

# ATF Operational Status

Summary of FY2014 and plan for FY2015

N. Terunuma, KEK

18<sup>th</sup> ATF2 project meeting and 18<sup>th</sup> ATF TB/SGC meeting,  
Feb. 25 2015, LAPP Annecy

# Major troubles and repairs in FY2014

- Cooling water system
- EXT kicker
  - controller
  - heavy failure on the HV charging section

# Renewal of the Refrigerator for EXT/ATF2 cooling water



**Renewed during the summer shutdown in 2014.**

Previous: operated in 25 years

- Powerful but only used less than  $\frac{1}{4}$ , 15 min operated every an hour.
- Simple ON/OFF control. Heavy current load when it turns on → disturb primary 400V line → Linac RF, ...

**Failures: leak of gas → turn off by low**  
2010 Aug/Sep...

long shutdown but no damage on beam schedule

2013 Sep/Oct... same as above

**2014 Apr... lost a week of beam operation**

Renewed:

**inverter control → smooth variation then 400V line had been stabilized.**



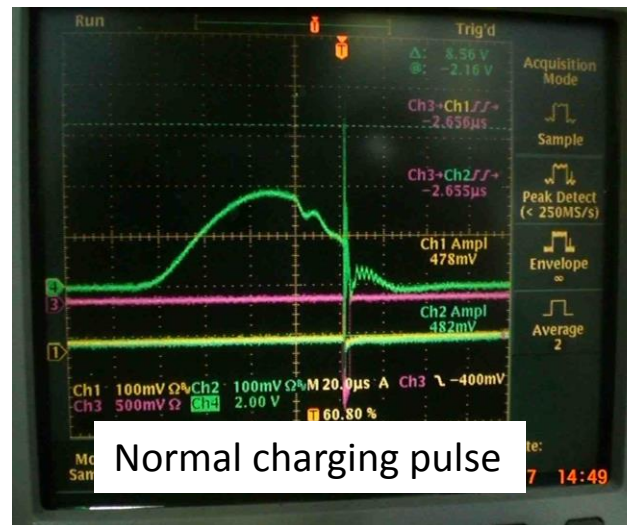
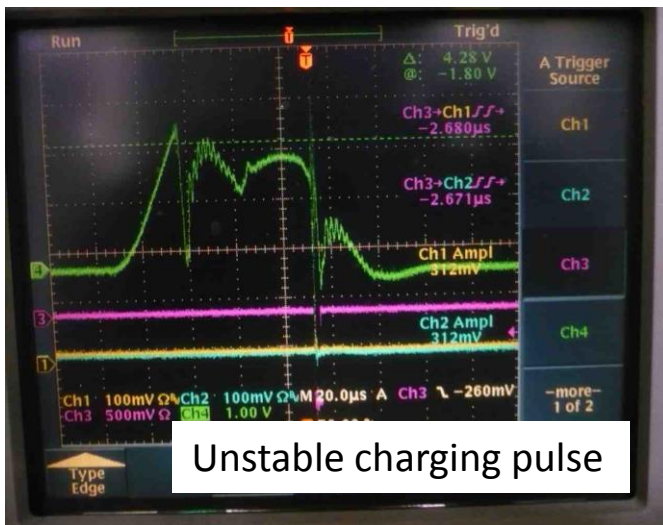
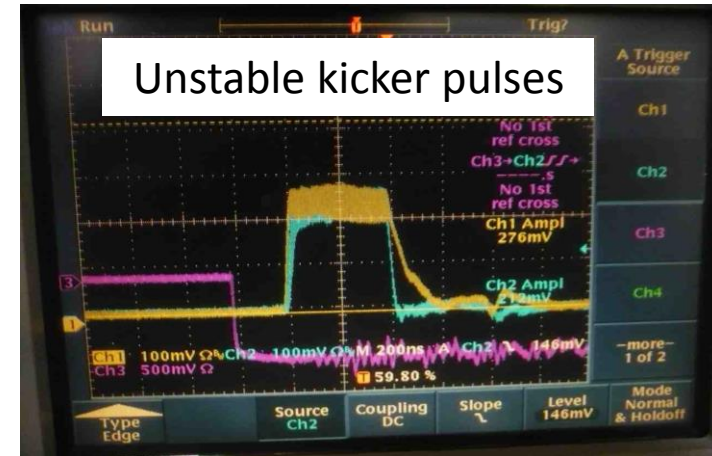
# (1) Troubles on EXT kicker controller

- We had faced the problem which deny the HV control of the EXT kicker.
- It happened frequently between March and June in 2014, and forced to wait the R&Ds.
- Exchanging the logic board recovered the control but lost again in short term. It was repeated several times.
- In summer 2014, some boards were repaired but broken shortly when tested in situ.
- Careful survey was done for the control units and found the 15V bias voltage supplied by a crate was 24V. It might damage the control board gradually in every board exchange.
- **After exchange a DC unit to 15V, we have no this problem again. FIXED.**



## (2) Heavy failure on the HV charging section of the EXT kicker

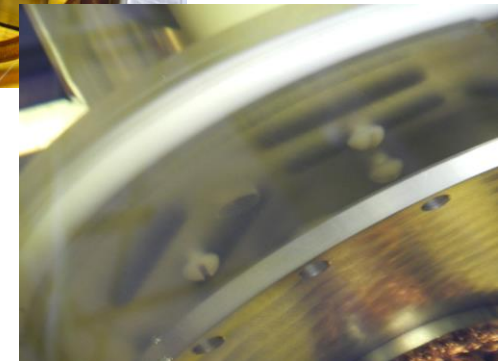
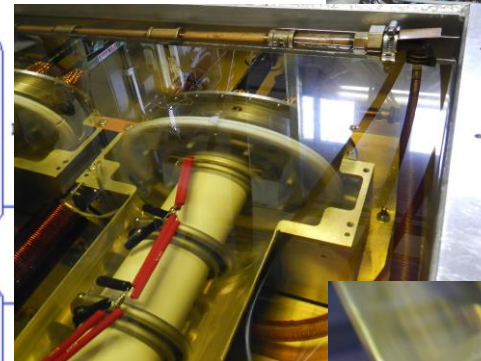
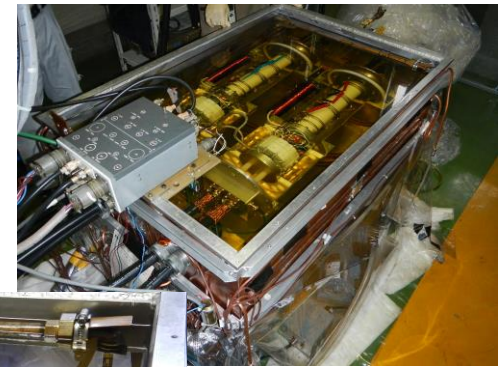
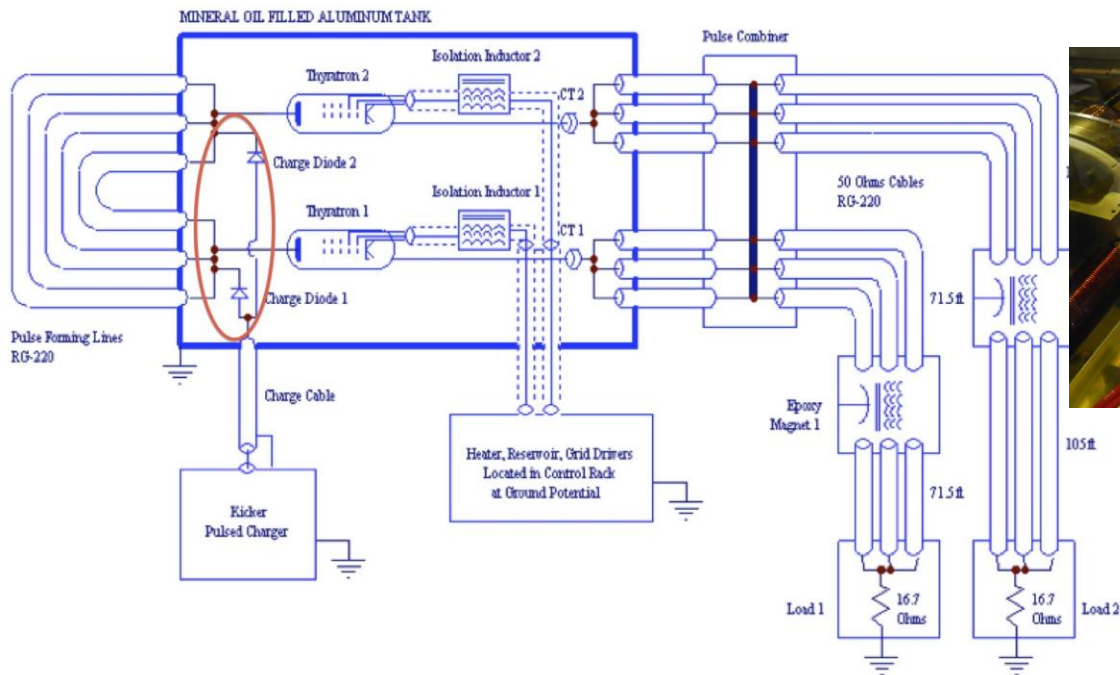
- On December 15<sup>th</sup>, the last week of FY2014 operation, EXT kicker became unstable, then had no pulse about an hour later.
- Naito-san checked and found a HV charging cable had a damage.
- The situation was not improved after repairing the cable.





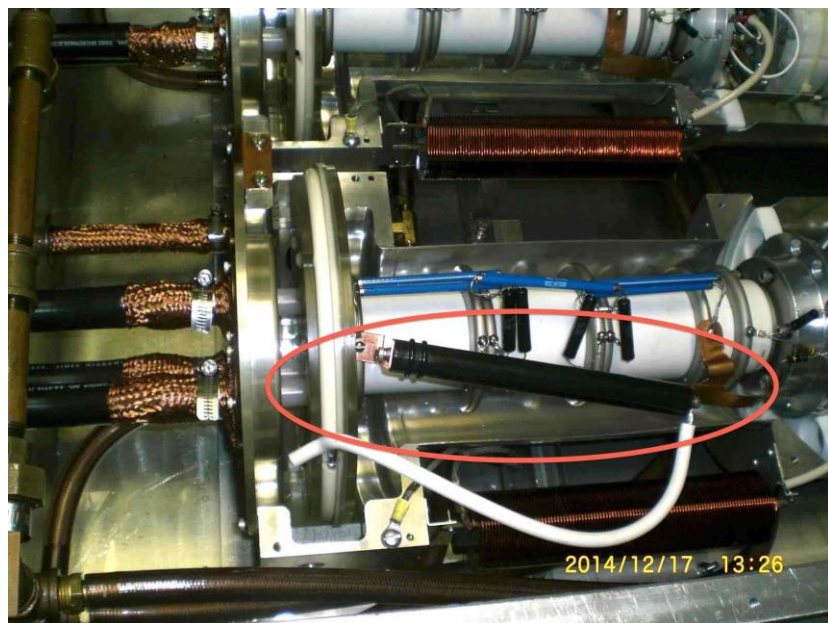
## (2) Heavy failure on the HV charging section of the EXT kicker –continued --

- SLAC specialist suggested a damage of the diode at the PFL charging section.
- Naito-san confirmed the diodes were broken down.



## (2) Heavy failure on the HV charging section of the EXT kicker –continued --

- Fortunately, a person who had been worked at KEK-PS showed a diode on the old power supply of PS. It was bigger and matched to ours.
- adding PS diode into the EXT kicker system, then temporary recovered.
- **At present, all diodes were renewed. Inj-Kicker was also checked, OK.**
- It is suspected the break of diode units were exist in the past.
- **expect the stable beam extraction than before.**



2014 Week	Date	OWL 1-9	DAY 9-17	SWING 17-1
51	Mon 12/15	☑	☑ start 13:00?	☑ Small beam (Low beta*)
	Tue 12/16	☑ Small beam (Low beta*) <b>Cancel</b>	☑ Small beam (Low beta*) <b>Cancel</b>	☑ DFS-WFS <b>Cancel</b>
	Wed 12/17	☑ Diamond sensor, Gound motion <b>Cancel</b>	☑ IPBPM <b>Cancel</b>	☑ IPBPM <b>Cancel</b> / DFS-WFS  Startup/DFS-WFS
	Thu 12/18	☑ DFS-WFS	☑ IPBSM Cherenkov <b>Diamond sensor,</b> <b>Ground motion</b>	☑ Diamond sensor, Gound motion  IPBPM
	Fri 12/19	☑ IPBPM <b>DFS-WFS</b>	☑ IPBPM	☑ IPBPM
	Sat 12/20	☑ Diamond Sensor	☑ Small beam	☑ Small beam
	Sat 12/21	☑ Small beam	☑ Small beam/IPBSM Cherenkov	☑

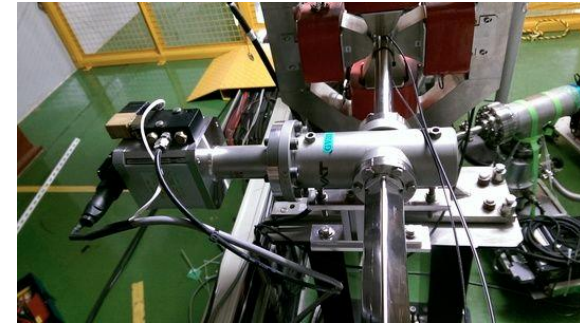
# Beamline modifications

- Wakefield mitigations
- Cooling water pipes at ATF2
  - vibration
- CBPM at the end of LINAC
  - a *relic* of the past.



# Wakefield mitigation

- **Rotate the EXT vacuum Gate Valves**
  - Three GVs in EXT was rotated in this summer.
  - Made a gap structure symmetric in vertical; cylinder port of GV,  $45^\circ \rightarrow 0^\circ$
- **multi-OTRs were re-installed**
  - They were removed in June 2014 for the Goal-1 study. No improvement was obtained when removed... insufficient beam tuning?
  - **Mask piece of the side port had been installed in fall 2014.**
- **No wire scanners from EXT to IP**
  - They were removed in spring 2014.



# Vibration Study



- Andrea and Marcin stay at ATF, Sep. 30~ Oct. 10
- QF1 (came from PEP-II)
  - It is a sensitive magnet but not yet measured
  - Check the rigidness of the fixture on the mover
  - Coherency
    - versus distance
    - between 2 magnets
- QD0...
- QD20...zzzzz

# Vibration measurement suggested the source around QF1X

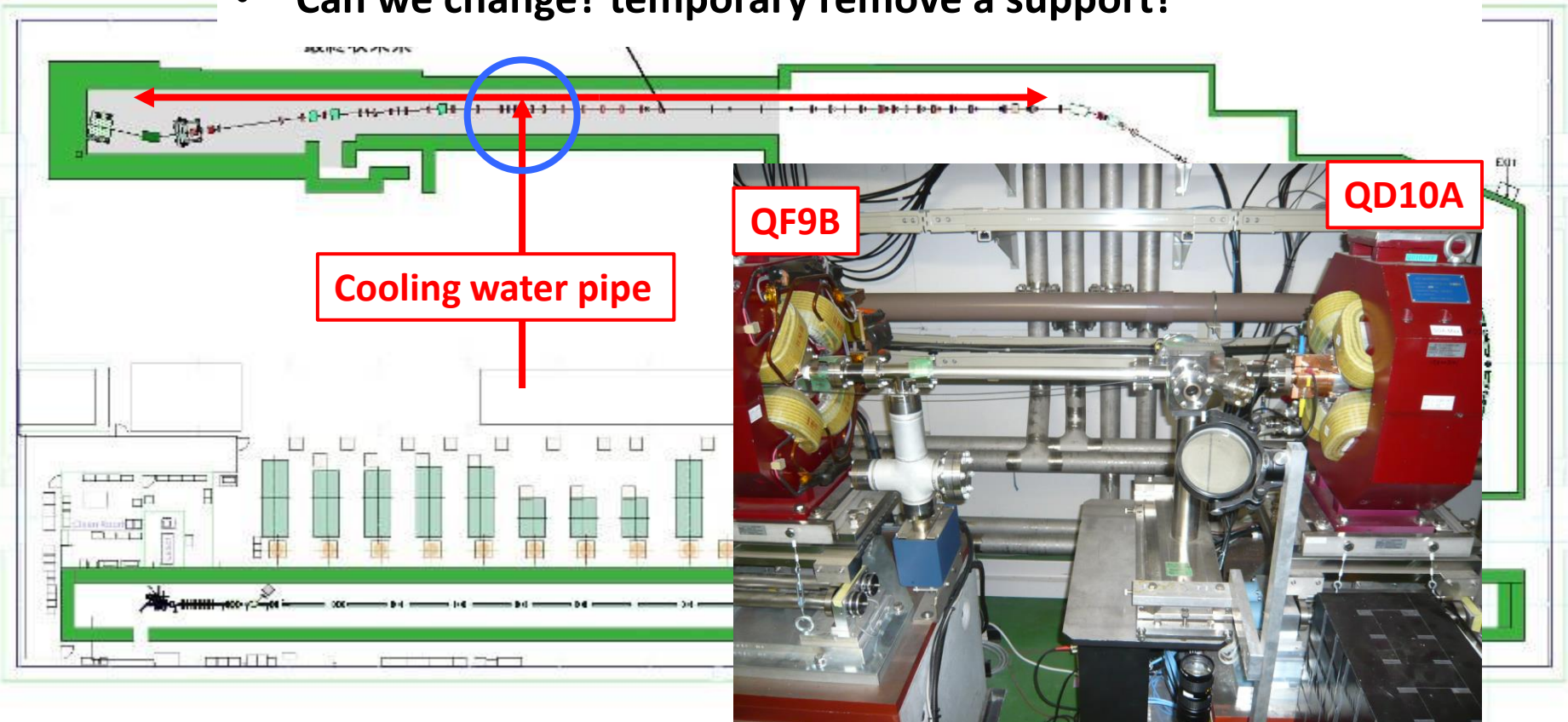


- Cooling water pipes touched the QF1X table.
- Made a gap between table legs and pipes (June 2014).

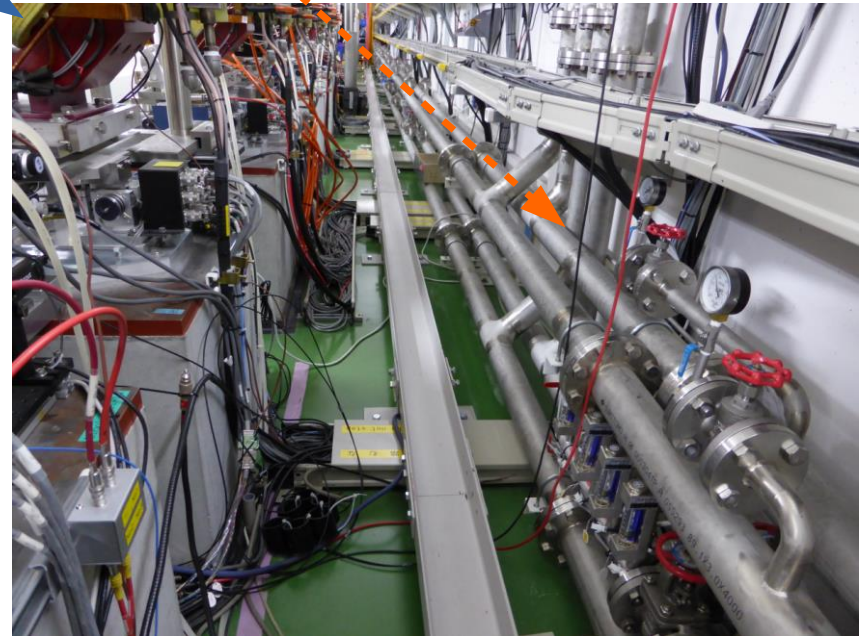


# Vibration measurement suggested the source around QD10A

- Cooling water is divided into two ways by T-pipe on the wall near QD10A. It may bring a water turbulence.
- **Support of split pipes is on the floor and near the QD10A.**
- **Can we change? temporary remove a support?**



# Cooling water pipes near to QD10AFF magnet



The cooling water pipes were responsible for the strong vibrations in the region of QF1X and QD2X magnets. Therefore, it was checked if the cooling water pipes near to QD10AFF are also source of vibrations.

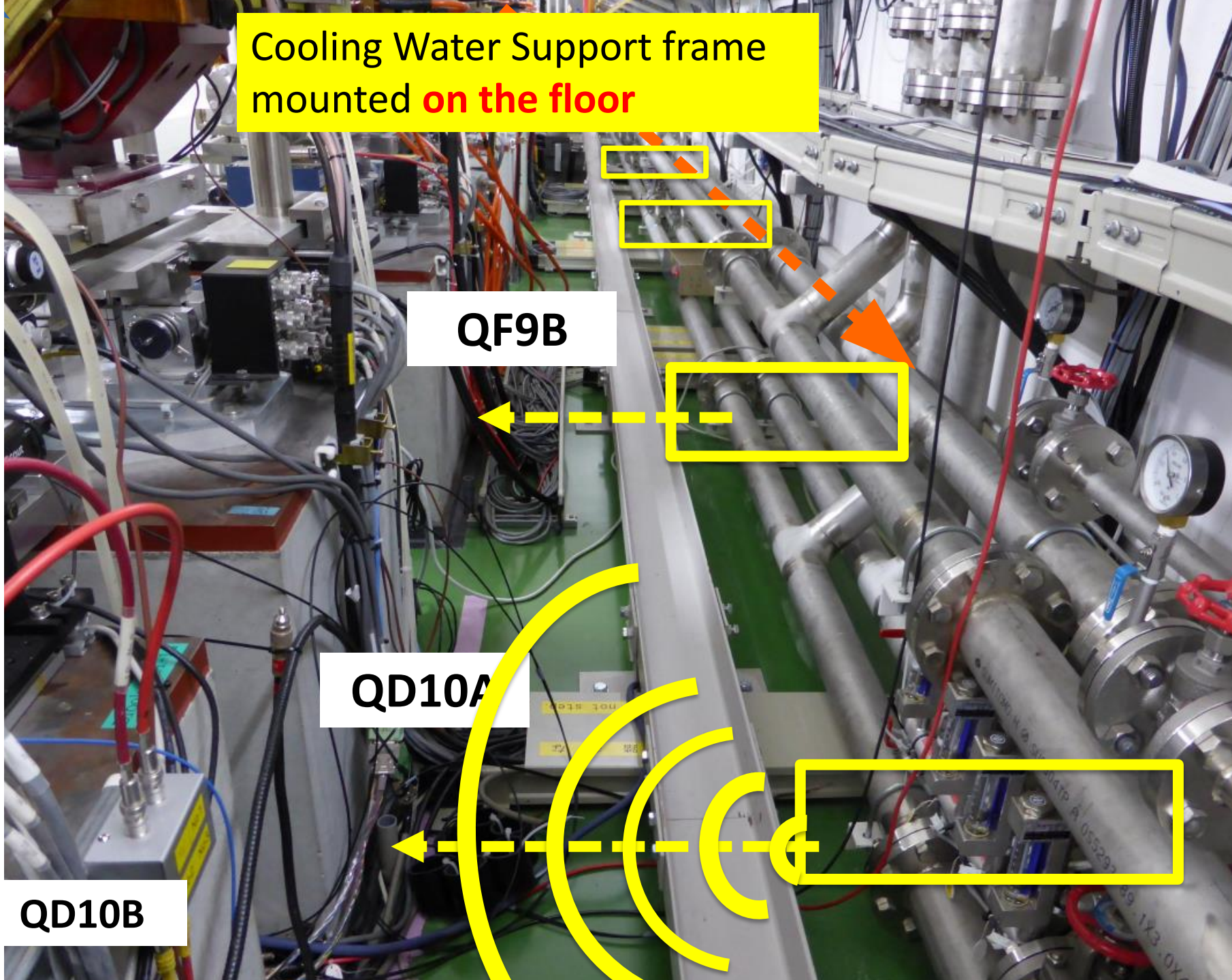


Cooling Water Support frame  
mounted **on the floor**

QF9B

QD10A

QD10B



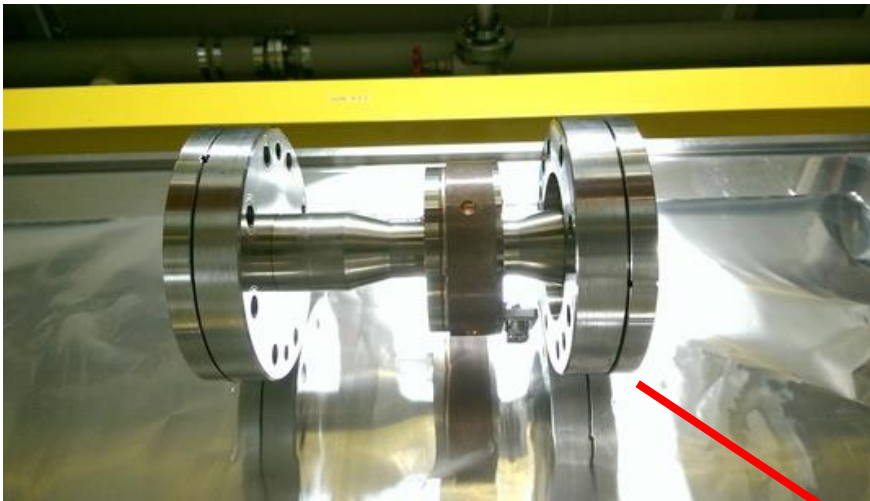


# Cooling Water Support frame mounted **on the floor**



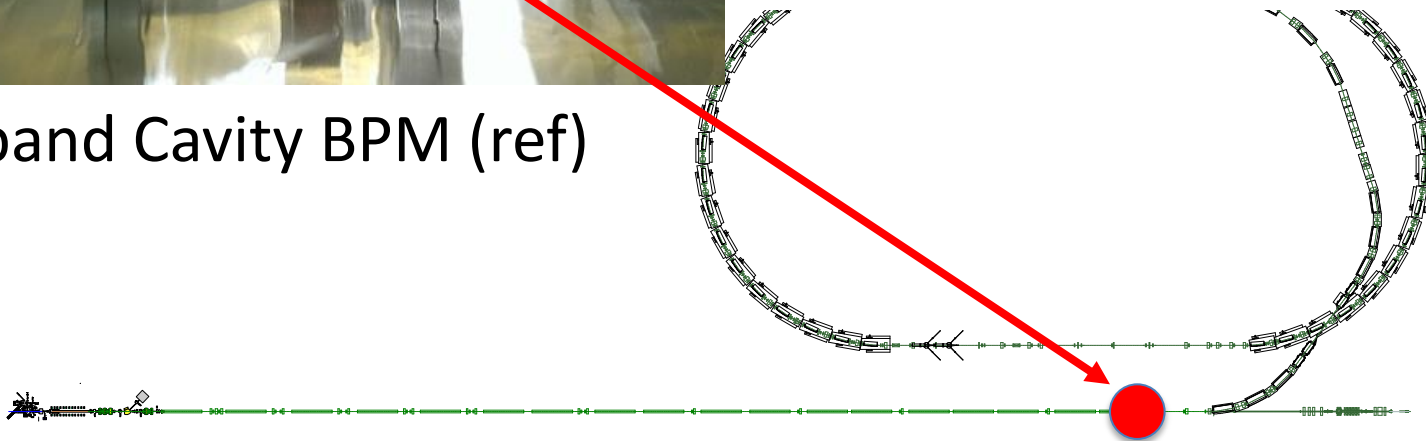
# Improvement for 2015

- a *relic* of the past at the end of LINAC was removed in January 2015



X-band Cavity BPM (ref)

- narrow aperture,  $\phi 10$
- improve the beam transfer to BT/DR



# Beam schedules

- FY2014 results
- FY2015 plan

# Difficulties on the ATF operation in FY2014

- R&D and maintenance budget was not sufficient for 2014.
  - minimum expenses to keep a beam operation
  - few R&D supports
- In addition, the electricity charge became twice in 2014
  - It did not mean a half of the beam operation.
  - Cooling facility uses more than a half of the annual electricity of ATF.
  - Minimize the running time of the ATF accelerator
  - **then, Power off the cooling facility during the monthly shutdown of ATF, i.e., summer and ... spring 2015.**
    - 1.4 MW (beam on) → 0.6 MW (standby, cooling on) → 0.2 MW (shutdown)
  - **(12 weeks beam in 2014) / (21 weeks beam in the past)**
  - Cooperation by CERN/CLIC helped **additional two weeks operation.**



# Result of ATF Beam Operation in FY2014, 14 weeks

## 2014

January						
Su	Mo	Tu	We	Th	Fr	Sa
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
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26	27	28	29	30	31	

February						
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March						
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30	31					

April						
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20	21	22	23	24	25	26
27	28	29	30			

postpone 4/21-25 to June, Water Fa

May						
Su	Mo	Tu	We	Th	Fr	Sa
				1	2	3
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11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

June						
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22	23	24	25	26	27	28
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July						
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August						
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31						

September						
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October						
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November						
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23	24	25	26	27	28	29
30						

December						
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14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

12/8-19: Cooperation with CERN

## 2015

January						
Su	Mo	Tu	We	Th	Fr	Sa
				1	2	3
4	5	6	7	8	9	10
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February						
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March						
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April						
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12	13	14	15	16	17	18
19	20	21	22	23	24	25
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Shutdown

# ATF budget situation for FY2015

- Electricity charge
  - KEK **is considering** how to assign the electricity charge of facilities. It will be fixed soon as expected below.
    - **FY2014**: distribute the operation budget to each project, then gather their electricity charge from each project. Each project should pay the electricity based on their budget → **reduce beam time to 2/3**
    - **FY2015**: reserve the electricity charge of all facility before splitting the KEK common budget into each project. Each project do not need to worry about the electricity by their budget → **full year beam is expected**
- R&D and maintenance
  - Resulting the electricity issue, R&D and maintenance budget for ATF is still limited as FY2014.
  - Minimum approach is required.

# ATF Beam Plan for FY2015, 20 weeks

2015

January							February							March						
Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa
				1	2	3	1	2	3	4	5	6	7	1	2	3	4	5	6	7
4	5	6	7	8	9	10	8	9	10	11	12	13	14	8	9	10	11	12	13	14
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18	19	20	21	22	23	24	22	23	24	25	26	27	28	22	23	24	25	26	27	28
25	26	27	28	29	30	31								29	30	31				

Japan Physics Society 3/21-24

April						
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ALCW15 4/20-24, Tokyo event 4/22

May						
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24	25	26	27	28	29	30
31						

IPAC15 5/3-8

June						
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July						
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August						
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KEK Power 8/1-2, KEK close 8/12-14  
Japan Acc. Society 8/4-7

September						
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Japan Physics Society 9/25-28

October						
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November						
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LCWS15 11/2-11/6

December						
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KEK close 12/29-1/3

2016

January						
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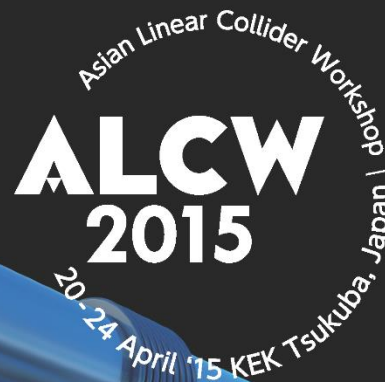
February						
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Japan Physics Society 3/19-22

April						
Su	Mo	Tu	We	Th	Fr	Sa
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# KEK, Tsukuba, April 20-24



## Asian Linear Collider Workshop 2015 KEK, Tsukuba, April 20-24

International workshop co-hosted by KEK, ACFA and LCC, to study the physics and detectors and the implementation of future linear electron positron colliders.

On April 22, a special symposium "ILC Tokyo Event" at the University of Tokyo as a part of the workshop.

### ILC Tokyo Event : Wednesday, April 22, 2015

- Main plenary session of ALCW2015
- Lectures and a panel discussion for ILC in Japan
- ILC Food Festa: enjoy the cuisine from the countries of the signatories to the ILC TDR

Asian Linear Collider Workshop 2015 is the next in the series of regional linear collider workshops held around the world. The purpose of the workshop is to enhance the study of the physics cases and to advance the accelerator and detector designs for future electron positron linear colliders.

The workshop is held at a critical moment for ILC in Japan. AAA and LCC organize the **ILC Tokyo Event on April 22** at the University of Tokyo. A symposium and ILC Food Festa will be held. We will join the event.

The workshop web is at <http://www-conf.kek.jp/alcw2015>  
Please register and come to the workshop !



Illustration : Rey Hori

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