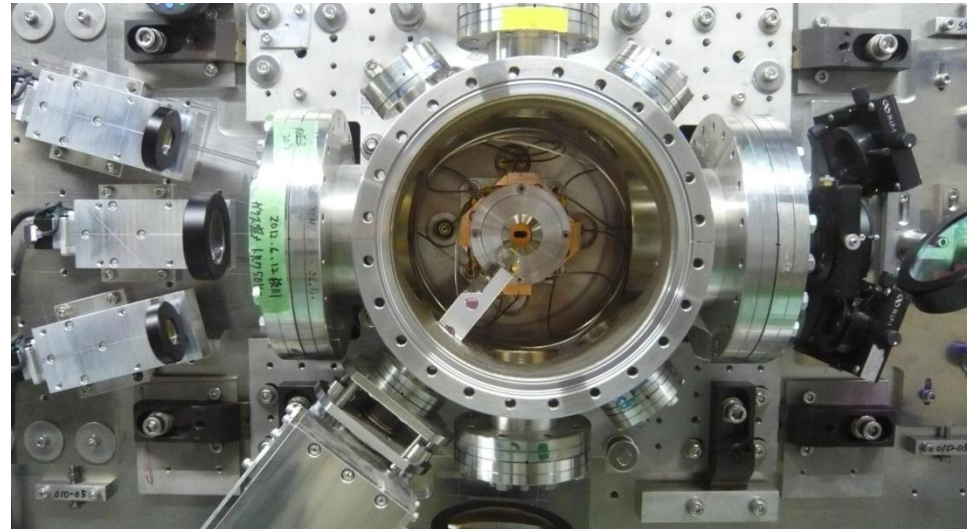
# Requirements for new IP chamber

1. Pre-alignment of IP-BPM set with respect to rest of beam line  $< 200 \mu\text{m}$
2. Internal pre-positioning accuracy  $\sim 50 \mu\text{m}$
3. Remote relative positioning via beam based alignment within  $< 5 \mu\text{m}$   
(dynamic range of IP-BPM electronics)
4. Mechanical calibration of IP-BPM scale factors  $\rightarrow 10^{-4}$
5. Compatibility with IP-BSM operation (viewports for lasers, wire-scanner, electron / laser beam alignment...)



P.Bambade, IPAC2013

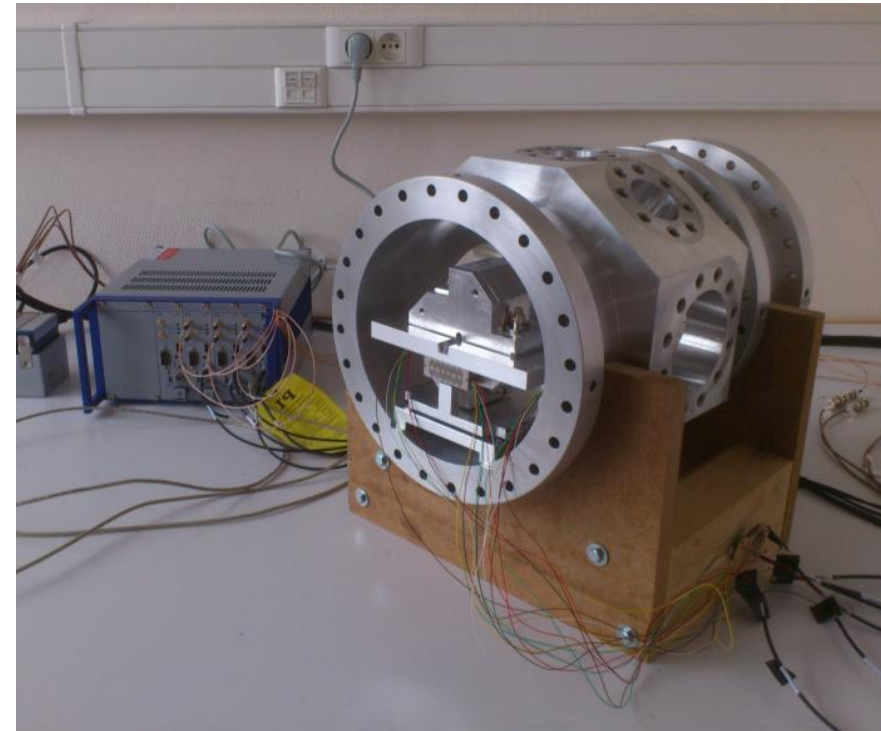
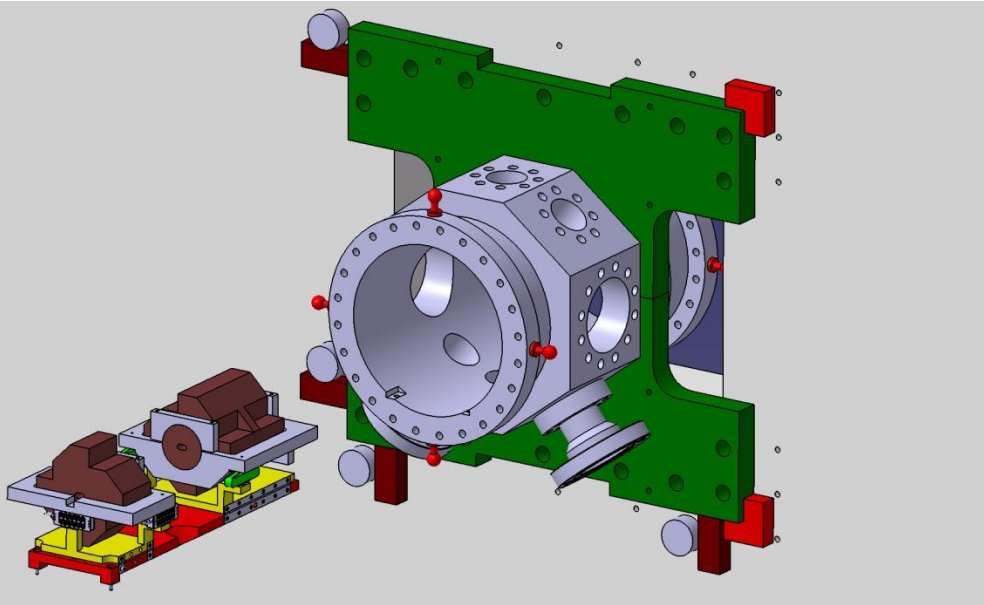
## *Present IP-chamber (FFTB)*





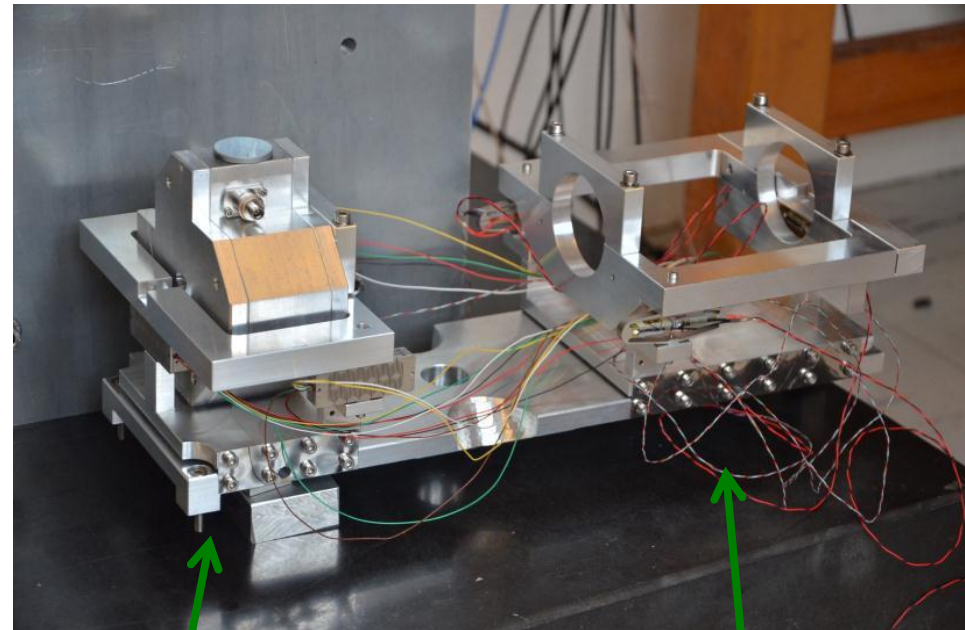
# Main features of new IP chamber

1. Mechanical references for precise pre-positioning and alignment
2. Adjustable fixture for rigid mount on IP-BSM optical table
3. Base-plate + cradles support BPM1-2 and BPM3 in tripod configurations
4. Lateral & vertical adjustments with 8 piezo-movers in 230-300  $\mu\text{m}$  range
5. Positioning within  $10^{-4}$  of the range (strain gauges as input to feedback)
6. In-vacuum temperature monitoring
7. Remote electronics (25 meter cables)



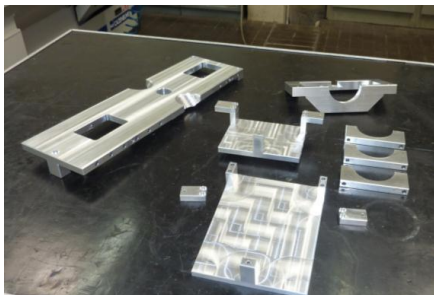
# Mechanical parts almost completed

- Chamber and internal parts manufactured at LAPP
- Modifications, alignment tools and temporary flanges at LAL
- Mounting fixtures on IP-BSM vertical table and for vibration sensor on chamber at LAL
- Upstream chamber extension, viewports extensions, final upstream / downstream flanges and tool for in situ relative laser / beam / IP-BPM alignment in progress at KEK



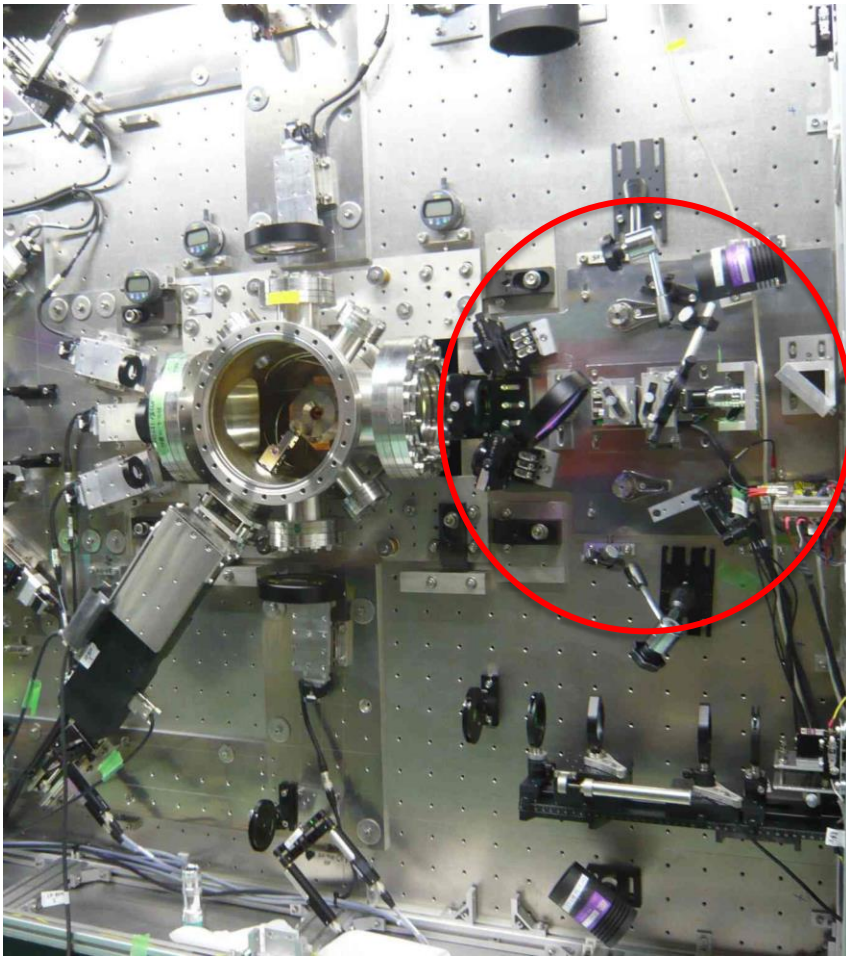
4 PI piezo-actuators

4 Cedrat piezo-actuators



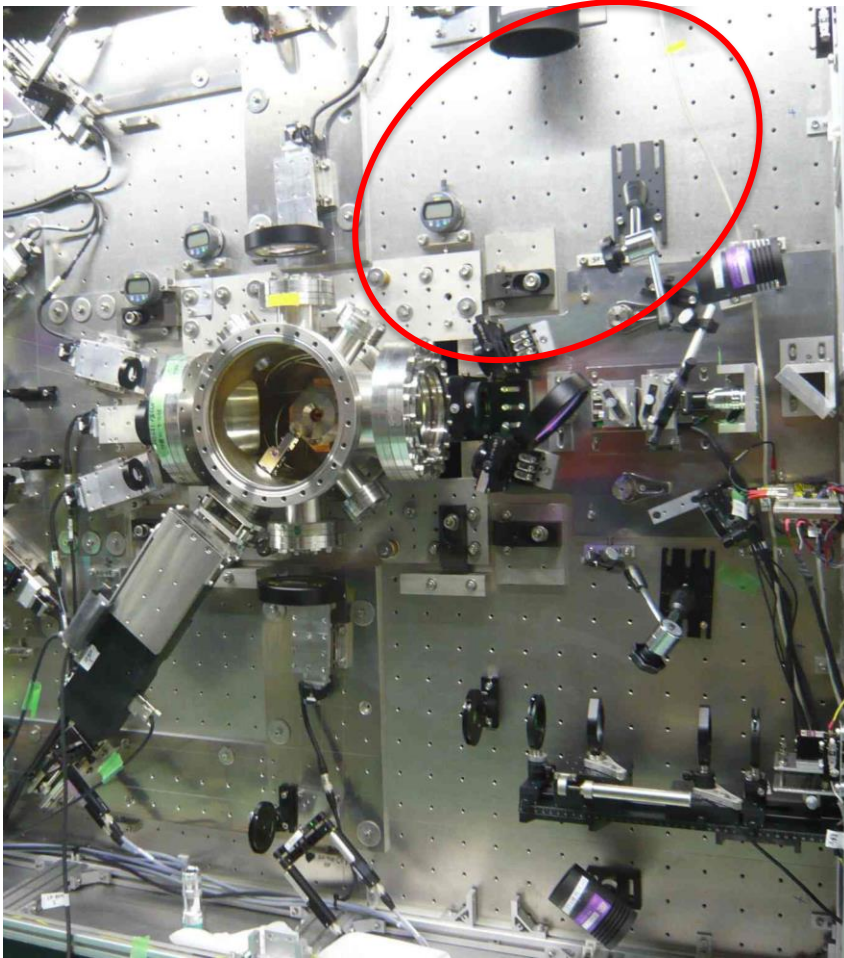
P.Bambade, IPAC2013

# Remove uncertainty of laser path at IP

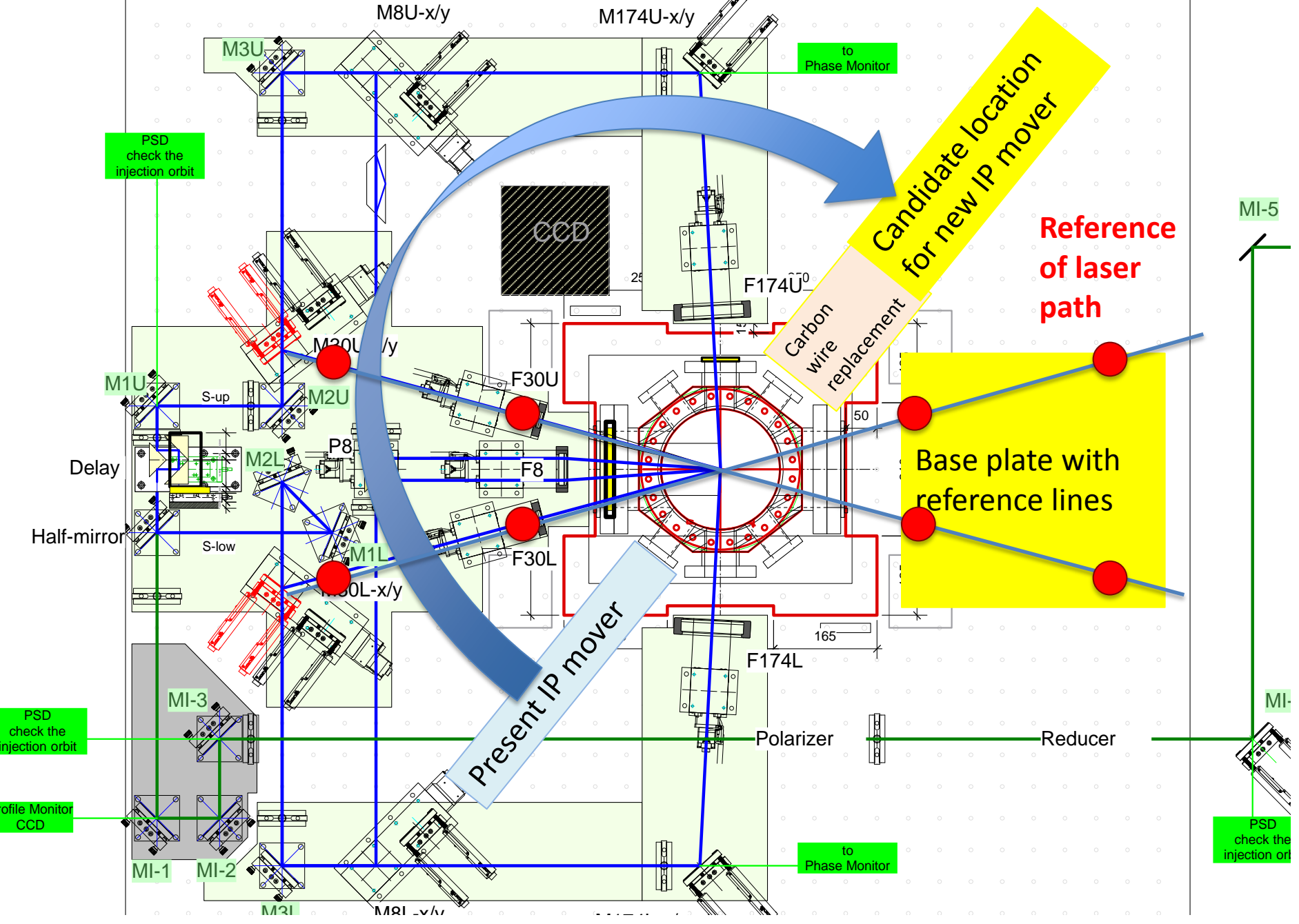


- Put new base plate at right side with reference lines.  
→ 8, 30 degrees
- **It makes Left-Right constraint on the laser path to minimize the uncertainty of fringe tilt, roll and pitch.**
- Connect all base plate with relative-position constraints. → 174 degree

# IP screen and Carbon wires



- Can not maintain the carbon wire by opening the end plate anymore. BPM is there.
- Need extension box to replace wires by moving a rod to there.
- Space for this box is available only at the upper right of a table.
- Connect all base plate with relative-position constraints. → 174 degree



Candidate location for new IP mover

Reference of laser path

Base plate with reference lines

Carbon wire replacement

Present IP mover

PSD check the injection orbit

to Phase Monitor

MI-5

PSD check the injection orbit

Offline Monitor CCD

to Phase Monitor

PSD check the injection orbit

# Summary

- **Improvement of the LINAC will be done for the stable beam injection.**
  - Four LINAC Klystron Modulators will be renewed.
  - Refrigerator for the LINAC RF will be renewed.
- **ATF2 IP will be reconfigured for Goal-2.**
  - chamber with 3 IP-BPMs on movers
  - well defined laser alignment scheme for IPBSM
- **New Laser Wire Monitor in DR will be available for the low emittance study.**