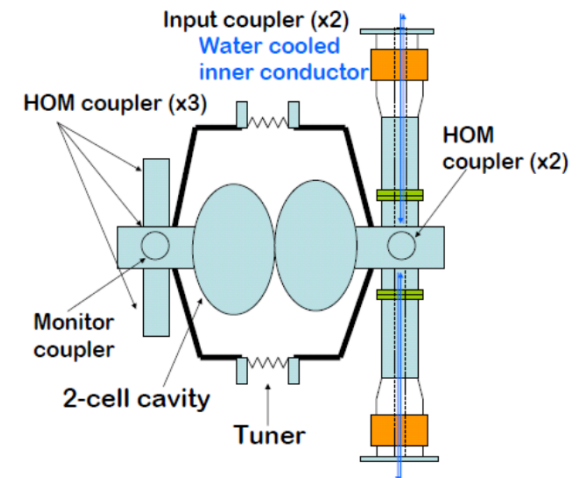
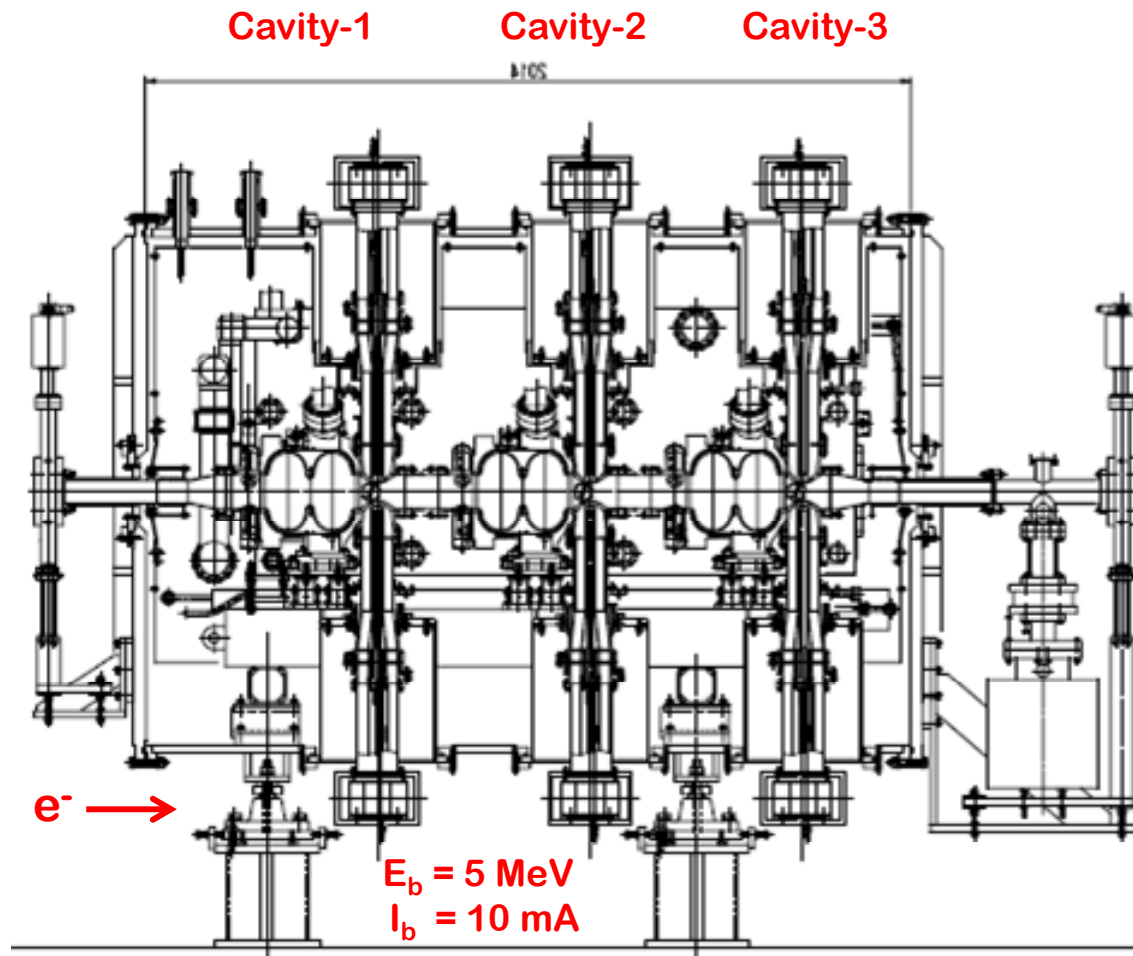


High Power Input Couplers for cERL injector

E. Kako and S. Noguchi
(KEK, Japan)

Injector Cryomodule for cERL

2



RF parameter of input coupler

| | V_{acc} [MV] | Q_L [$\times 10^5$] | P_{rf} [kW] |
|----------|--------------------------|----------------------------|-------------------------|
| Cavity-1 | 1.5 | 10. | 10 |
| Cavity-2 | 2.5 | 4. | 25 |
| Cavity-3 | 2.5 | 4. | 25 |

(Q_L /coupler, P_{rf} /coupler, $I_{\text{beam}} = 10 \text{ mA}$)

Input couplers for cERL injector

3

Two prototype input couplers



(completed in 2009, Oct.)
(finished conditioning in 2010)

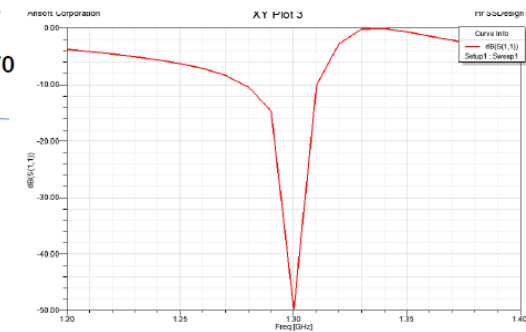
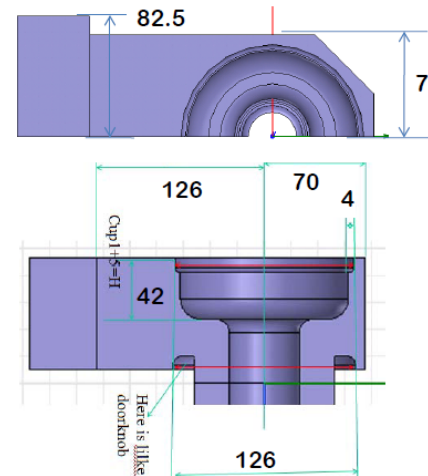
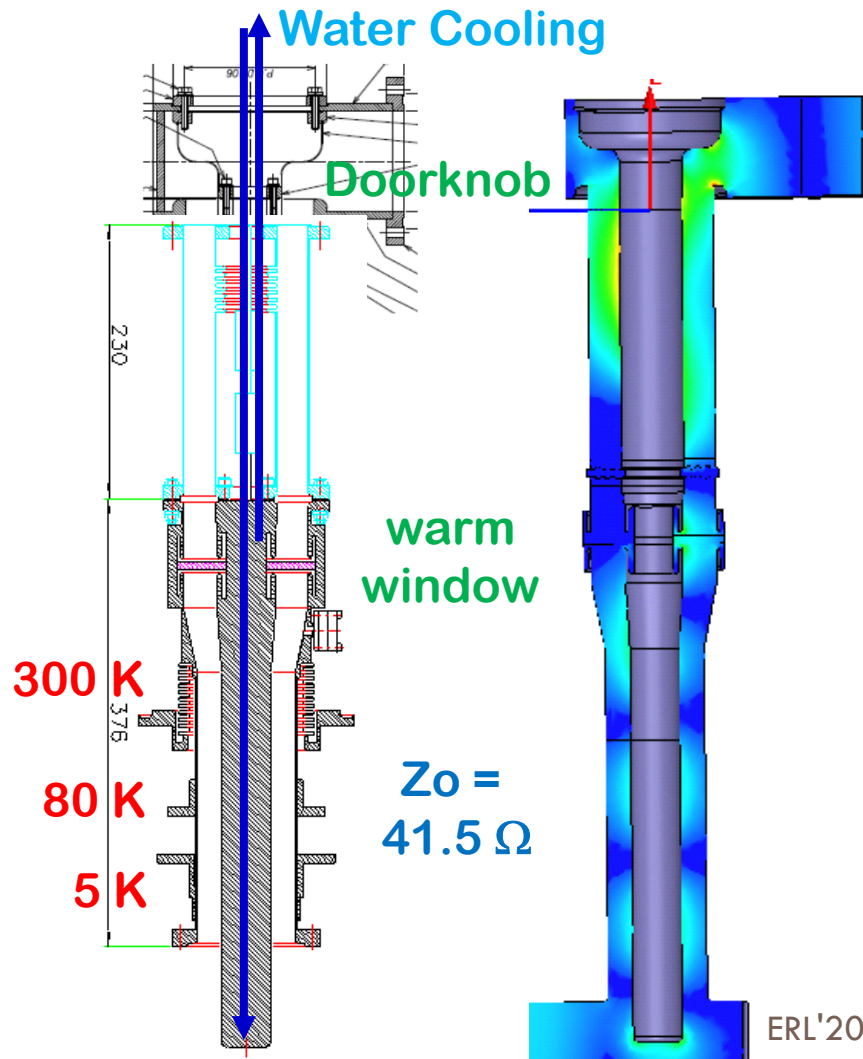
Six input couplers for cERL injector



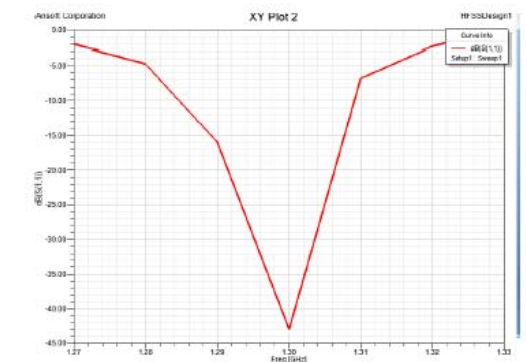
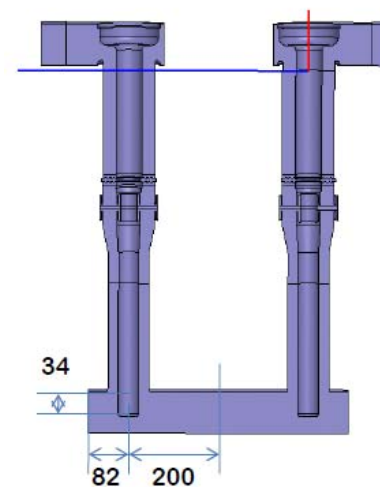
(completed in 2011, June)
(scheduled conditioning in 2011, Dec.)

Prototype input couplers for cERL injector (1)

4



S11 = -50. dB (1.3 GHz)



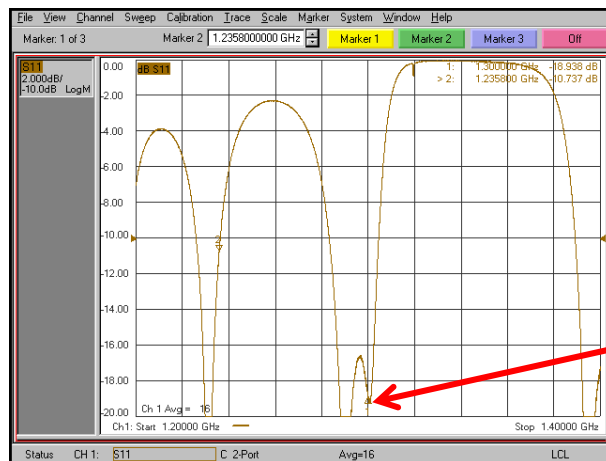
S11 = -42.5 dB (1.3 GHz)

ERL'2011 at KEK, 2011 Oct. 20

E. Kako (KEK)

Prototype input couplers for cERL injector (2)

5



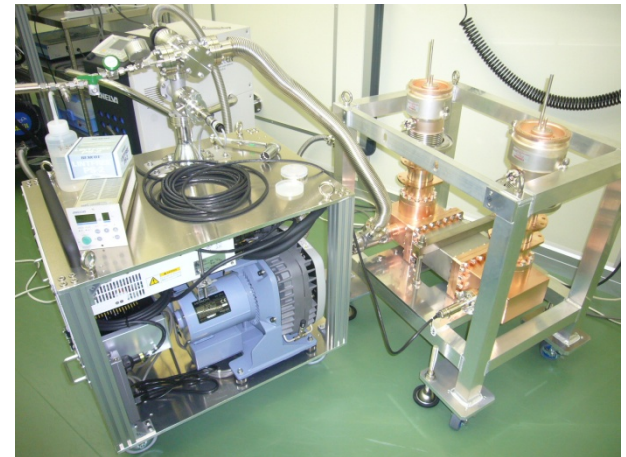
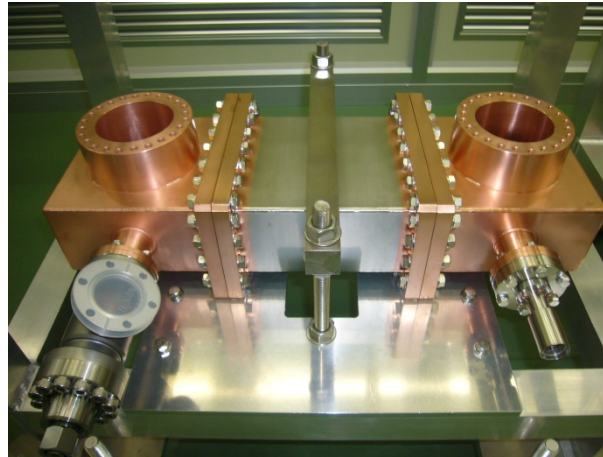
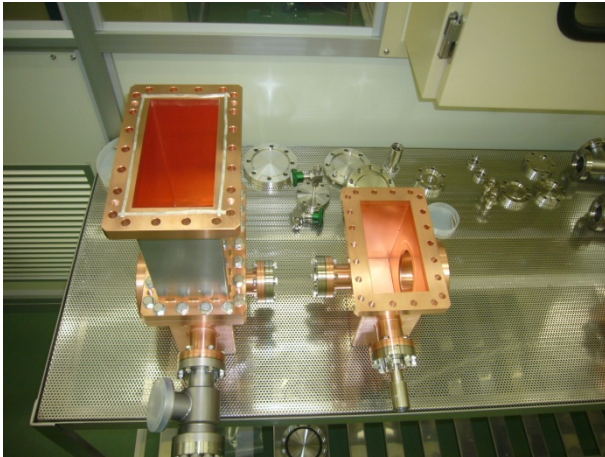
**$S_{11} = -19$ dB
(1.3 GHz)**

ERL'2011 at KEK, 2011 Oct. 20 .

E. Kako (KEK)

Prototype input couplers for cERL injector (3)

6

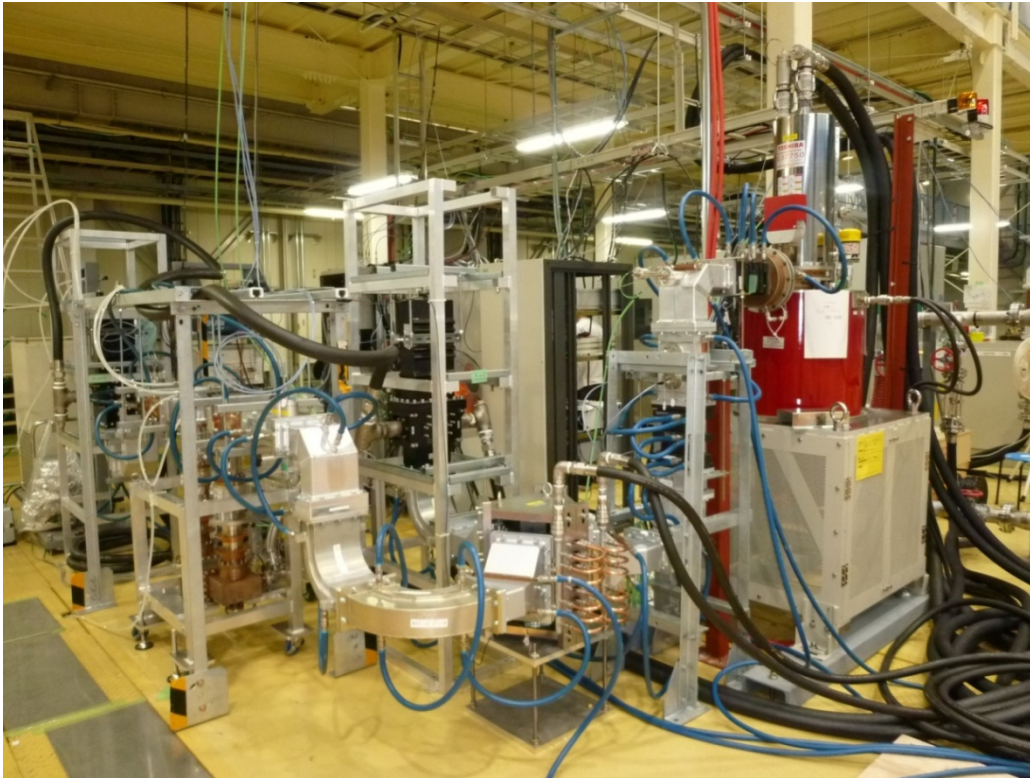


ERL'2011 at KEK, 2011 Oct. 20 .

E. Kako (KEK)

High Power Test Stand for cERL couplers

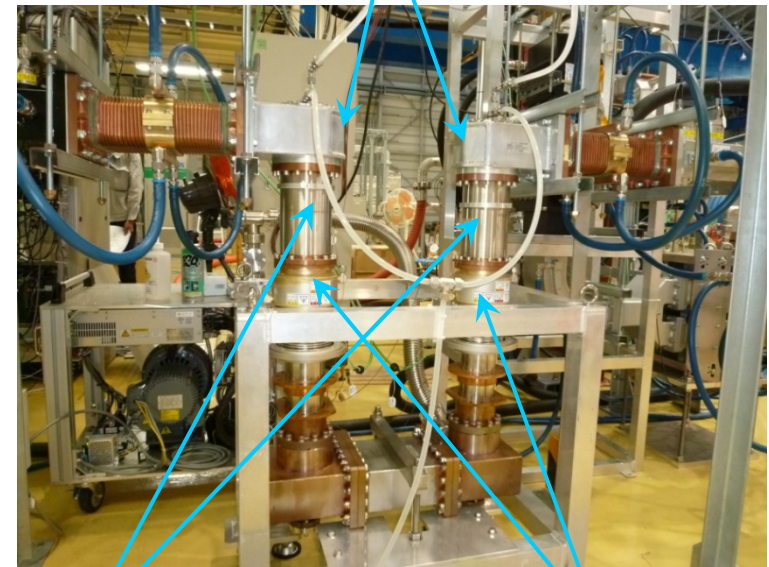
7



300kW CW Klystron

Location of Temperature Sensors

Doorknob



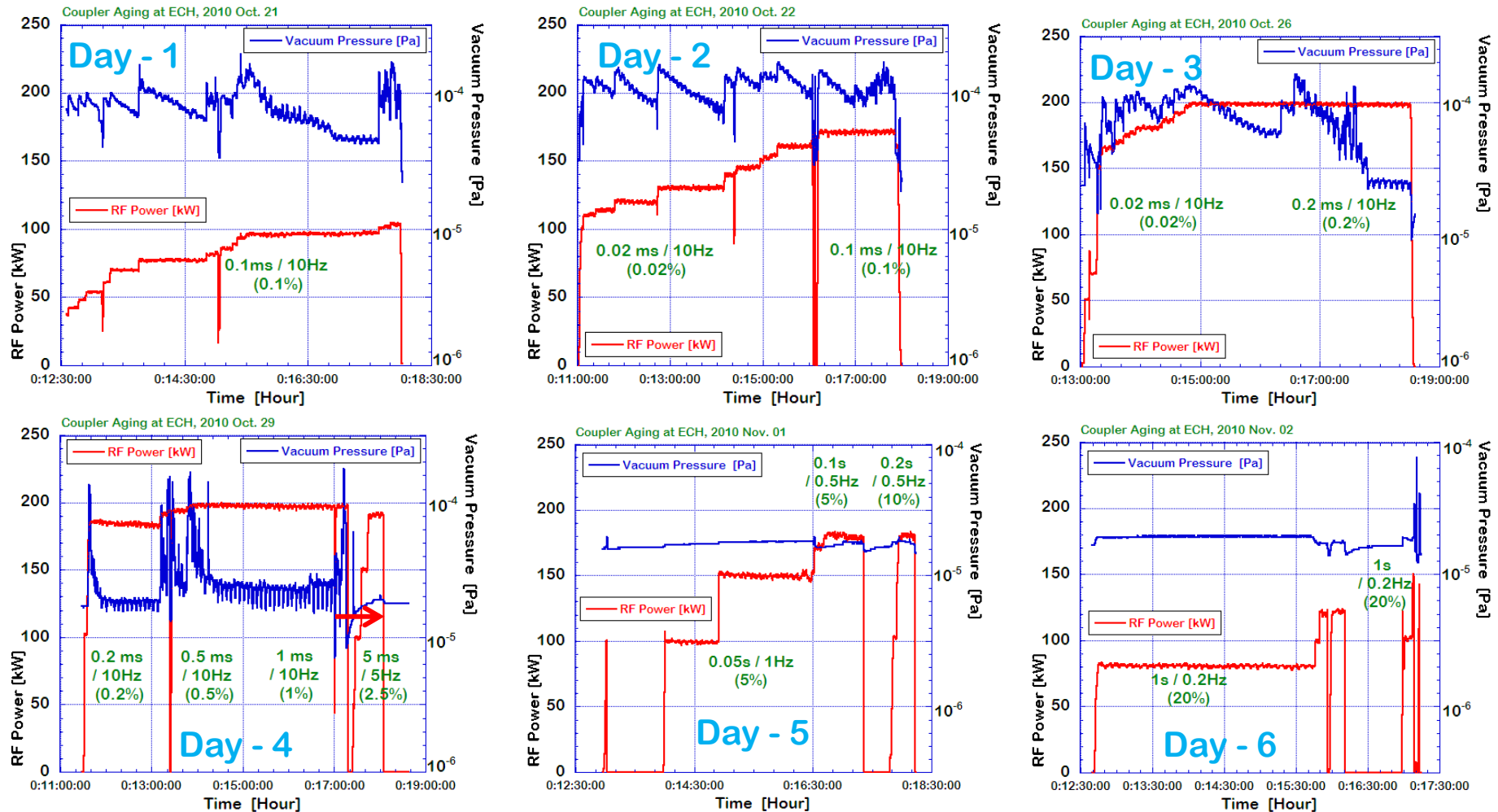
Coaxial line

RF window

High power test stand

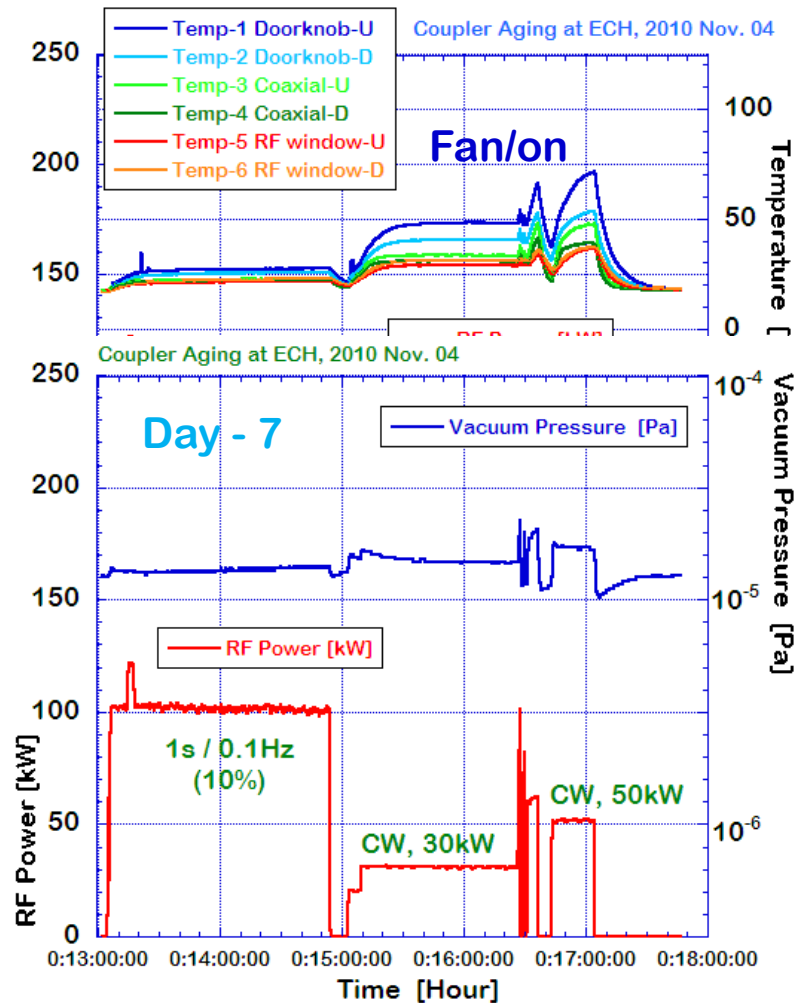
Results of RF Conditioning (1)

8



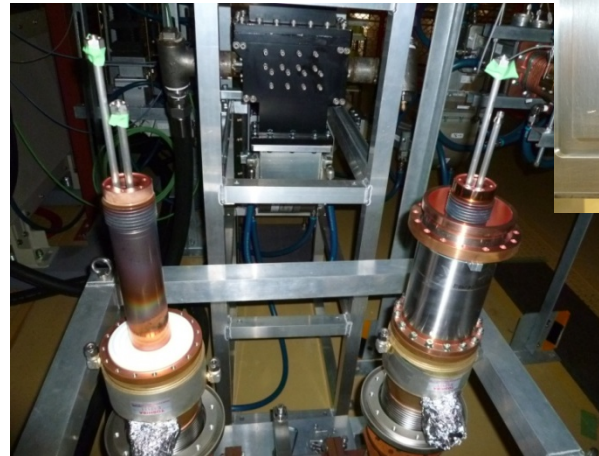
Results of RF Conditioning (2)

9



Conditioning Results

- 1s, 0.1Hz, 100kW for 2h
- cw 30kW for 1.5h
- cw 50kW for 0.5h
- cw 100kW for 1 min

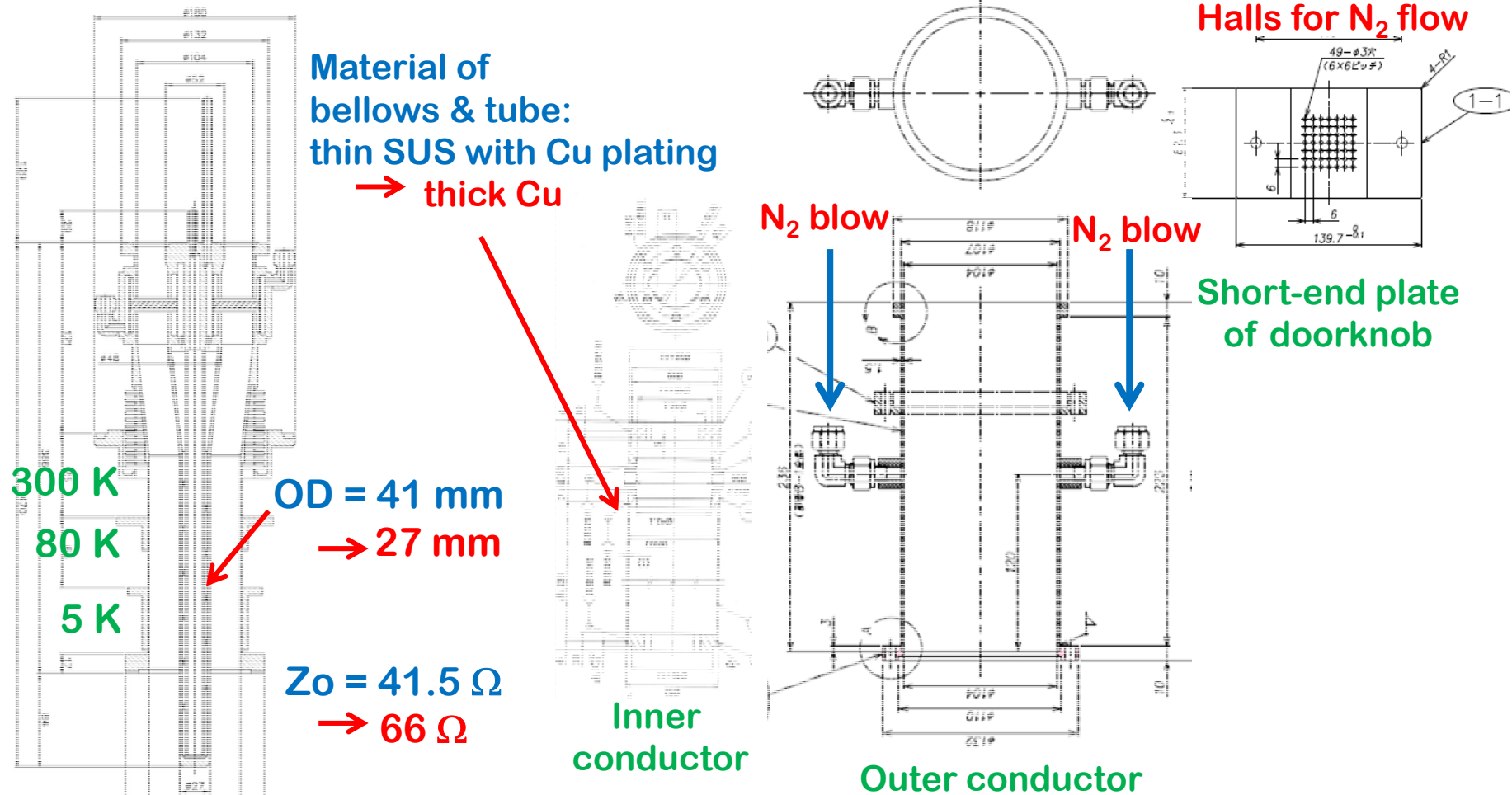


ERL'2011 at KEK, 2011 Oct. 20 .

E. Kako (KEK)

Improvement of Coupler Components

10



SUMMARY

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- Two prototype input couplers for cw operation were designed, fabricated and tested with high power RF source.
- RF conditioning up to 180 kW (0.2 sec and 0.5 Hz , duty 10%), and cw 50 kW was achieved.
- Required improvements of coupler components with efficient cooling for reducing the heat loss are under development.
- Six input couplers for cERL injector were completed. The RF conditioning will be carried out in 2011, December.