Introduction

- background for the following talks -

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ATF2 Technical Review, April3-4, 2013, KEK

ATF2 Goals

- **Achievement of 37 nm beam size (Goal 1)**
  - Demonstration of a compact final focus system based on local chromaticity correction
  - Maintenance of the small beam size
- **Control of beam position (Goal 2)**
  - Demonstration of beam orbit stabilization with nano-meter precision at the IP
  - Establishment of beam jitter controlling techniques at the nano-meter level with an ILC-like beam

Brief History

2005: ATF2 proposal

2007 – 2008: Beamline construction

2009 Jan-: Started the ATF2 beam commissioning

2009 Nov: First detection of IPBSM signal (2° mode)

2010 May: 300 nm (IPBSM 8° mode)

2011 Mar-: Earthquake and recovery

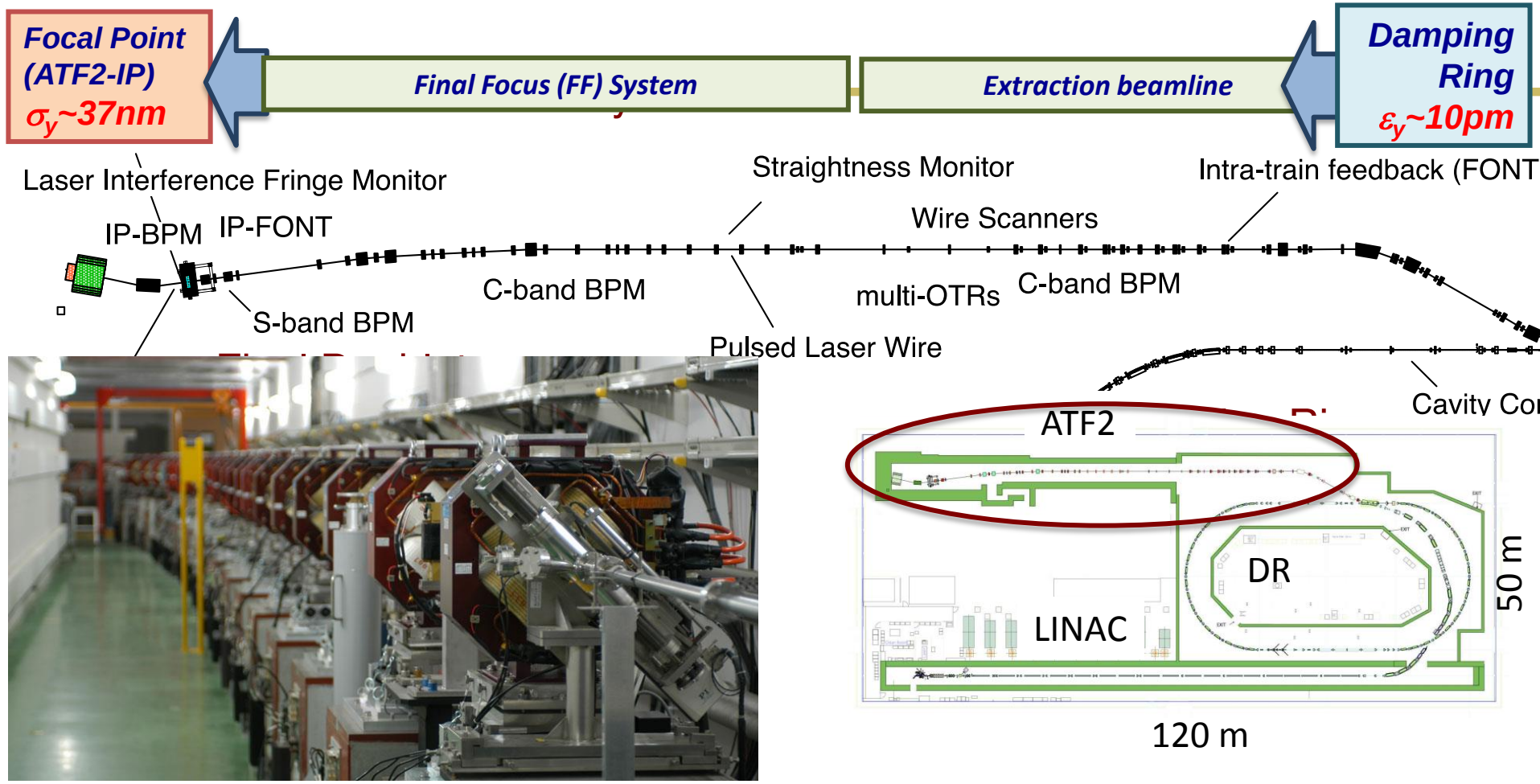
2012 Jan: Recovered the beam size achieved before the earthquake

2012 Feb: 160 nm (IPBSM, first 30° mode)

2012 Dec: 70 nm (IPBSM, first 174° mode)

ATF2

The ATF2 has been designed, constructed and operated under the international collaboration.

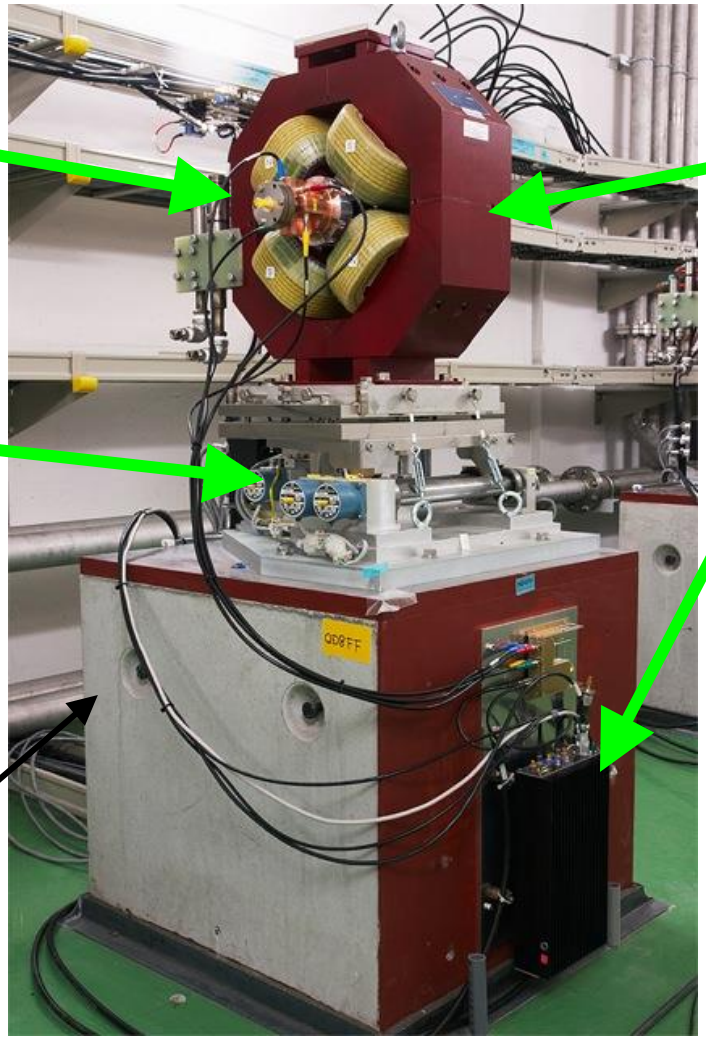


International Contribution (1)
ATF2 Q-magnet Setup

QBPM
(Cavity BPM)
(KEK,PAL)

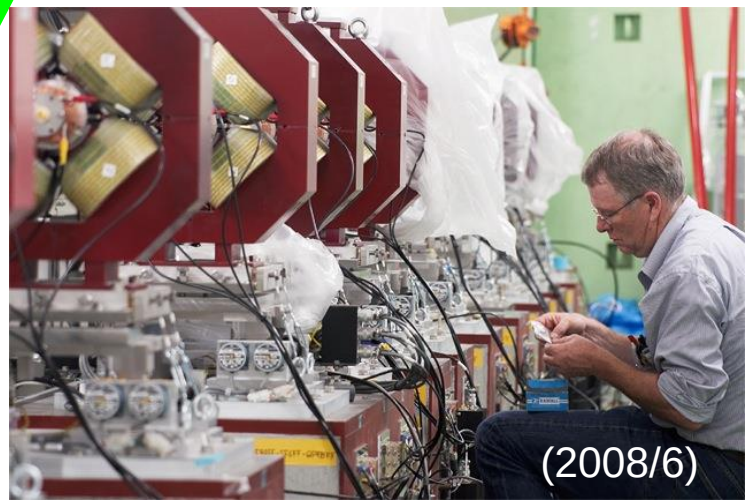
FFTB mover
(SLAC)

Concrete
Base Stand
(KEK)



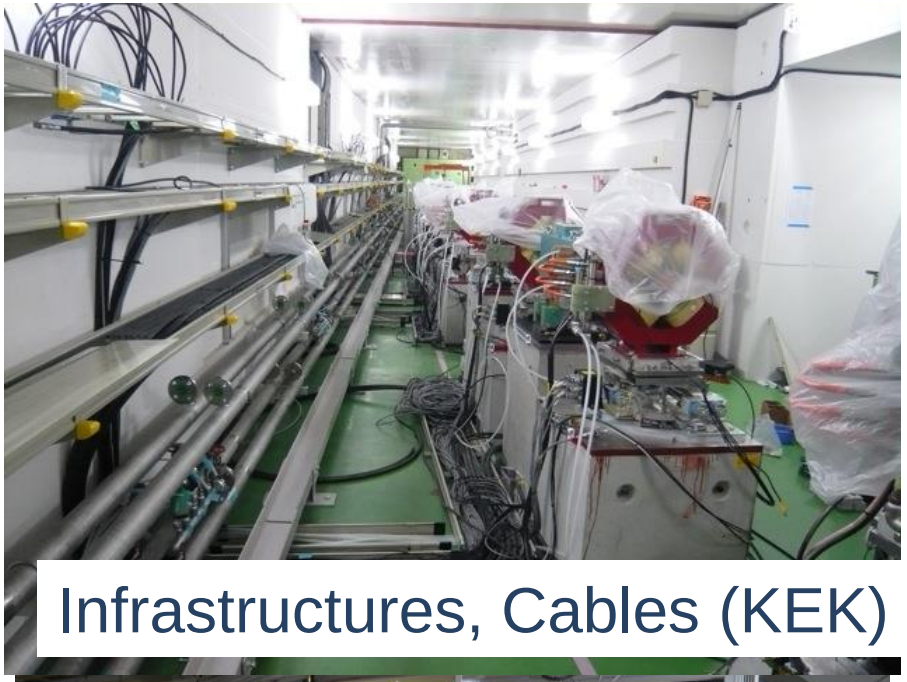
Q magnet
(KEK,SLAC,IHEP)

QBPM
electronics
(SLAC)



International contribution (2)

High Availability PS (SLAC)



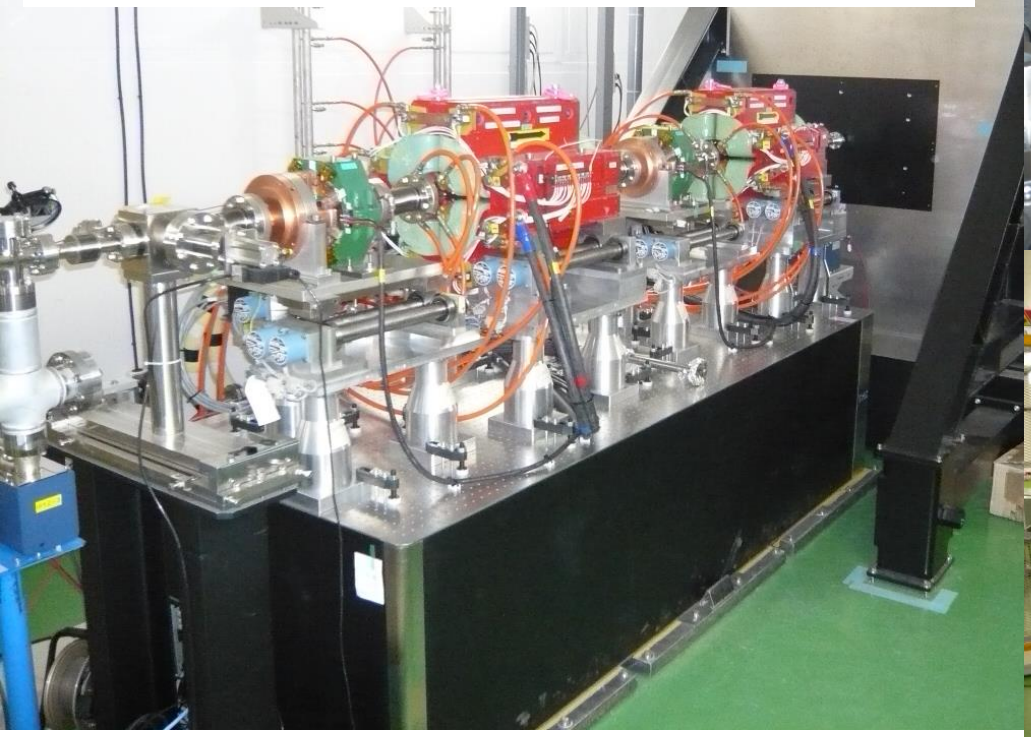
Infrastructures, Cables (KEK)

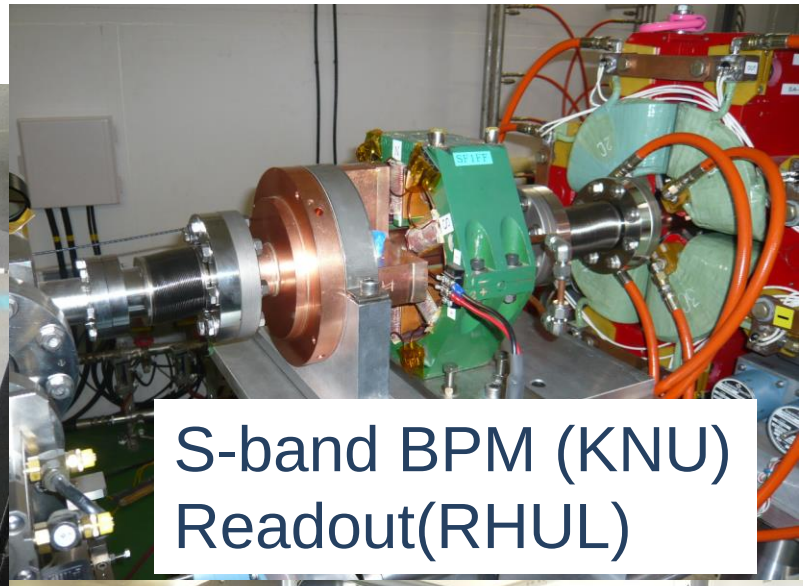
FF dipoles, quadrupoles (IHEP)
Sextupoles (SLAC)

Magnet mover system and QBPM readout (SLAC)

International contribution (3)

Final Doublet system
- Magnets and Movers(SLAC)
- Supports and Table (LAPP)



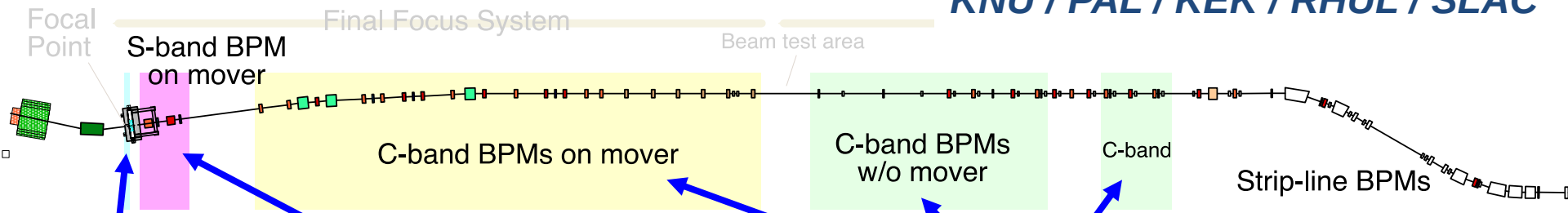


S-band BPM (KNU)
Readout(RHUL)

IP-BSM (Tokyo Univ., KEK)

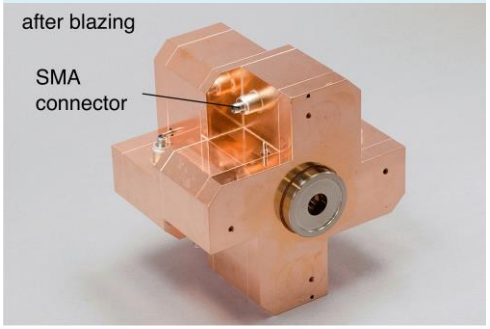
ATF2 Cavity BPM system

KNU / PAL / KEK / RHUL / SLAC



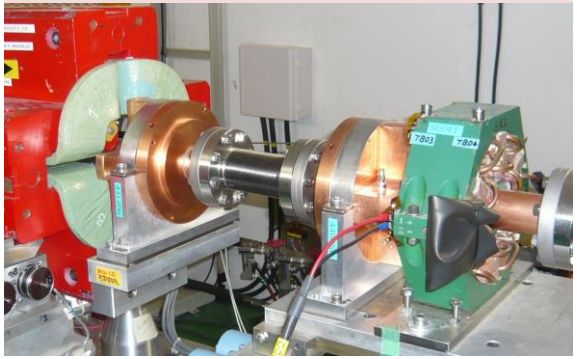
IP BPM system

(BPM + Ref) Cavity
1 unit
Target : 2 nm
Aperture: 6 mm(V)



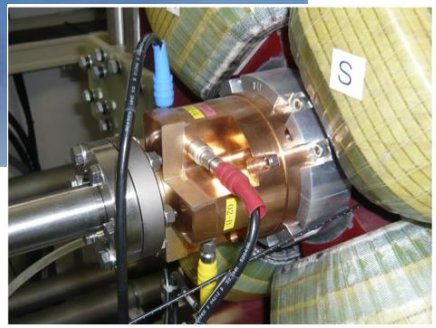
S-band BPM system

BPM cavity: **4 units**
Ref. cavity: **1 unit**
Target : 100 nm
Aperture: ϕ40 mm



C-band BPM system

BPM cavity: **34 units**
Reference cavity: **4 units**
Target resolution: 100 nm
Aperture: ϕ20 mm



Major upgrade after the ATF2 startup

Performance improvement

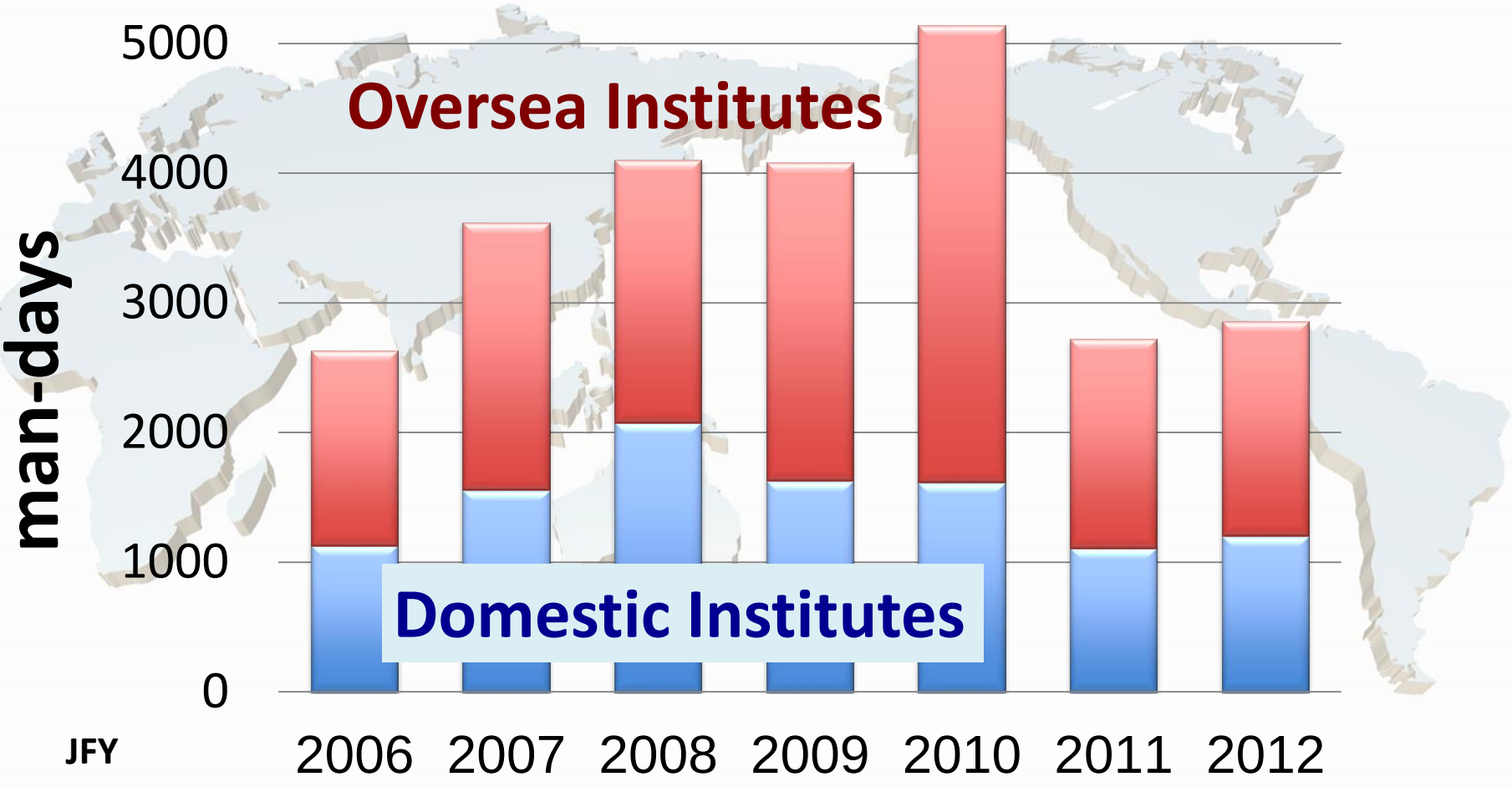
- 2010 Feb: LCLS Readout electronics for EXT Stripline BPMs (SLAC)
- 2010 Jun: Multi-OTR beam size monitor for the fast emittance measurement (IFIC,SLAC)
- 2010 Sep: Improvement of the Cavity BPM readout system (RHUL, SLAC)
- 2012 Oct: Increase the beam repetition rate; 3.12 Hz ← 1.56
- Continuous: Stabilize the beam intensity ← storage in DR ← LINAC stabilization

Modifications by results of beam studies

- 2012 Jan: Remove 2nd kicker
- 2012 Jul: Redesign the IPBSM to improve the reliability and reproducibility (KEK)
- 2012 Aug: Four KEKB Skew Sextupoles for error correction (KEK)
- 2012 Oct: Exchange QF1 by PEP-II quad. to meet the multipole tolerance (SLAC)
- 2013 Feb: Swap the strange magnet, SD4FF

Manpower Contributions

Collaborators visiting ATF

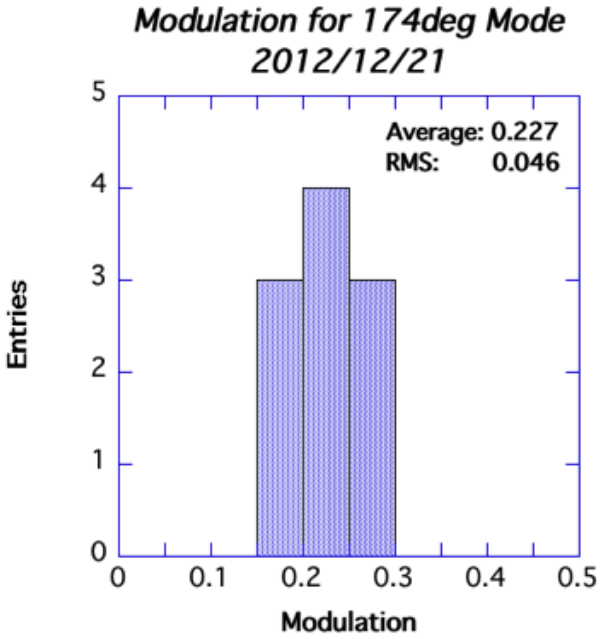


Beam time

- General
  - **21 weeks/year**; summer (4Mo)/winter(1Mo)/spring(3w) shutdowns
  - Monday to Friday, **12 shifts/week** due to the available manpower
  - Detail shift assignment is discussed in the meeting on Friday.
- Usual beam runs
  - A beam for other R&Ds does not match to ATF2; Compton,…, LW, FONT.
  - Initially 50 : 50 for ATF2 and others
  - Recently 70(ATF2):30(others)
    - →50:50?; R&D in DR (Compton cavity, ε_y 2 pm,…) will back in fall.
- ATF2 dedicated beam runs
  - Keep beamline for ATF2. Short (a few days) and long (more than a week) Continuous weekend operation.
  - 2010 May 17 – May 21 1 week (resulted in 300 nm)
  - **2012 Nov.26 – Dec. 21, 4 weeks (resulted in 70 nm)**
  - 2013 May 13 – May 24, 2 weeks (aim to 37 nm)

Recent History

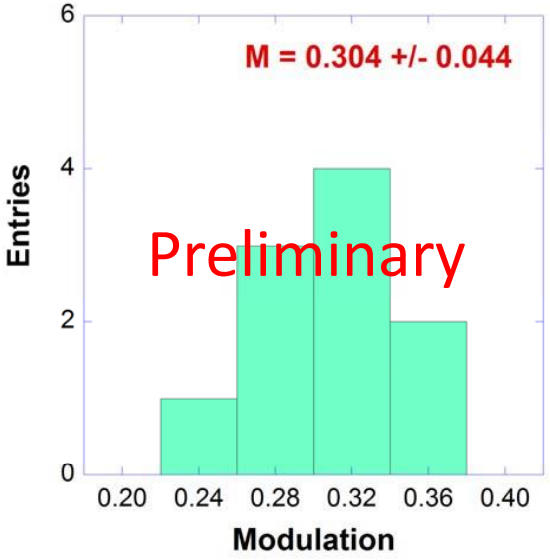
2012 Dec: <70 nm

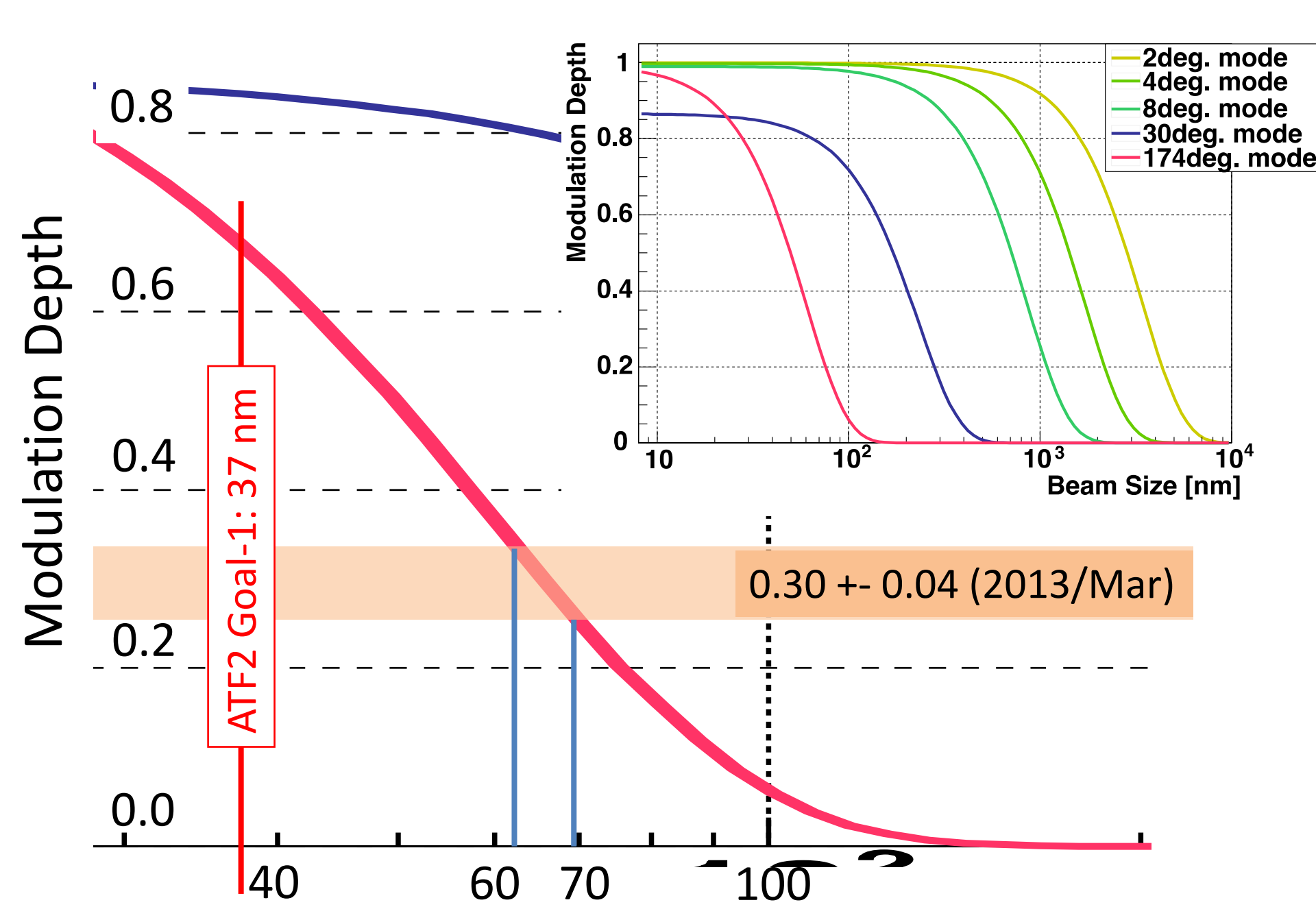


2013/03 /14

after IP-BSM roll alignment
after IP-BSM pitch alignment

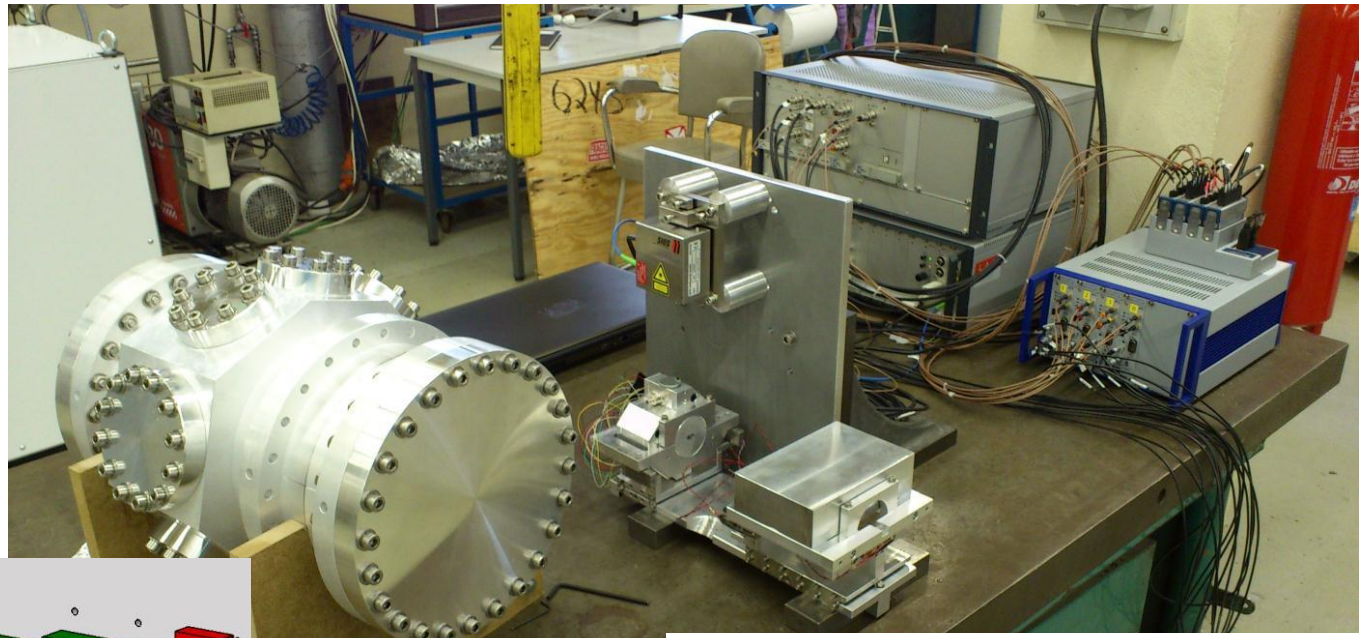
2013 Mar: <65 nm

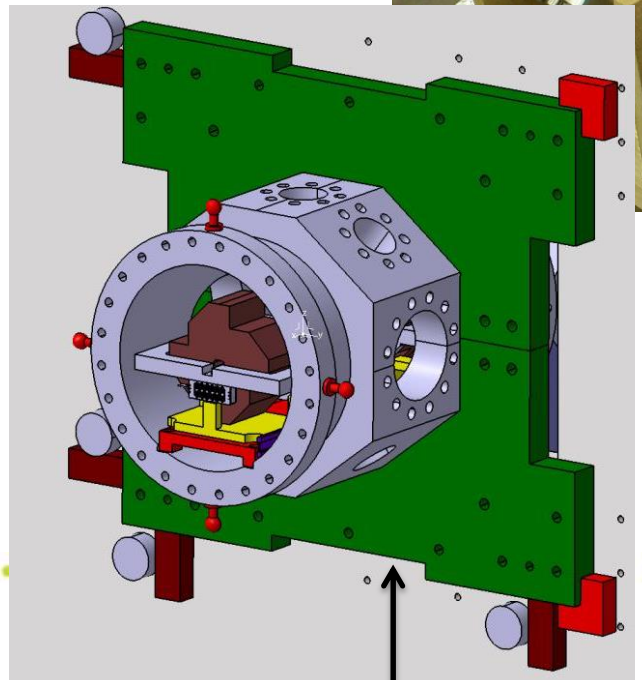


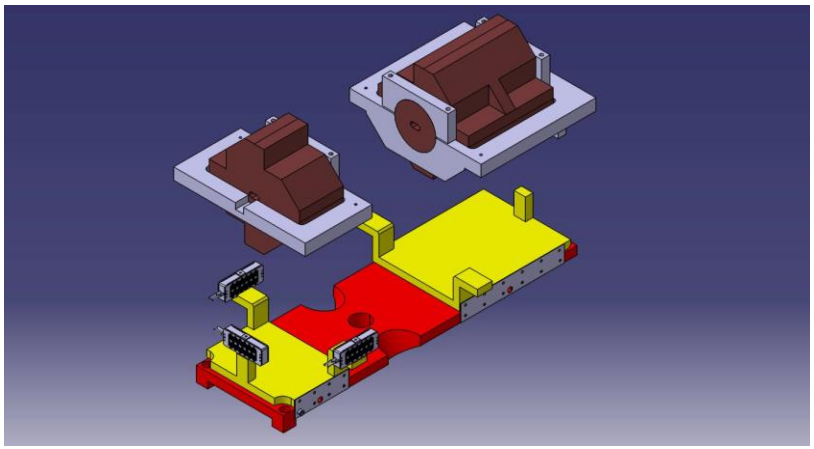


Beam size (nm) if the modulation is not reduced by errors on IPBSM

for Goal-2: New IP chamber and BPM movers at LAL







These will be installed in coming summer.