

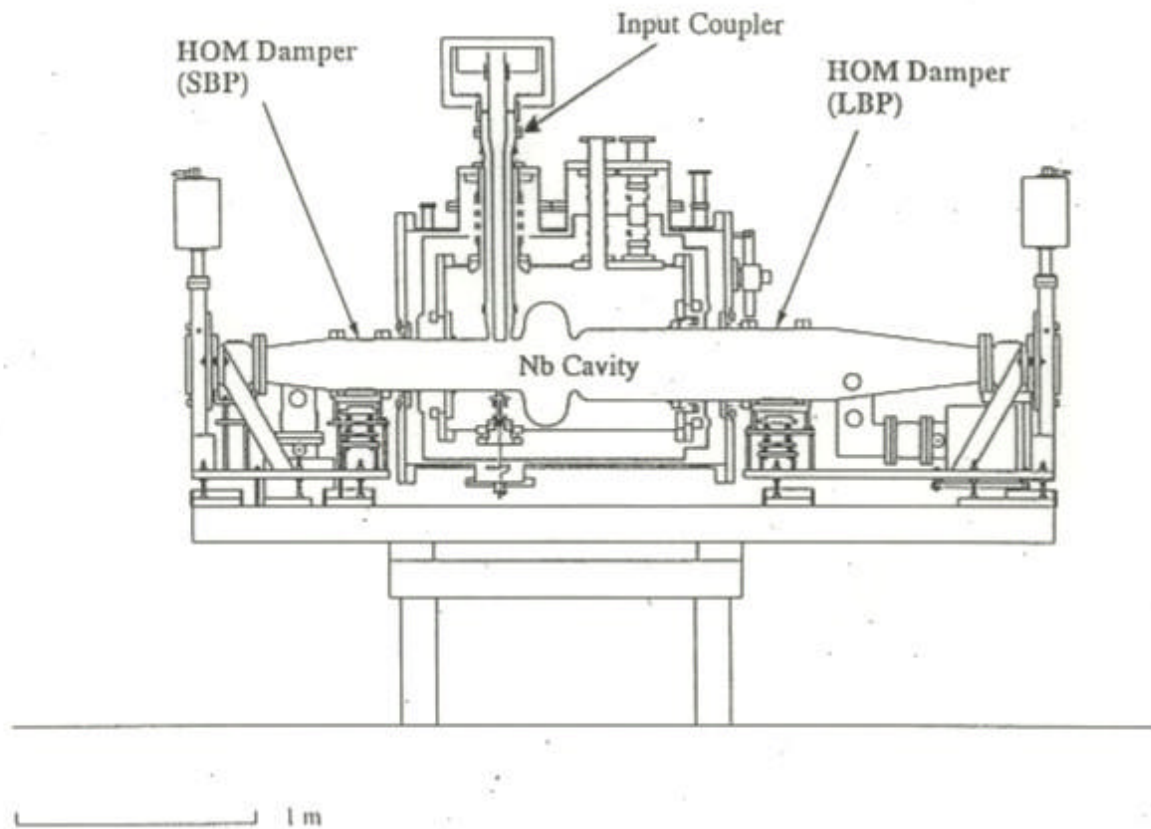
Superconducting Cavity for KEKB

S.Mitsunobu

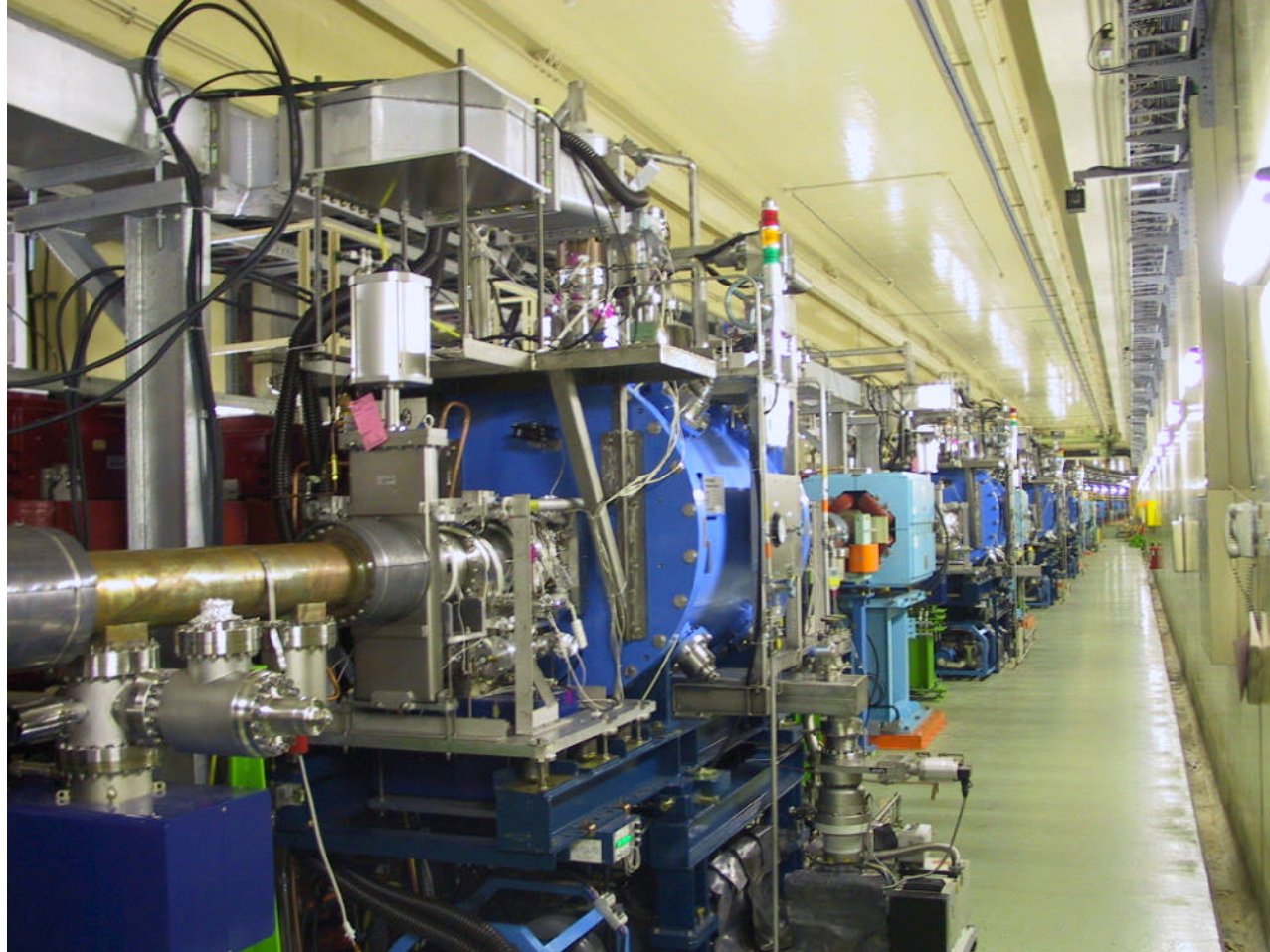
Operation of SC Cavity

- 1998.11-2000.7 4 cavities
2 metal gasket failure
- 2000.10-2000.10 7 cavities(8 cavities Inst.)
1 cable failure
- 2000.10-2000.12 6 cavities(8)
2 cable failure & 1 coupler failure
- 2001.1-2001.7 6 cavities(7)
1 vacuum leak & 1 coupler failure
- 2001.10-2001.12 7 cavities
1 vacuum leak
- 2002.1-2002.6 8 cavities
- 2002.10-2002.11 8cavities
- 2003.1- 8cavities

Superconducting Cavity Module for KEKB HER



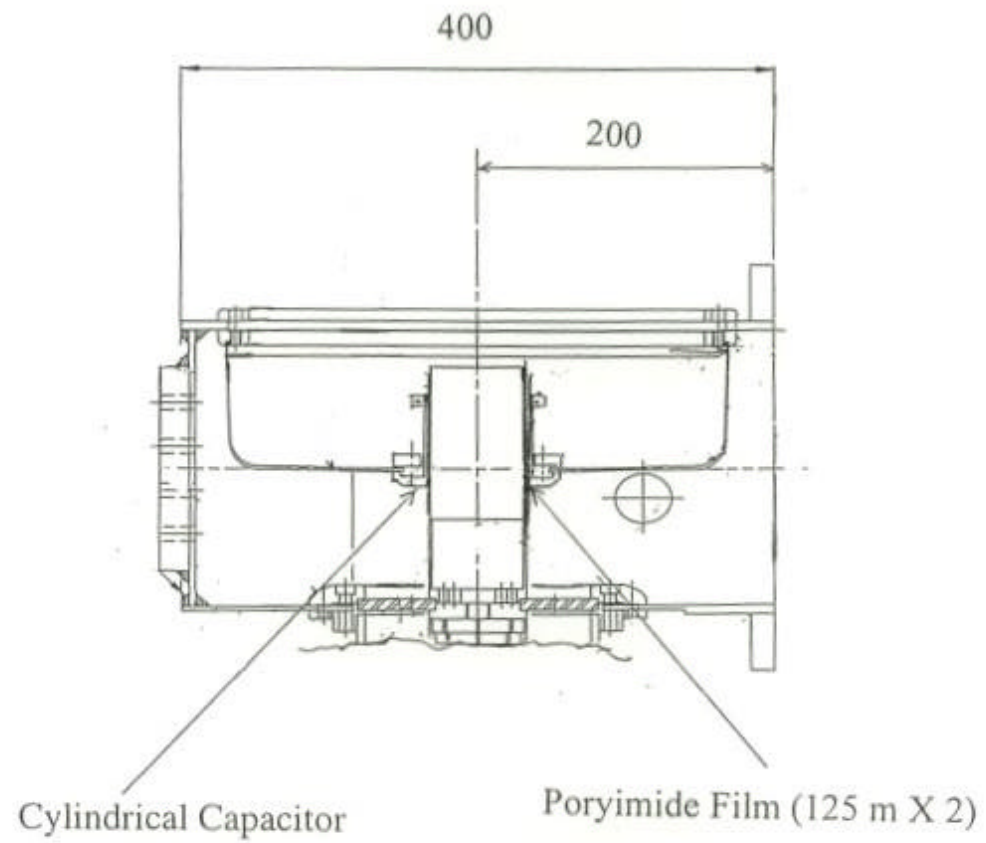




Processing of Cavity

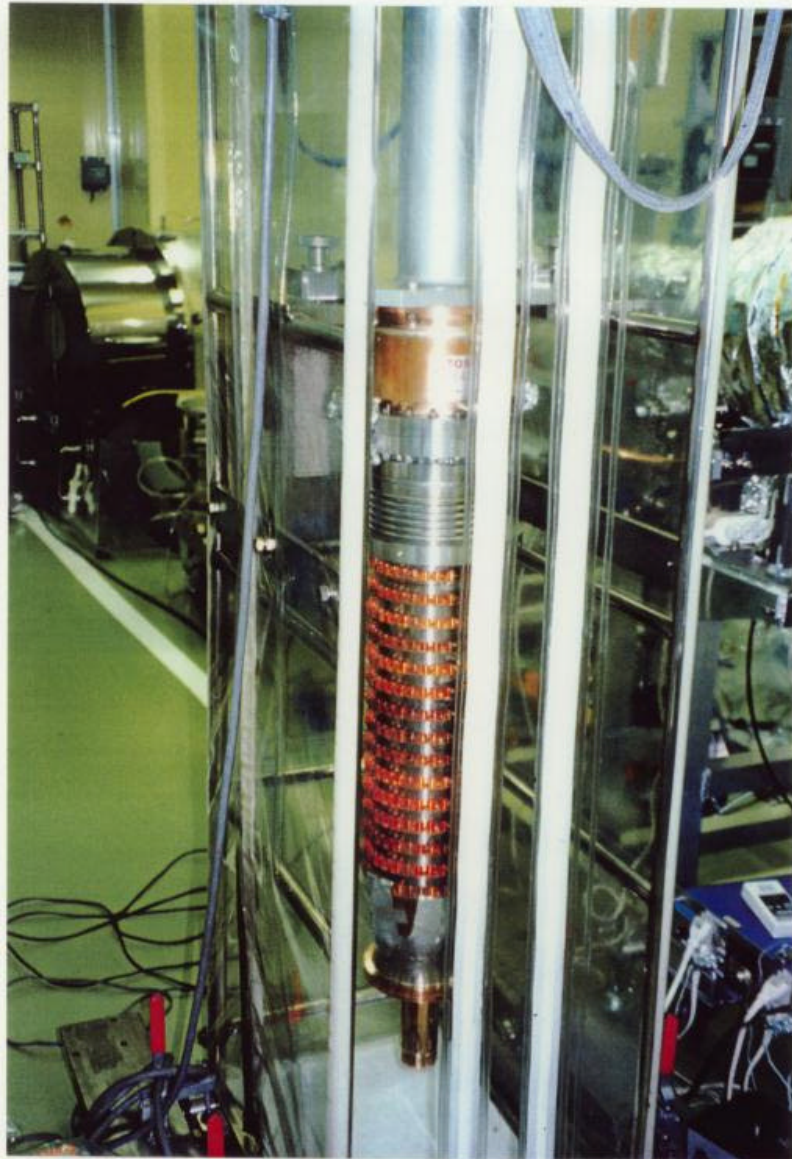
- Room temperature RF processing for input coupler with bias voltage.
- Cavity processed with pulse modulated power.
- NEG pumps reactivated every warm up.
- Cavity processed with bias voltage if frequent trip due to coupler.

Biased Type Doorknob Transition for KEKB SC Cavity

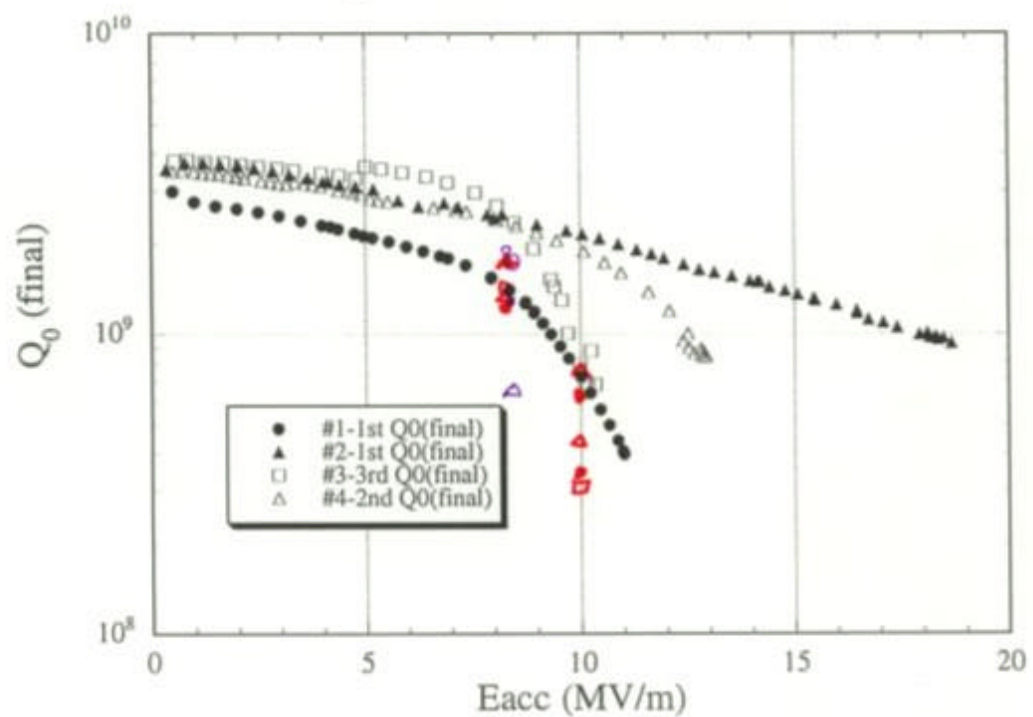


KEK INPUT COUPLER

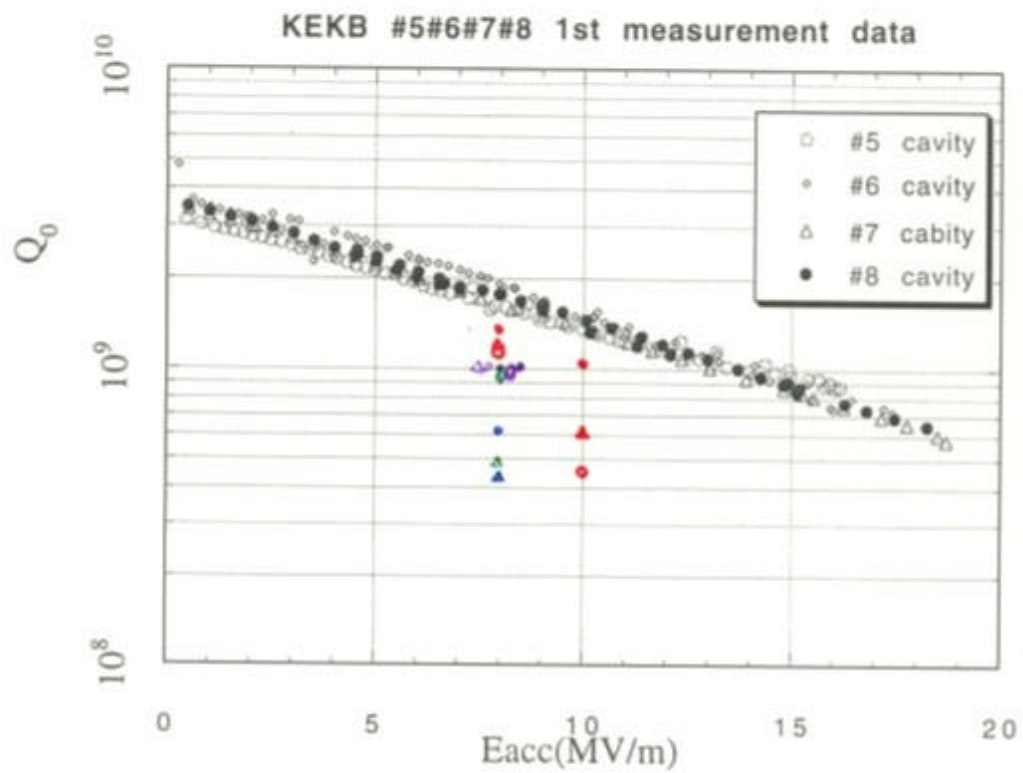
10



Q_0 vs Eacc of KEKB-SC.980521

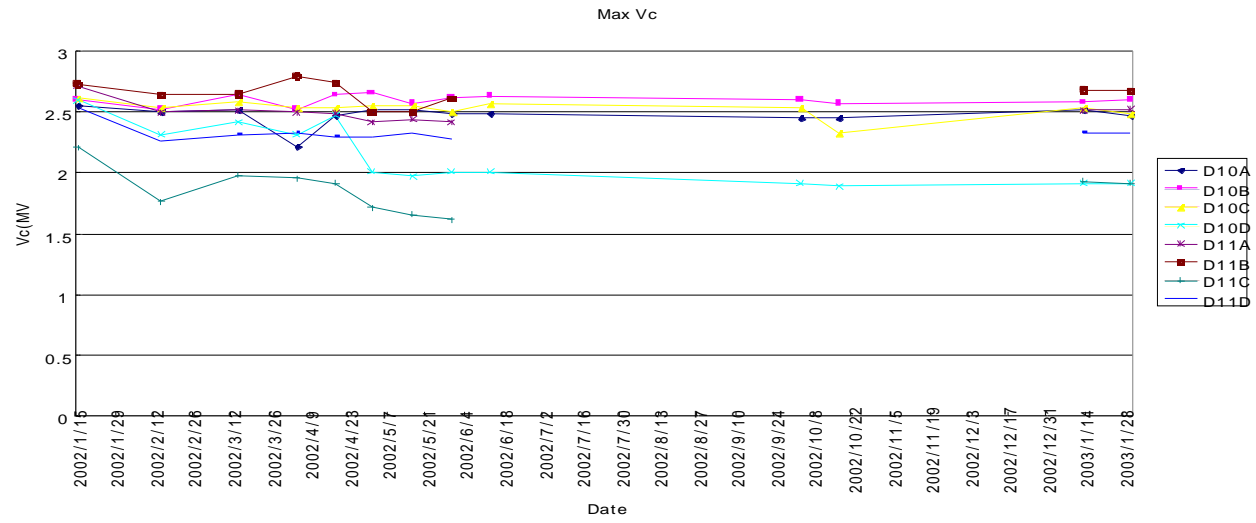


(Furuya, Tajima, Mitsunobu)



2000.10.11
2001. 4.19
2001. 9.27
2002. 1.15

Cavity Max Vc



KEKB 2-Hour Operation Summary

This graph automatically updates every minute. Current local time is 'Sat Oct 26 15:27:52 JST 2002'

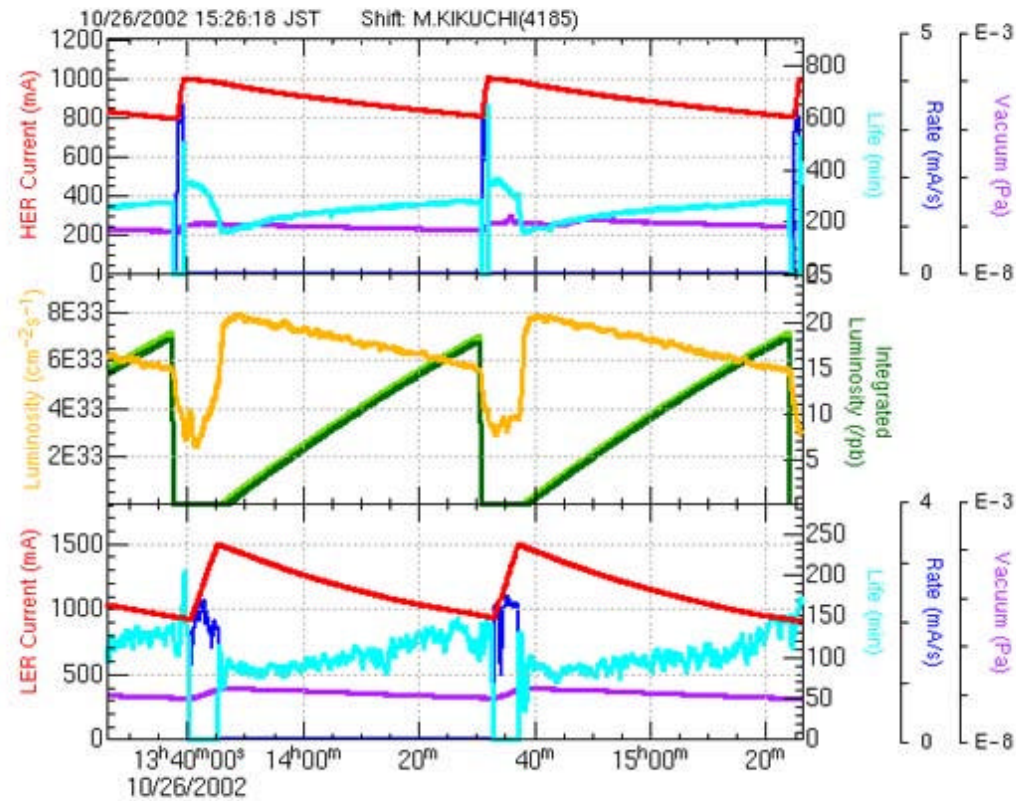
KEKB Physics Run

L 2.85×10^{33} /cm²/s L peak 7.88×10^{33} /cm²/s Int. L .00 /pb

Int. L/Day 242.8 /pb Int. L/24h 360.6 /pb Eff. L 472.8 /pb/Day

HER 1002.31 mA 342. min 1.2×10^{-7} Pa

LER 908.92 mA 174. min 7.5×10^{-8} Pa



HER : Physics Run

LER : Physics Run

SCG HOM Damper Status (A, B)

From left to right; Cavity vacuum, Water flow rate, Inlet temp., Outlet temp. and Power absorbed through damper.

A-CCG	A-S-Flow	A-S-IN	A-S-OUT	A-S (kW)
V	L/min	C	C	kW
0.764	5.03	24.18	34.69	3.70
Coupler	A-L-Flow	A-L-IN	A-L-OUT	A-L (kW)
V	L/min	C	C	kW
0.807	4.90	24.21	40.24	5.49
B-CCG	B-S-Flow	B-S-IN	B-S-OUT	B-S (kW)
V	L/min	C	C	kW
0.593	4.95	24.22	35.08	3.76
Coupler	B-L-Flow	B-L-IN	B-L-OUT	B-L (kW)
V	L/min	C	C	kW
0.526	4.98	24.04	40.50	5.73

Operation summary

- Maximum Current 1004 mA
- Maximum Power to Beam 380kW
- HOM power 9kw/cavity
- No Trip for good vacuum condition and
a few trip/week for bad vacuum condition

Failures before and after installation

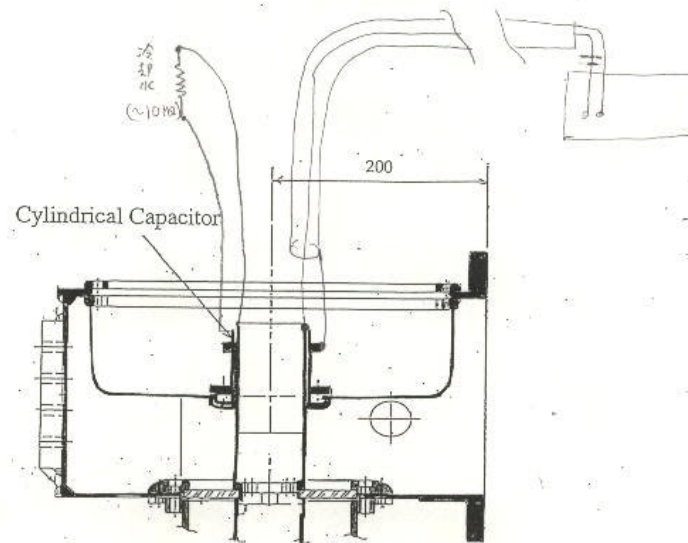
- One coupler ceramic break during horizontal cavity test
- One coupler damaged during operation of bud vacuum with 10 msec field decreasing time
- One coupler port break during installation and repaired using ultra-sonic solder
- Tow piezo element break and exchanged by properly made crystal one

Continued

- Ferrite burned in doorknob transition
- RF monitor semi rigid cable shorting after cooling down
- Metal gasket leaked by crack at copper weld
- One indium seal of LBP leaked

Measurement of electron current with coupler

Biased Type Doorknob Transition for KEKB SC cavity

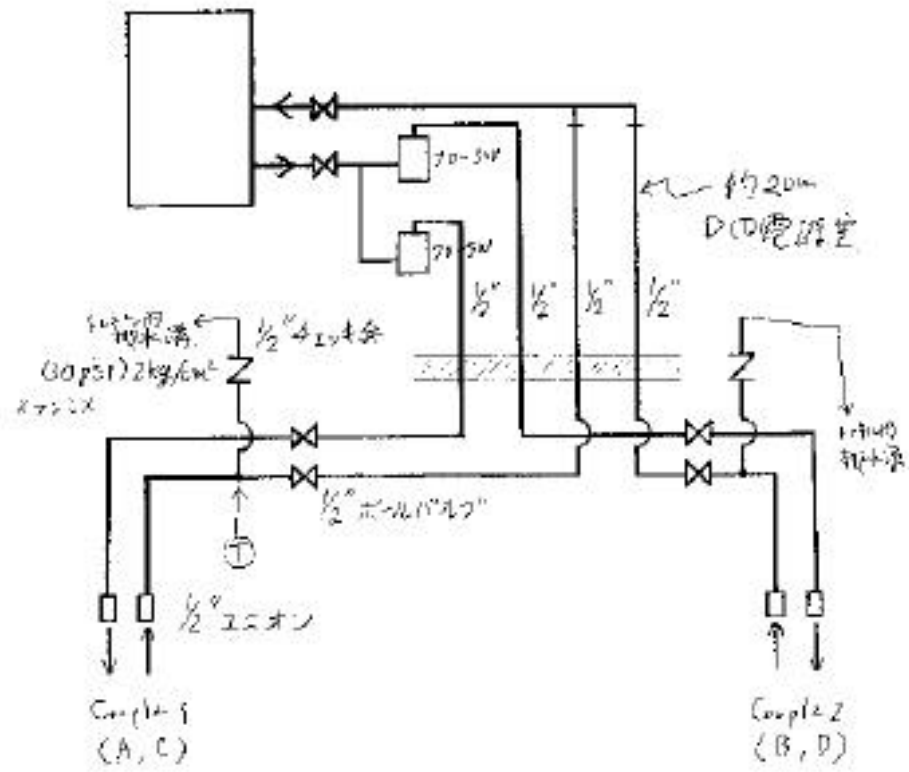


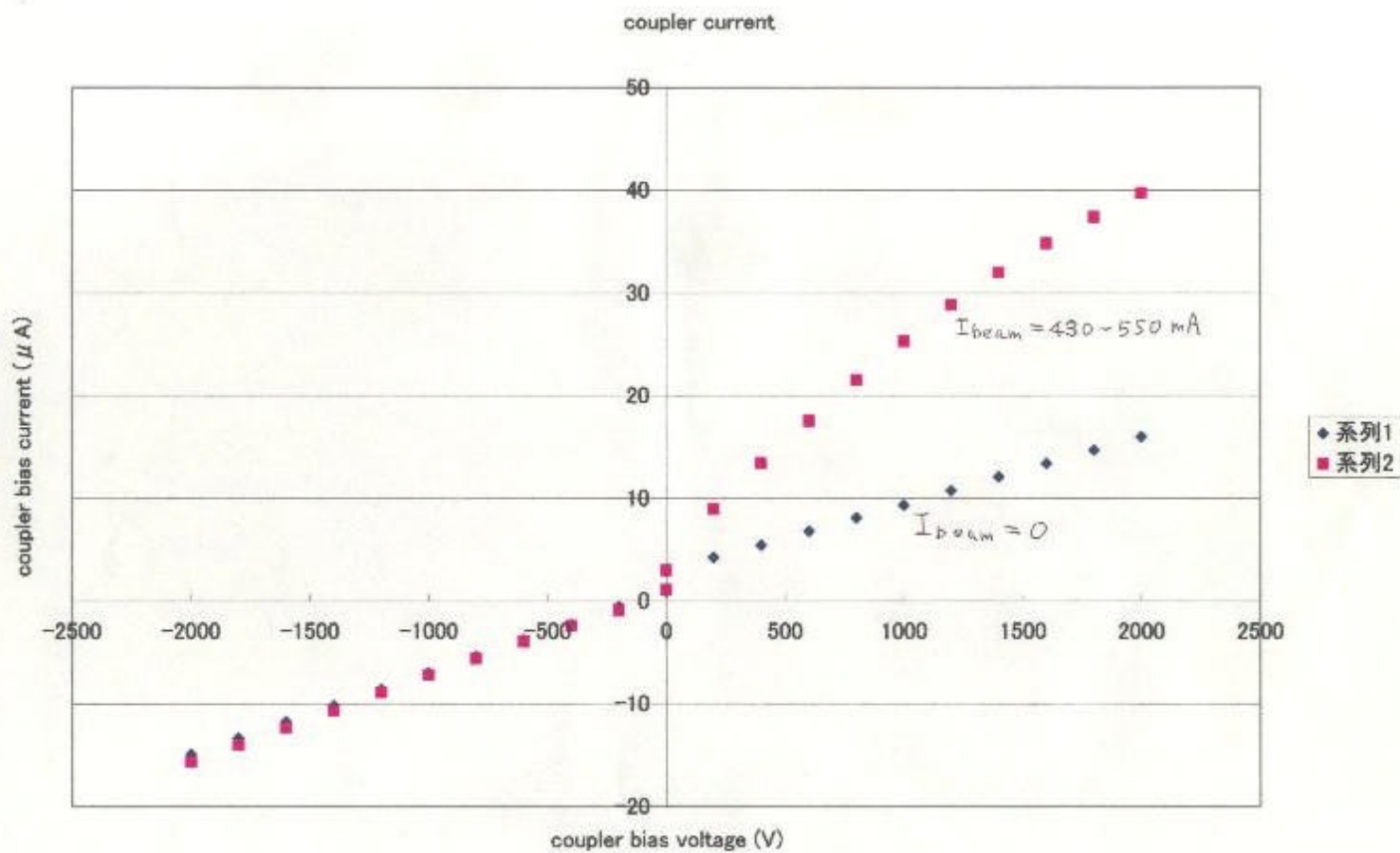
Cavity

(KEK, S.Mitsunobu et al)



SEC, Coupler



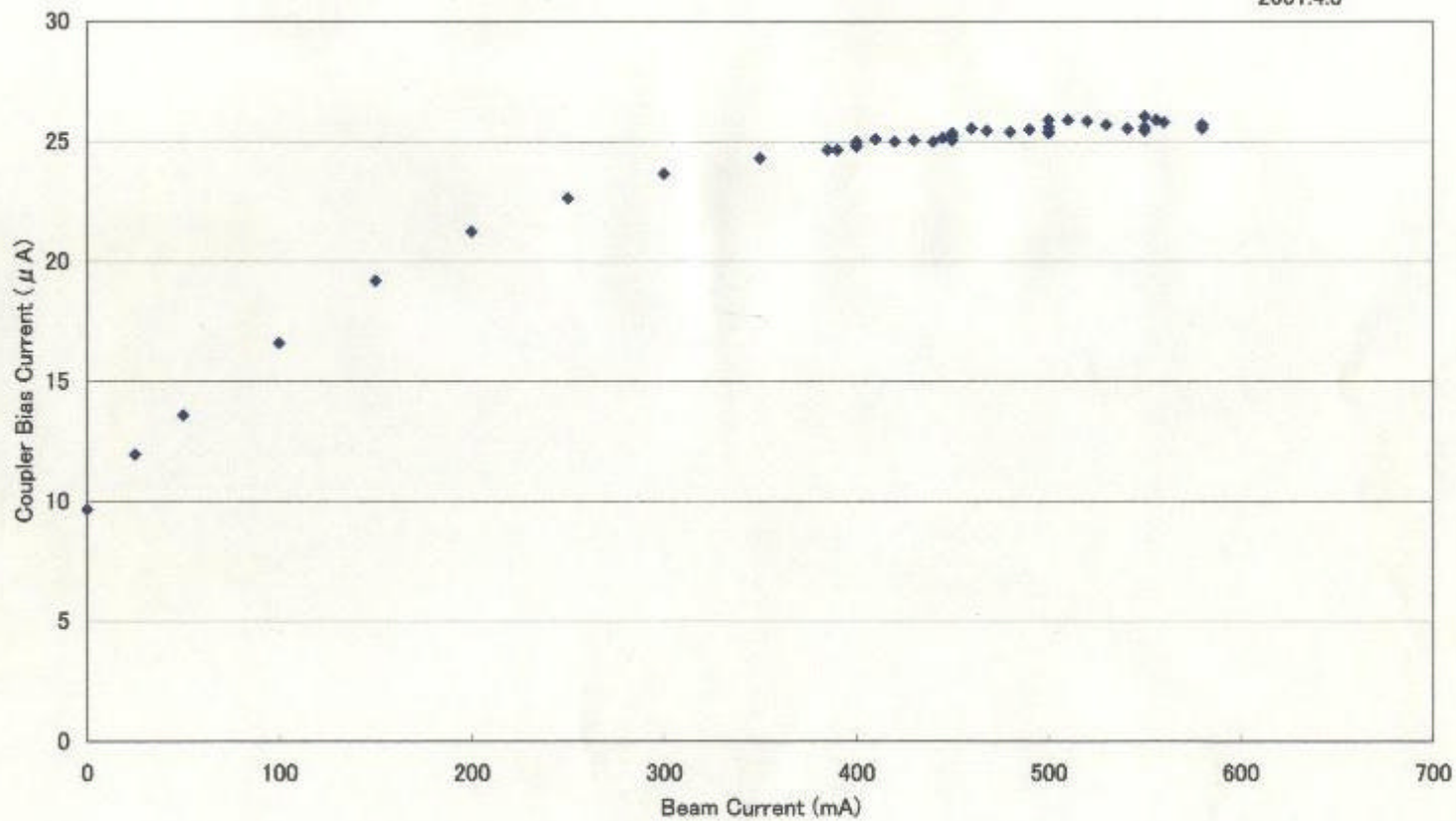


S. Mitsunobu & Y. Kijima

SCC coupler bias current vs Beam current

bias = +1000V

2001.4.8



(光延)

Summary

- High current application of superconducting cavities successfully performed at KEKB.
- Many failures show more study needed for higher current (cavity,coupler,HOM).
- The limitation of current is not superconducting cavity, we reached more than 1 A.
- For higher current, cooling for HOM increased 20 kW.
- For higher current, coupler test bench of 1 MW prepared.