First plans for new IP-BPM testing at KEK

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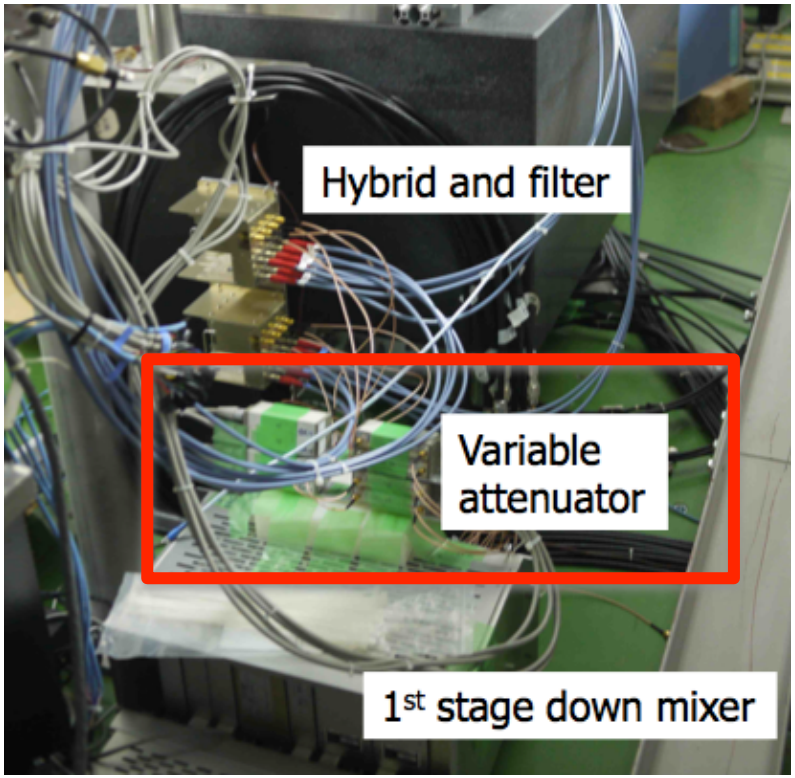
Preparation list for first beam commissioning

- We should prepare some part for the first beam commissioning at KEK
  - Variable attenuator to control remotely.
  - Preparation of ADC system with programing.
  - New reference cavity to avoid wake field problem.
  - Cavity center frequency tuning by using reference cavity BPM.
  - RF measurement of New electronics for linearity with system noise
  - How to measure 2nm beam position resolution with large beam angle at the IP?

Variable remote attenuator

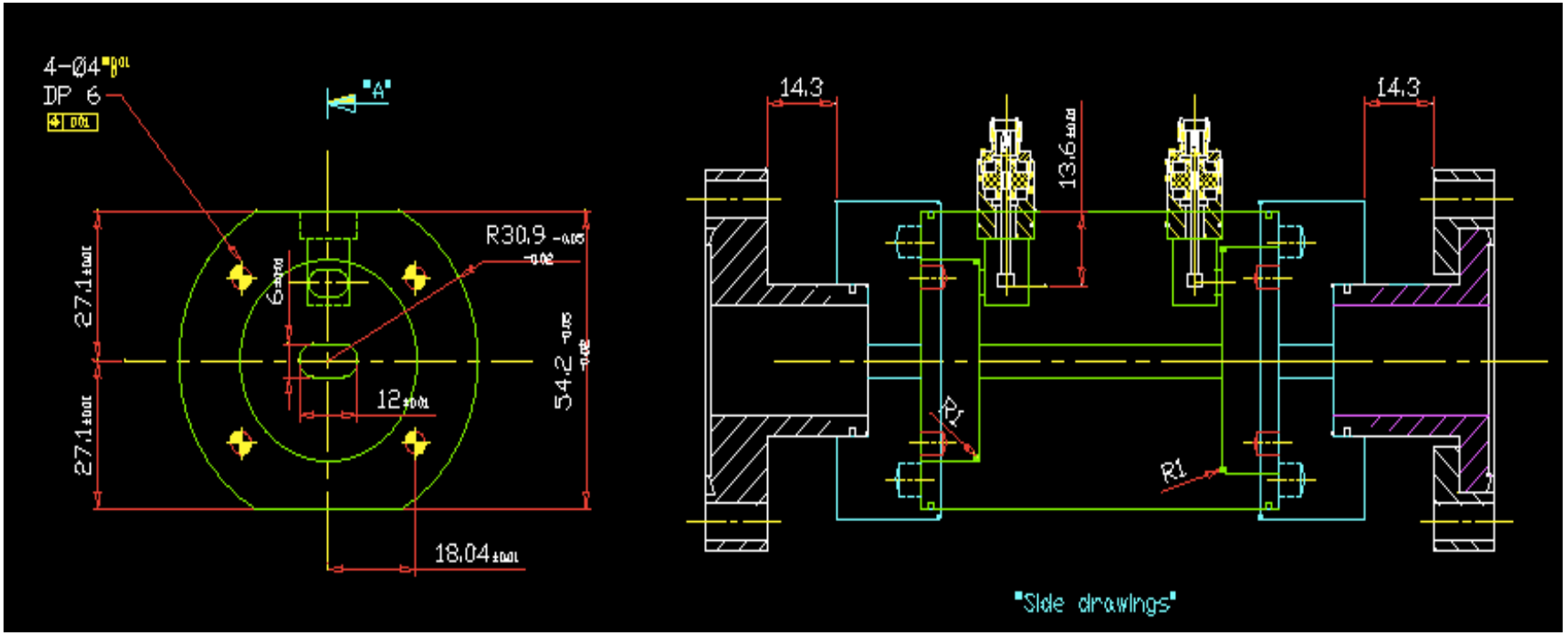
- Variable remote attenuator: we should prepare variable remote attenuator to install inside tunnel.
  - Option 1: by using existing variable attenuator (Y.I. Kim)
  - How many variable attenuators are Installed for High-Q IP-BPM system?
  - Can I use existing program for the New IP-BPM or should re-coding the program to control the variable attenu



Preparation of ADC system

- Fast sampling frequency? We need more than 100Mhz (10ns)?
- I should simulate the sampling speed of ADC with low-Q IP-BPM signal to check the wave form re-construction.
- Also, I should prepare ADC system programing of DAQ.

New reference cavity to avoid wake field problem.



More large aperture is needed to avoid wake field instability.
We should consider the changing material or some other possible solutions?

Center frequency tuning by using reference cavity

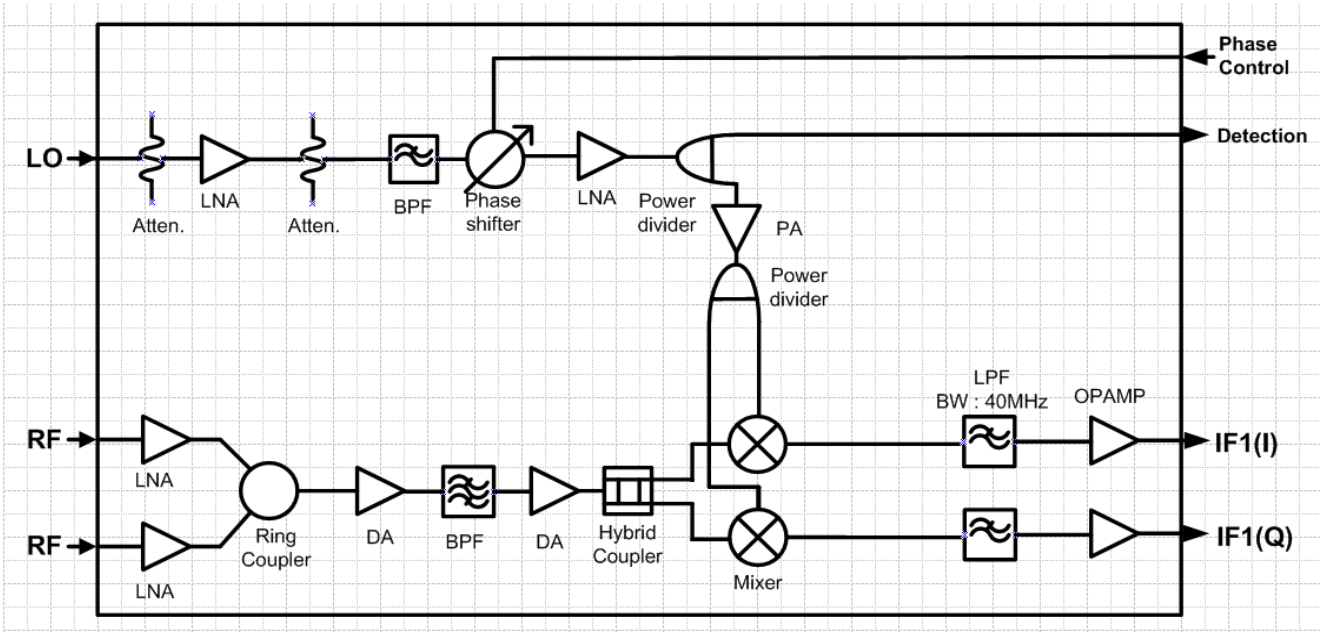
	Port	f_0 (GHz)	β	Q_0	Q_{ext}	Q_L	τ (ns)	V_out (uV/2nm)
Designed	X-port	5.7127	5.684	4959.29	872.42	741.91	18.72	7.739
Designed	Y-port	6.4280	5.684	4670.43	821.61	698.70	17.23	7.448
Double_1	X-port	5.6968	0.656	362.34	552.14	218.77	6.112	9.740
Double_1	Y-port	6.4099	0.668	845.66	1266.7	507.11	12.59	6.010
Double_2	X-port	5.6975				265.99	7.430	9.410
Double_2	Y-port	6.4097	0.641	834.70	1302.5	508.70	12.63	5.927
Single_1	X-port	5.6991	0.855	502.05	587.04	270.61	7.557	9.444
Single_2	Y-port	6.4089	0.986	1238.0	1255.9	623.43	15.48	6.037

Within 1 MHz deference.

RF measurement of new electronics

- New electronics was already measured all of RF test. However we should check again by using the fixed electronics with variable OPAMP.
- The linearity was from -22dB to -96dB.
- It means that almost close to noise figure level (1.88dB = -96.1dB).

	New electronics
BW of LPF	40MHz
Gain	54~44dB
Thermal Noise	-96.1dBm
Estimated Resolution due to thermal noise	2nm
Cascaded NF	1.88dB
RF $P1_{in}$dB	-22dB
Estimated Latency	25ns



IP-region beam test

- **How to measure 2nm beam position resolution with large beam angle at the IP?**
- **By using large beat function optics? Or install another location as extraction beam line?**
- **Reference cavity sensitivity calibration with crystal diode detector. Also, new crystal diode detector should be calibrated before beam commissioning.**

- **Electronics sensitivity check again by using piezo movers with IP-chamber**

Conclusion

- We should prepare many part of Low-Q IP-BPM system until IP-chamber installation.
- Also, we should find the solution during beam commissioning at KEK that how to measure the 2nm beam position resolution with large beam angle in the IP-region.
- To achieve successful second goal, I need many kind of people's helps.

Thank you for your attention !
with many comments.