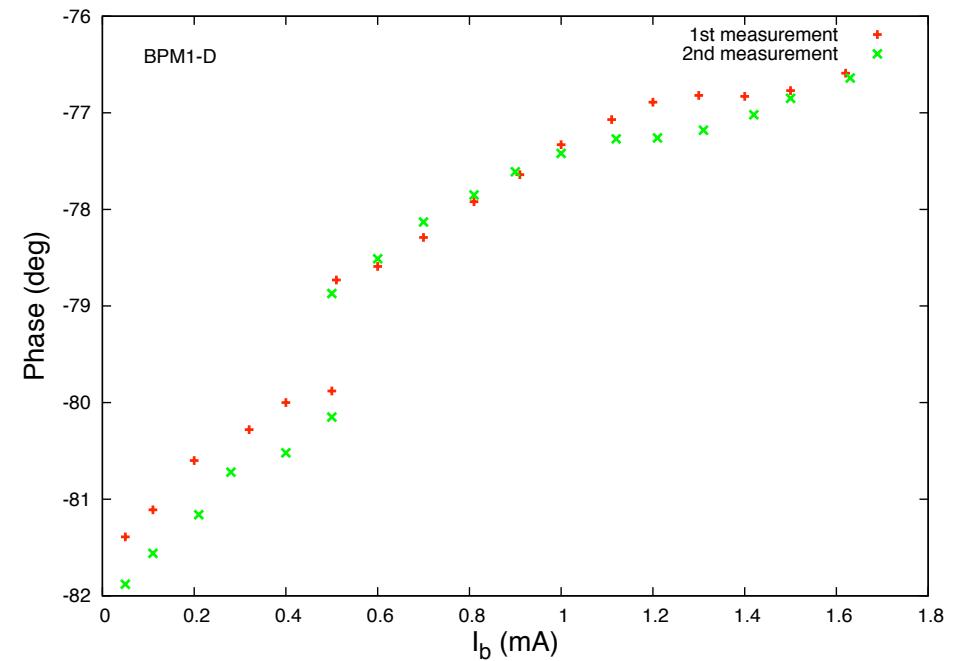
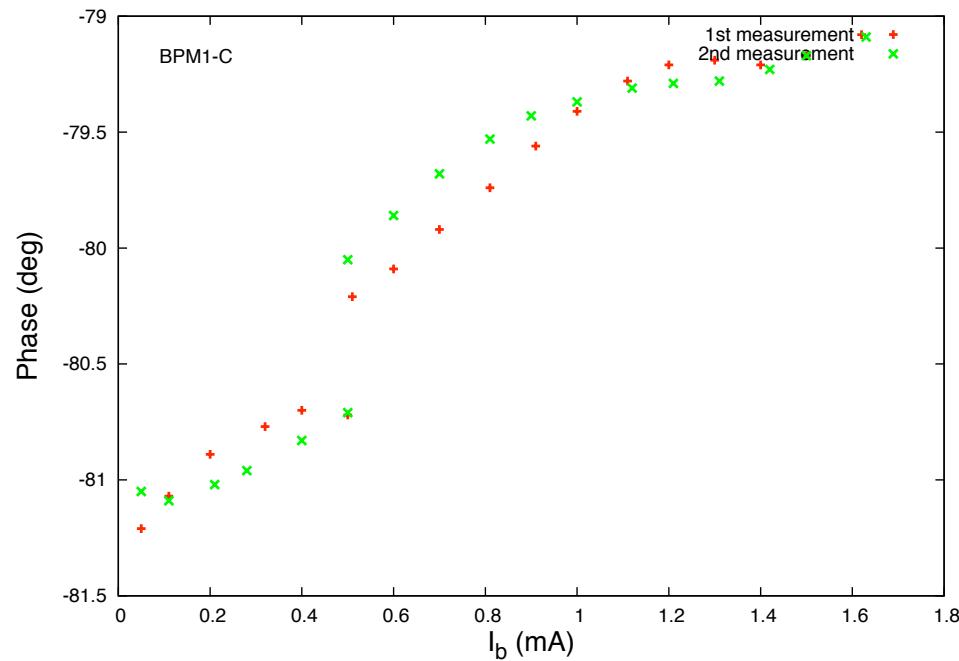
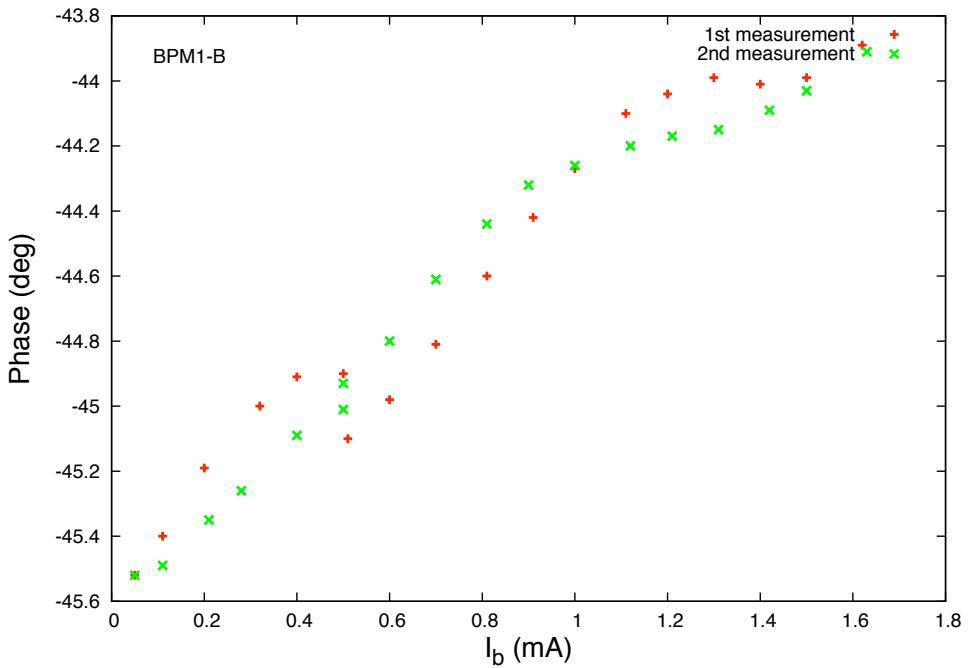
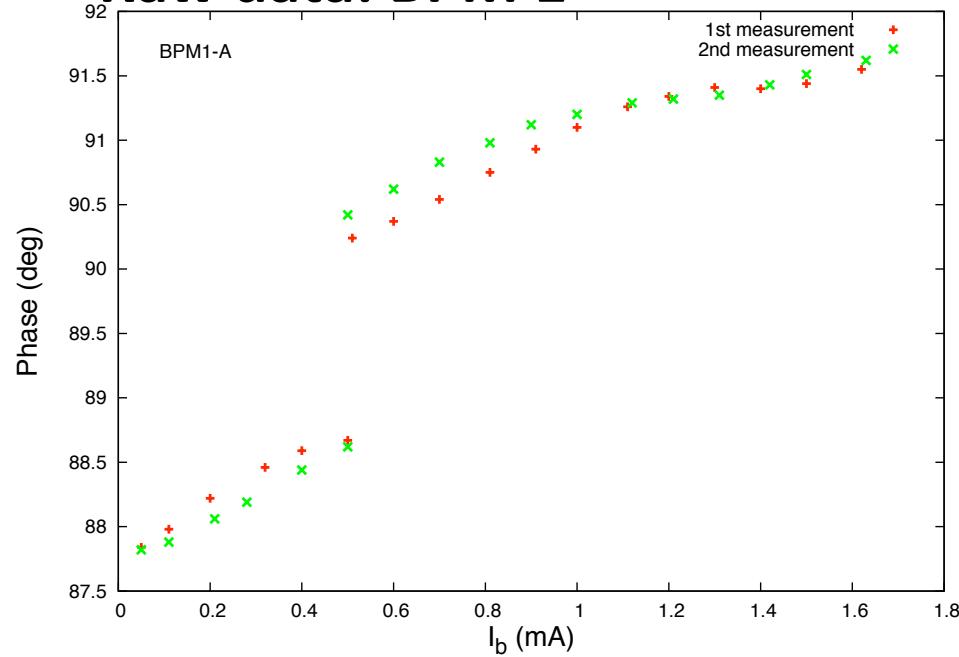


Loss factor measurement at KEKB LER

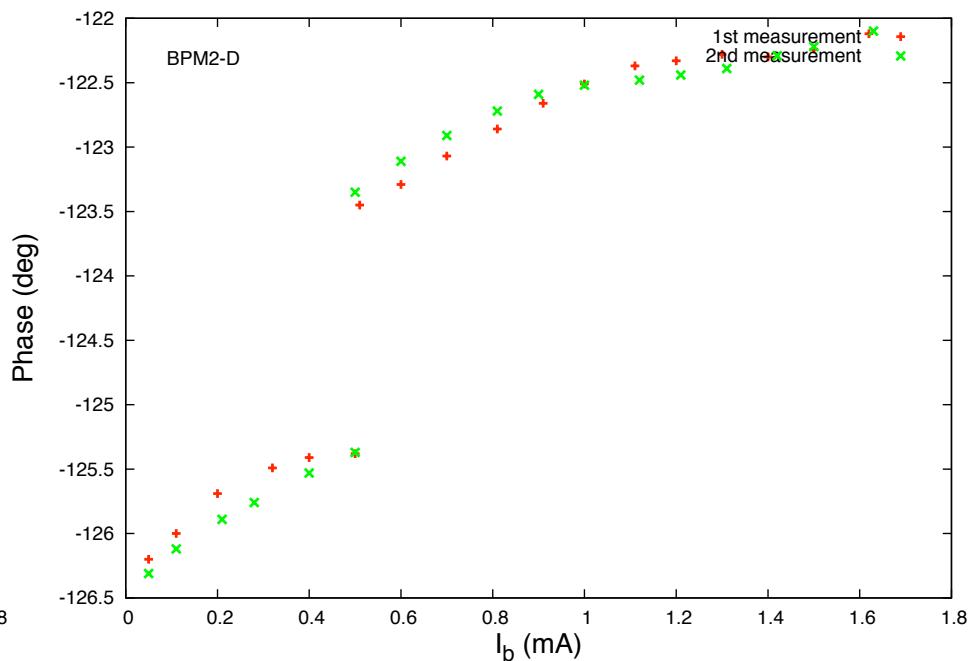
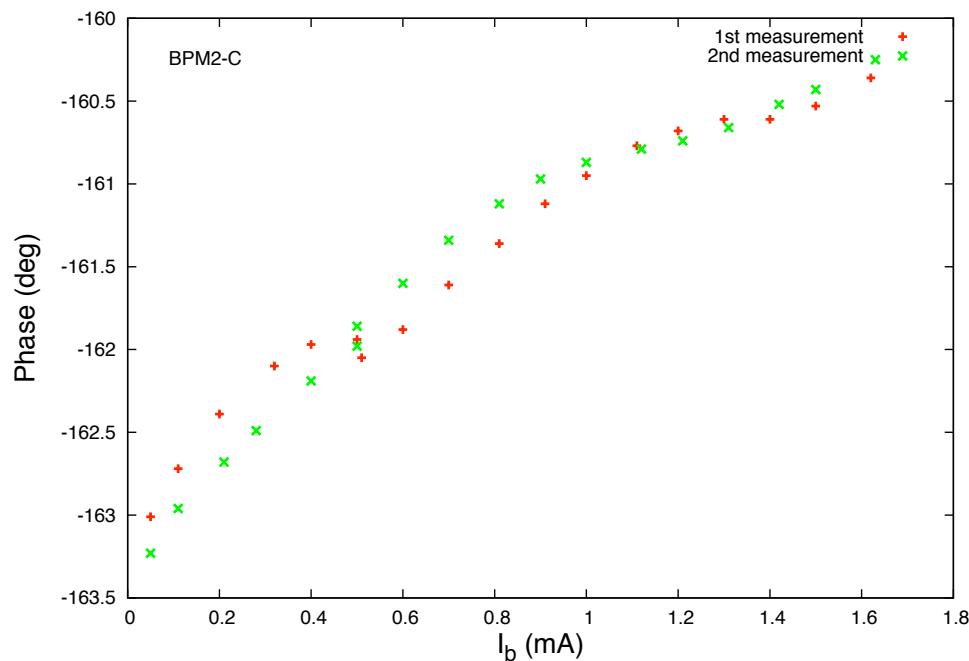
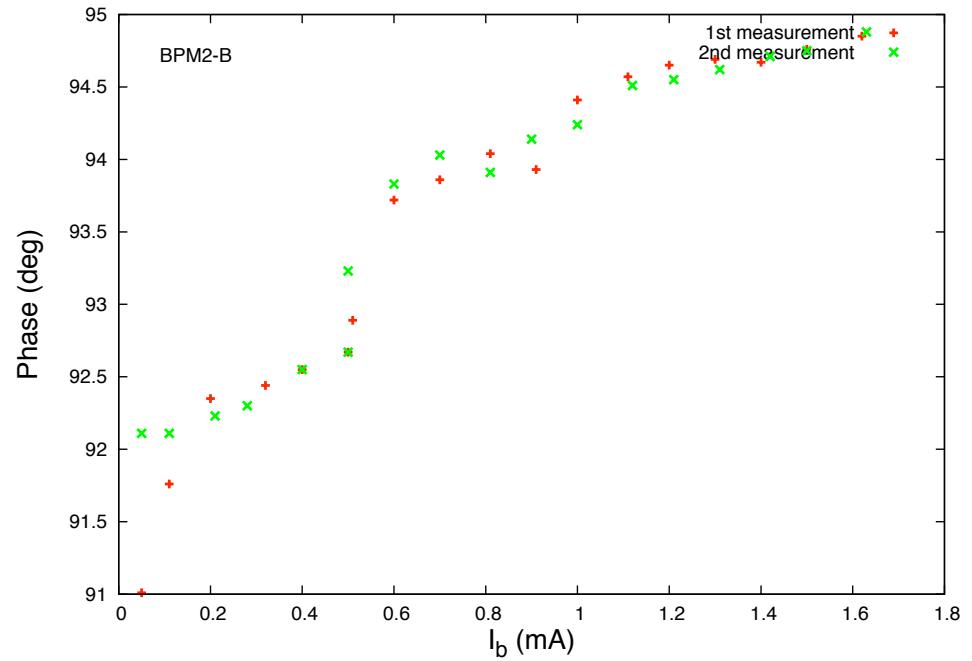
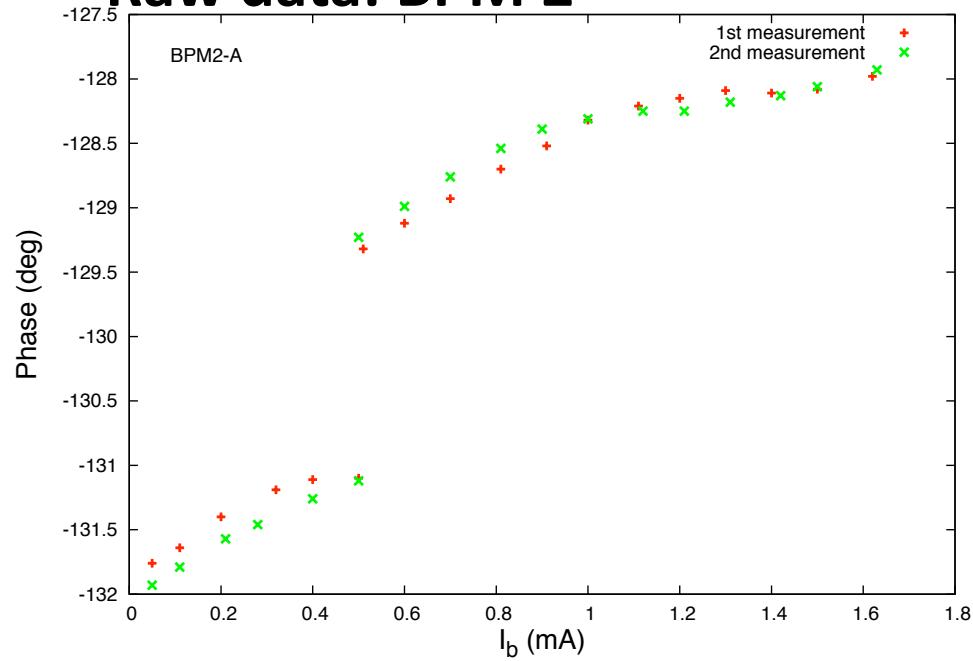
@ 2009.10.26

D. Zhou, T. Ieiri, J. Flanagan, K. Ohmi

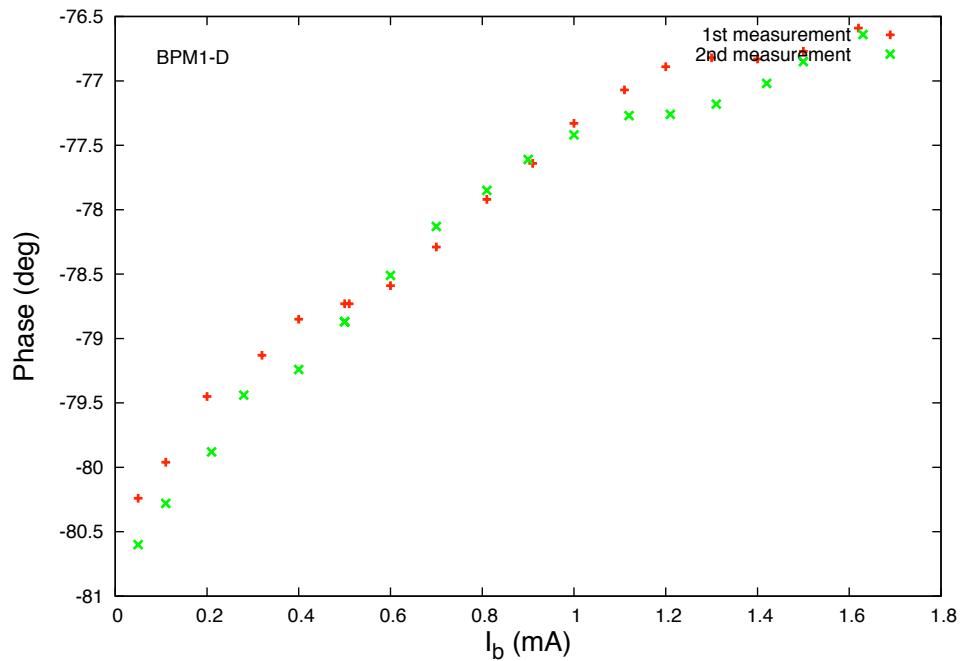
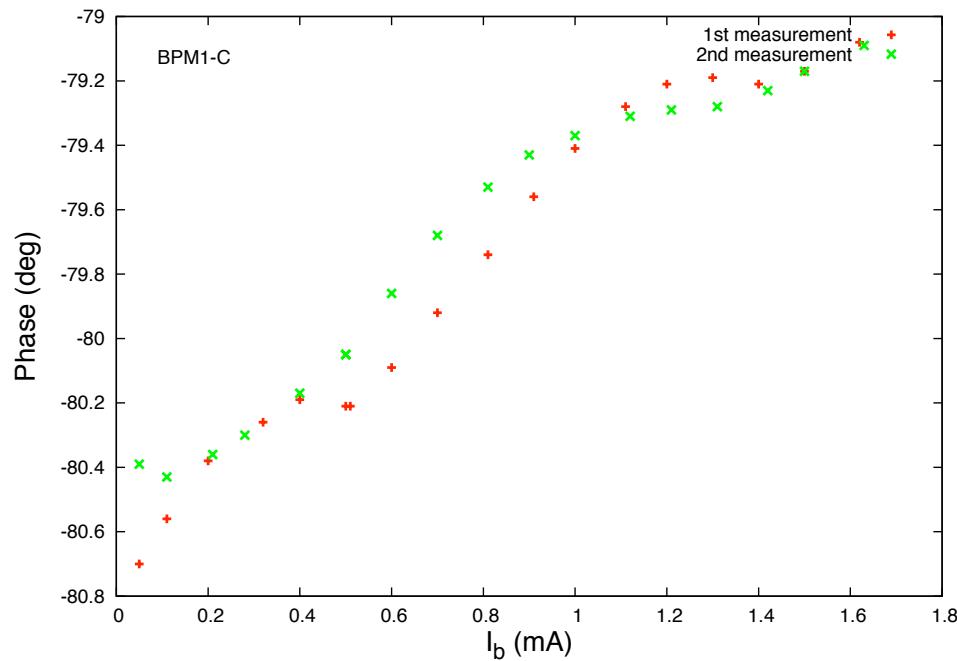
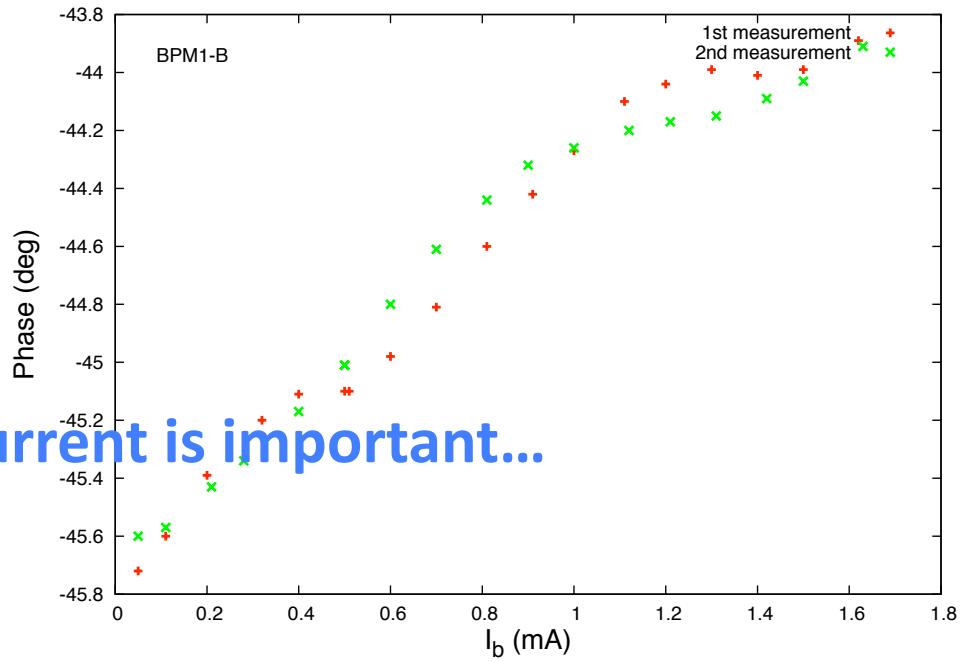
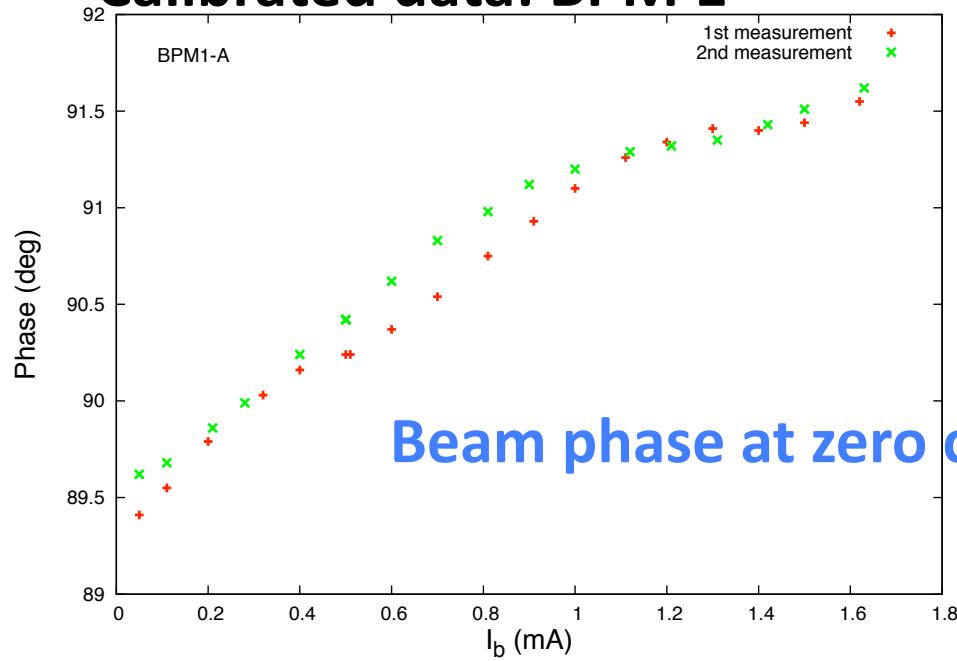
Raw data: BPM 1



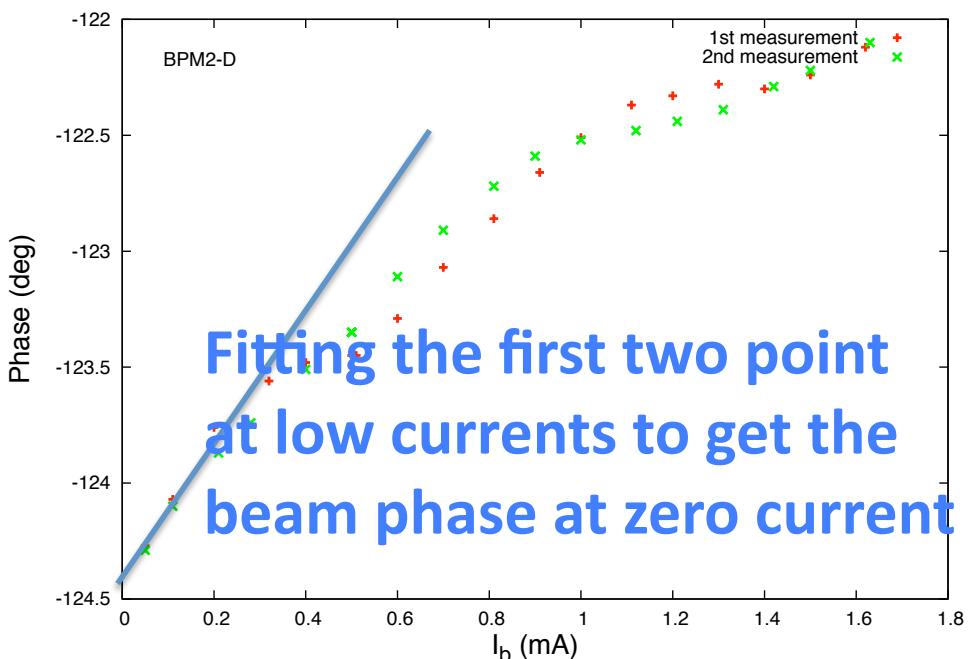
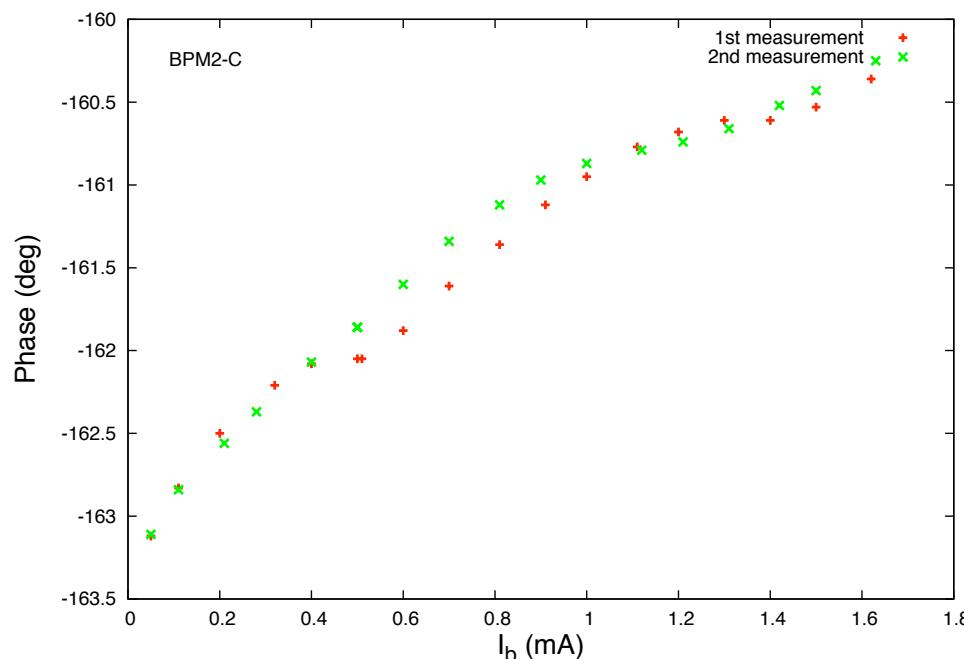
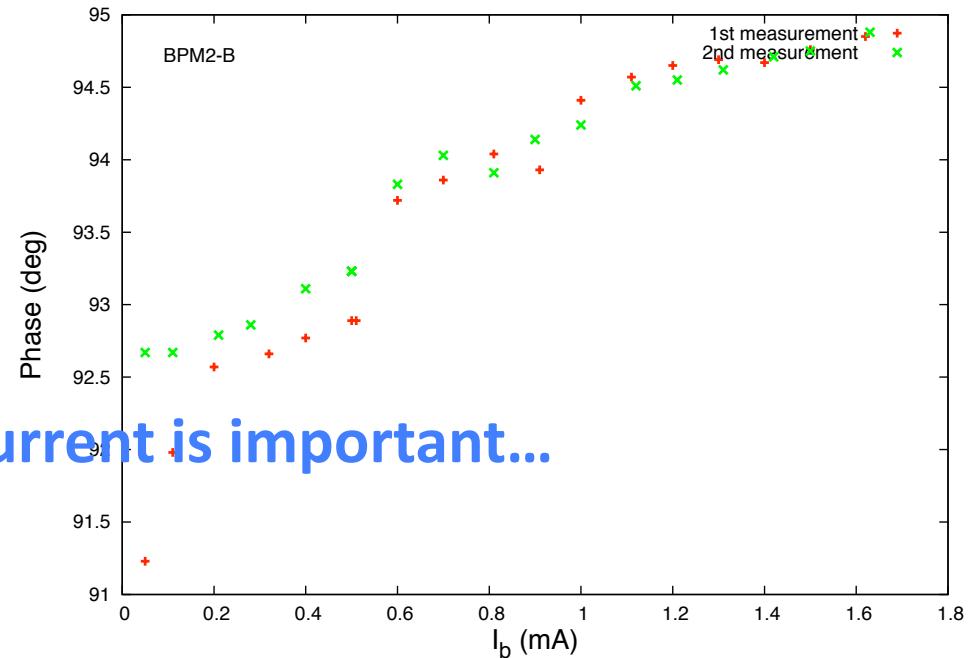
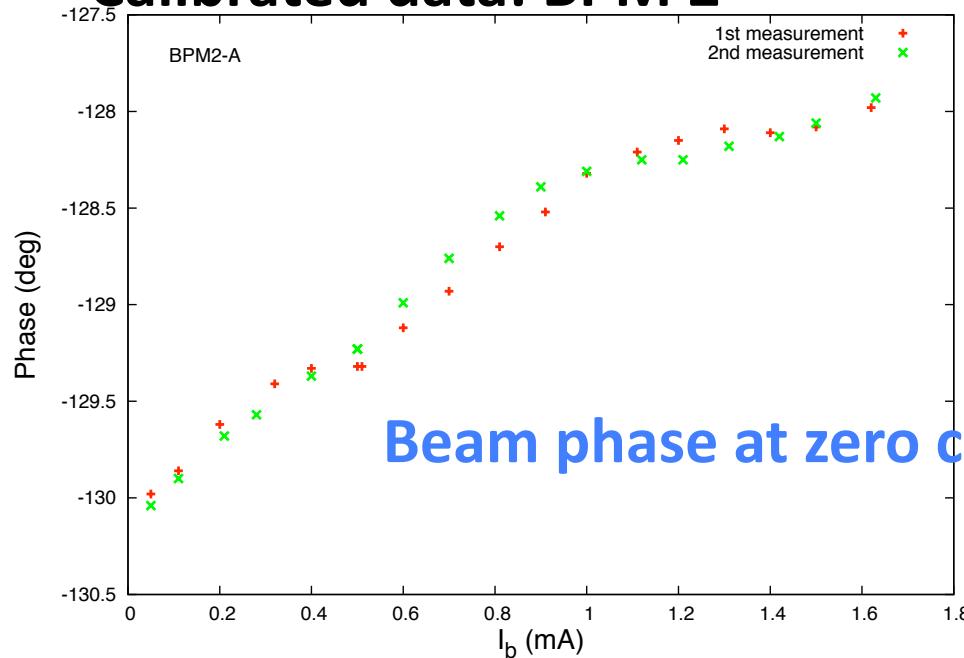
Raw data: BPM 2



Calibrated data: BPM 1



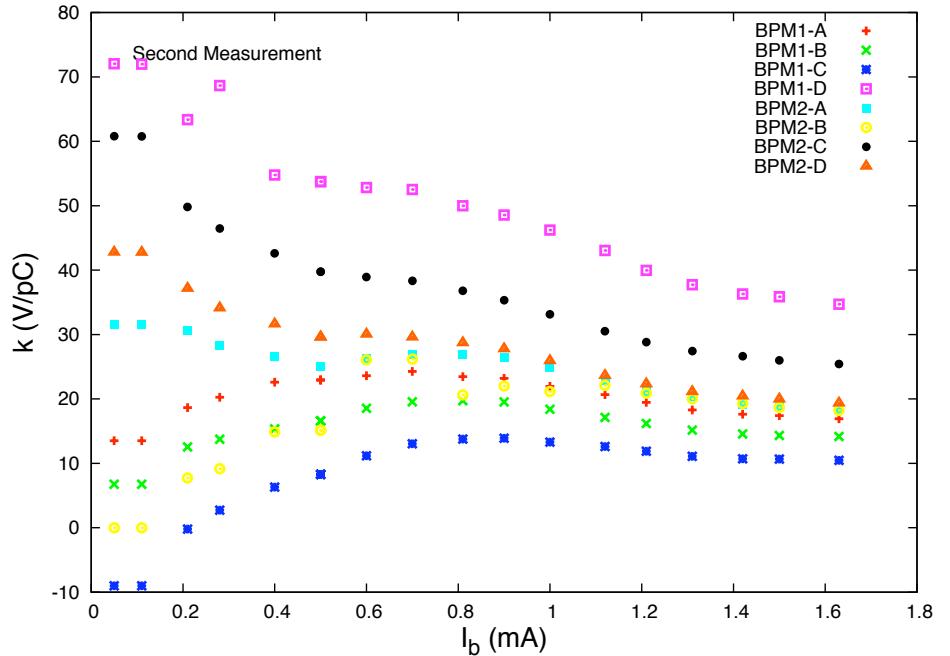
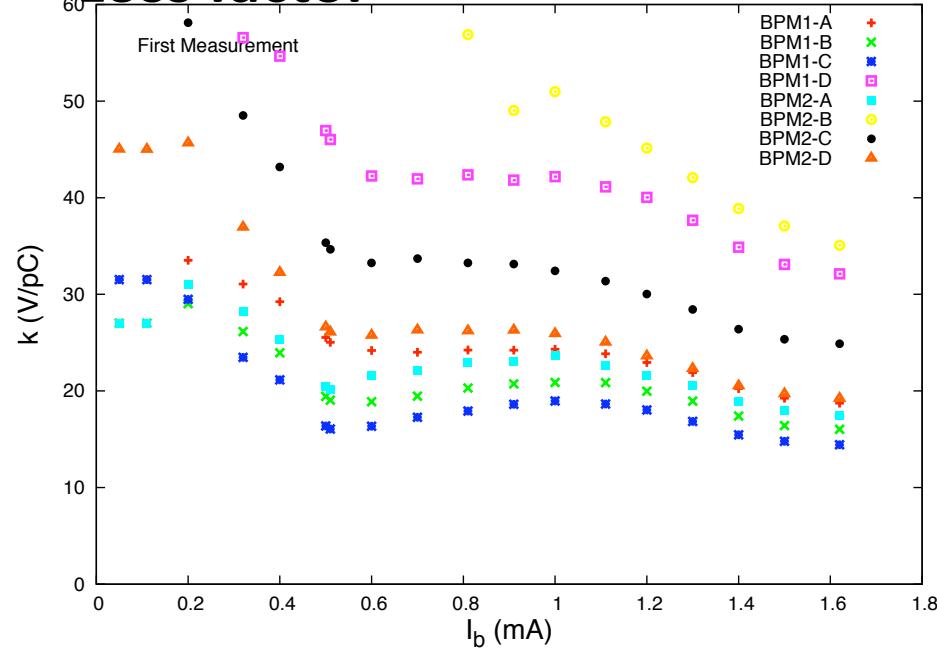
Calibrated data: BPM 2



Beam phase at zero current is important...

Fitting the first two point
at low currents to get the
beam phase at zero current

Loss factor

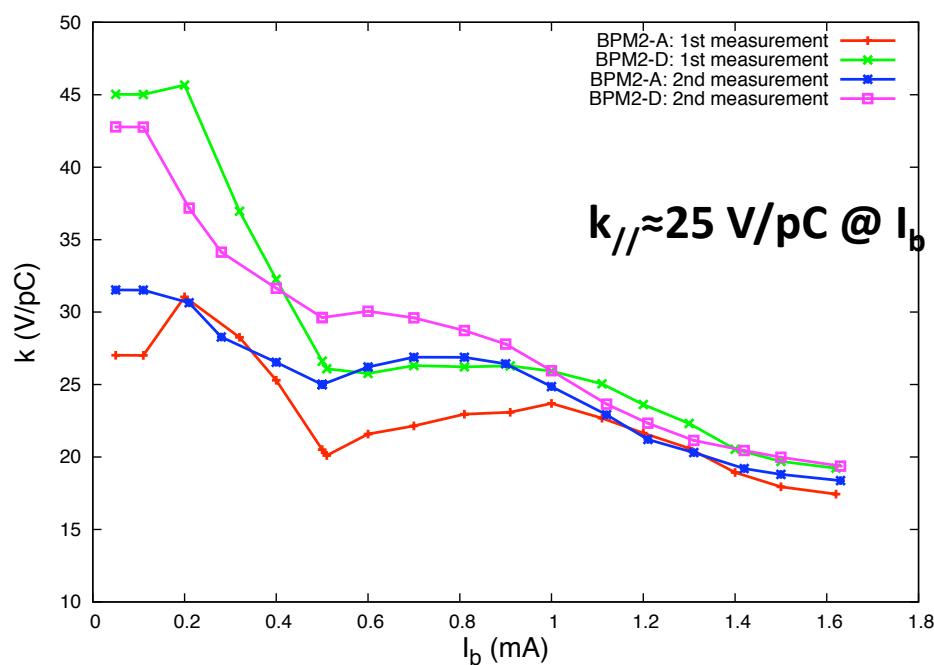


$$V_c \sin(\varphi_{s0} + \Delta\varphi_s) = U_0/e + k_{||}(\sigma_s)T_0I_b$$

$$U_0 = 1.82 \text{ MeV}$$

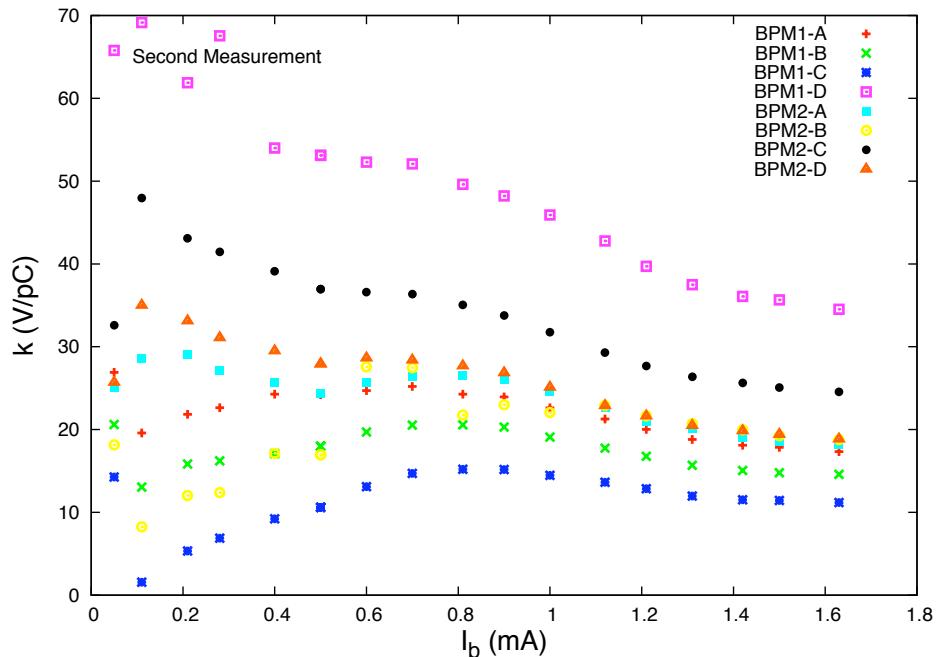
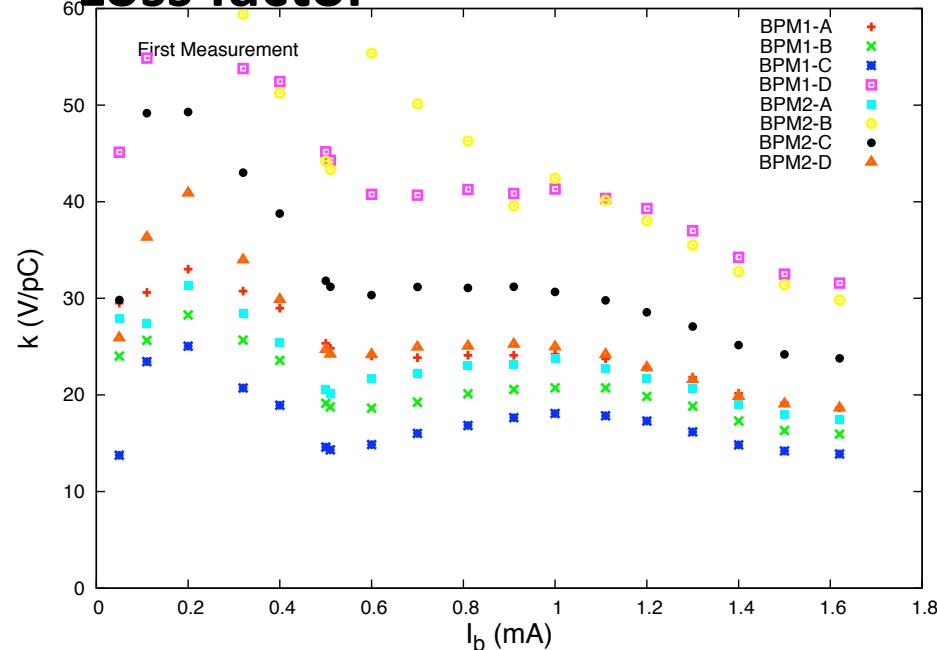
$$V_c = 8 \text{ MV}$$

$$\varphi_{s0} = 13.15 \text{ deg}$$

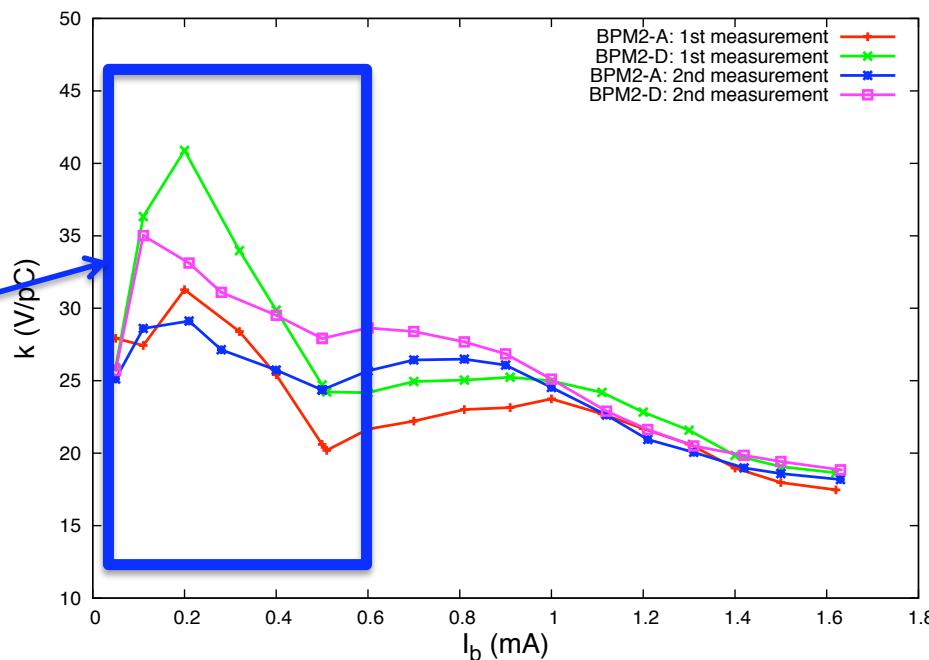


Beam phase:
Fitting first
2 points

Loss factor

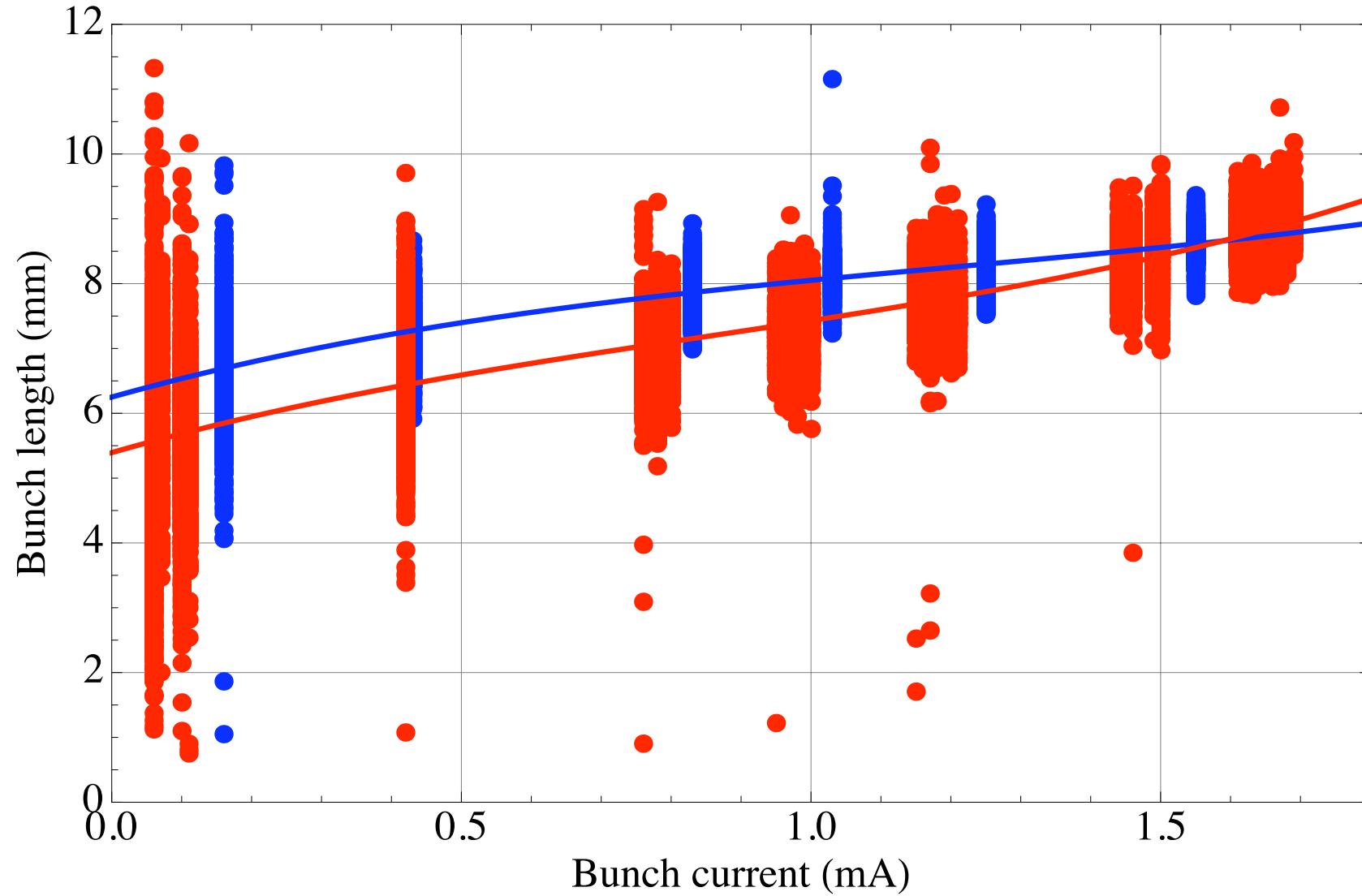


Quite depend on
choice of beam
phase at zero current



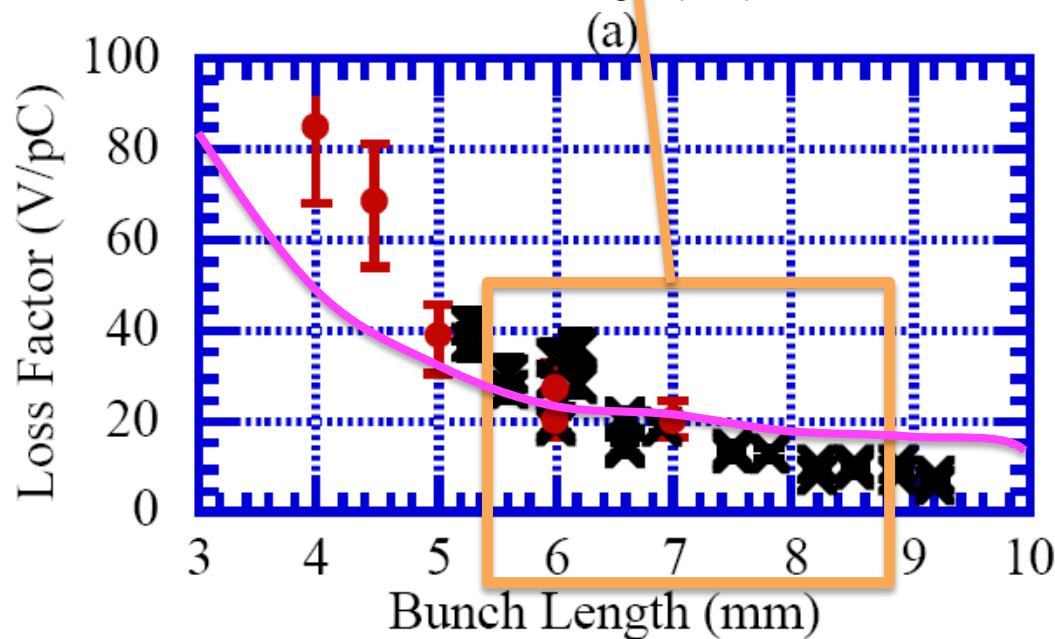
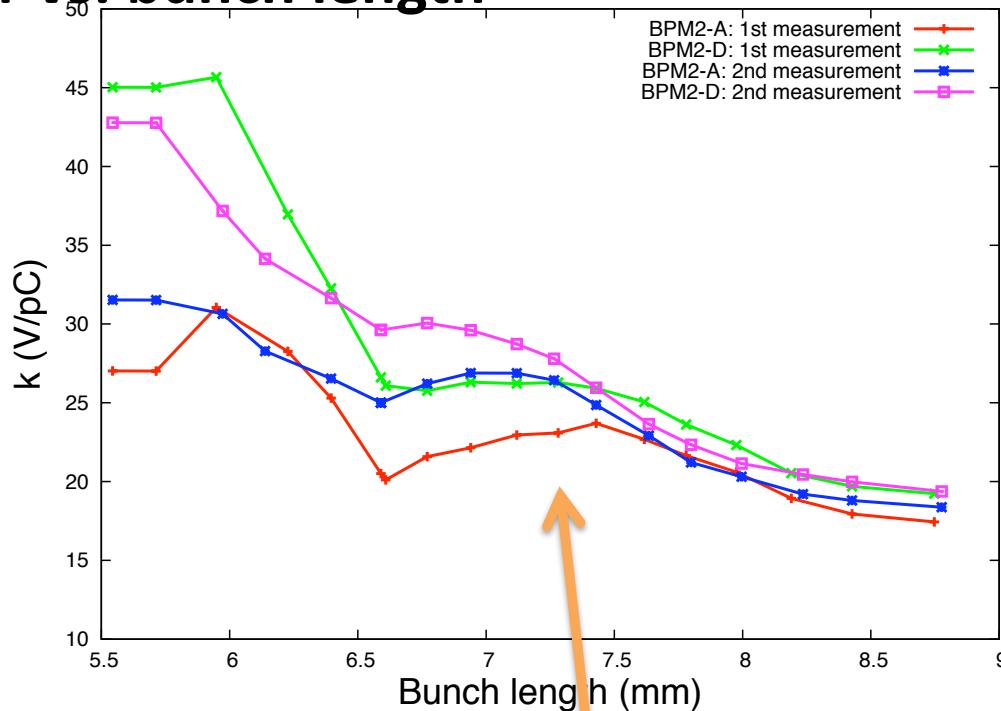
Beam phase:
Fitting first
4 points

Bunch length vs. bunch current (2008.10.26, Flanagan-san)



Calculate bunch length: Gaussian fitting

Loss factor vs. bunch length

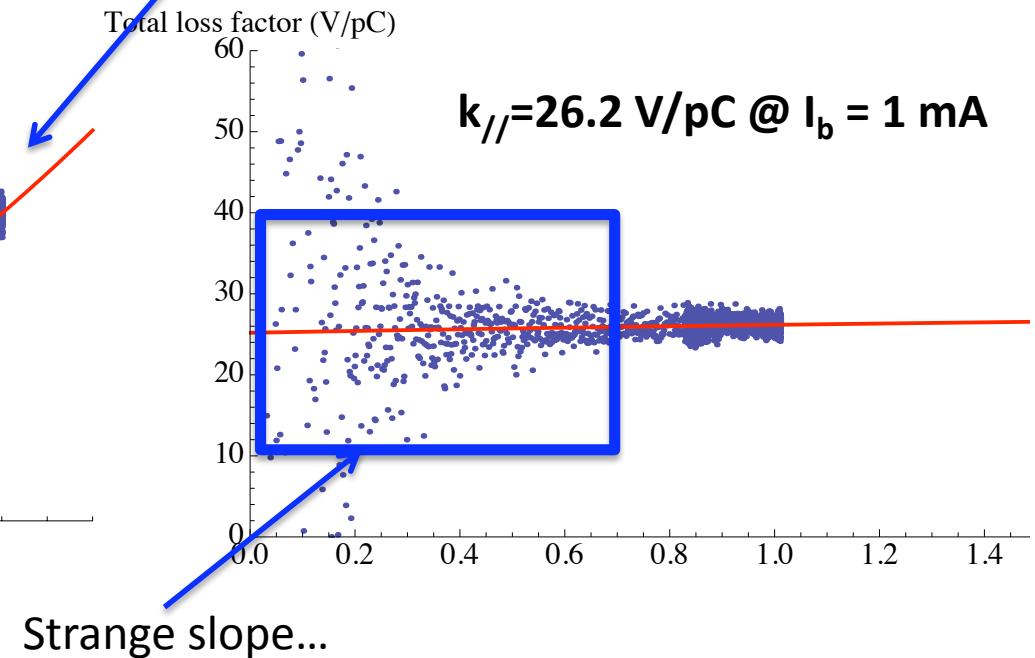
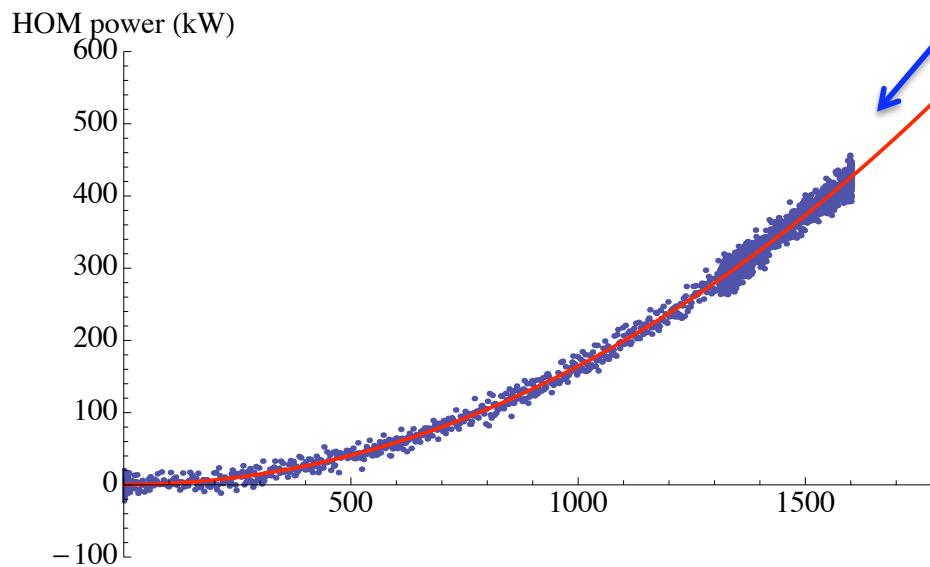
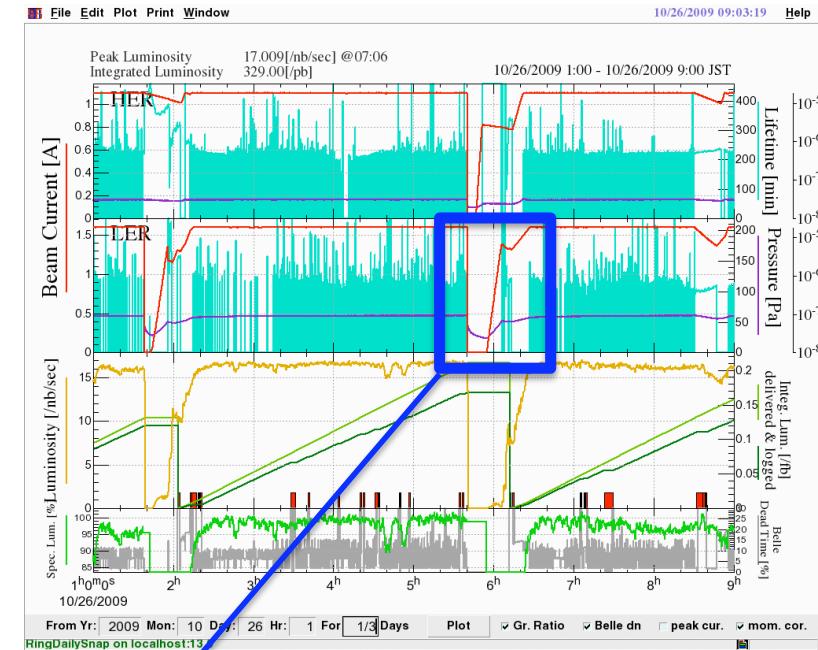


RF power balance method

E=3.594074 GeV @ Y(5S)

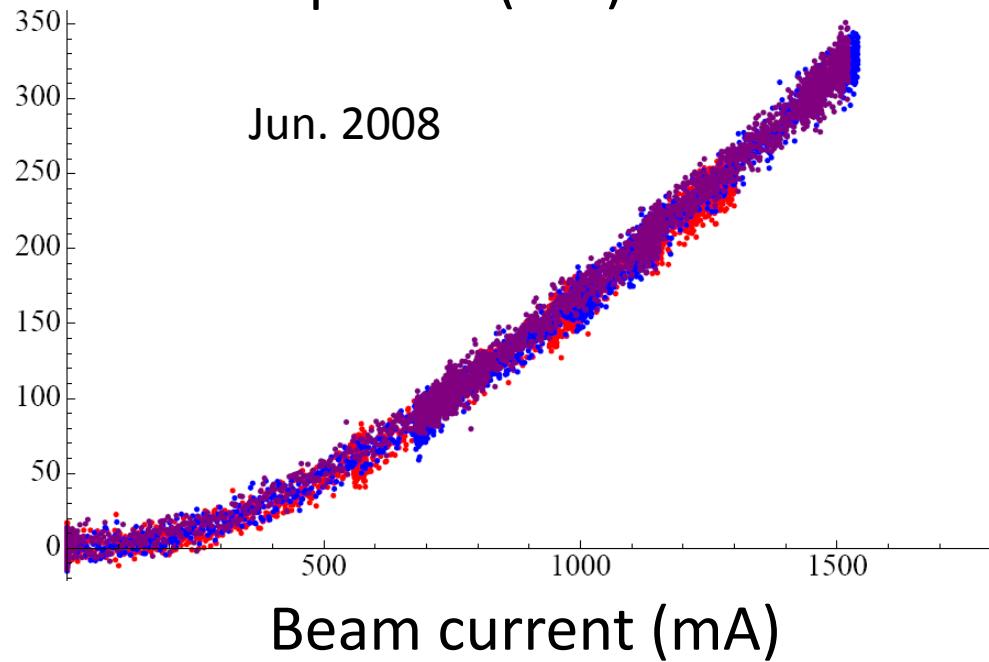
(2009.10.26)

At $I_b=1$ mA, the $k_{||}$ results are similar from the RF power balance method and beam phase shift method

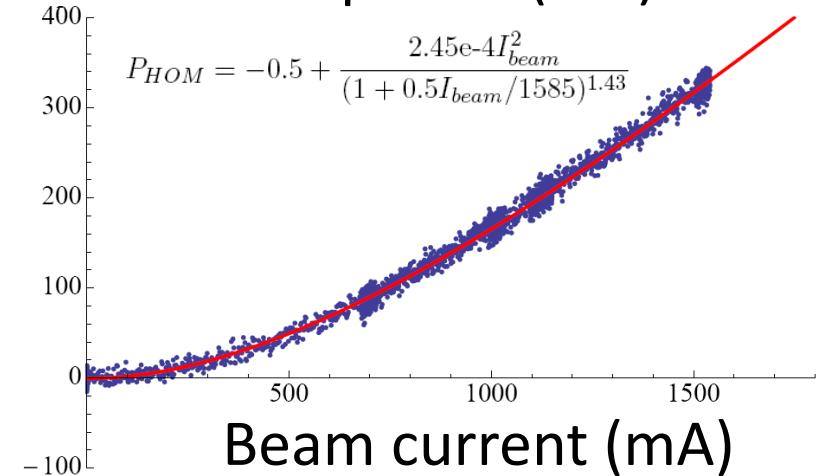


- $E=3.128585 \text{ GeV}$

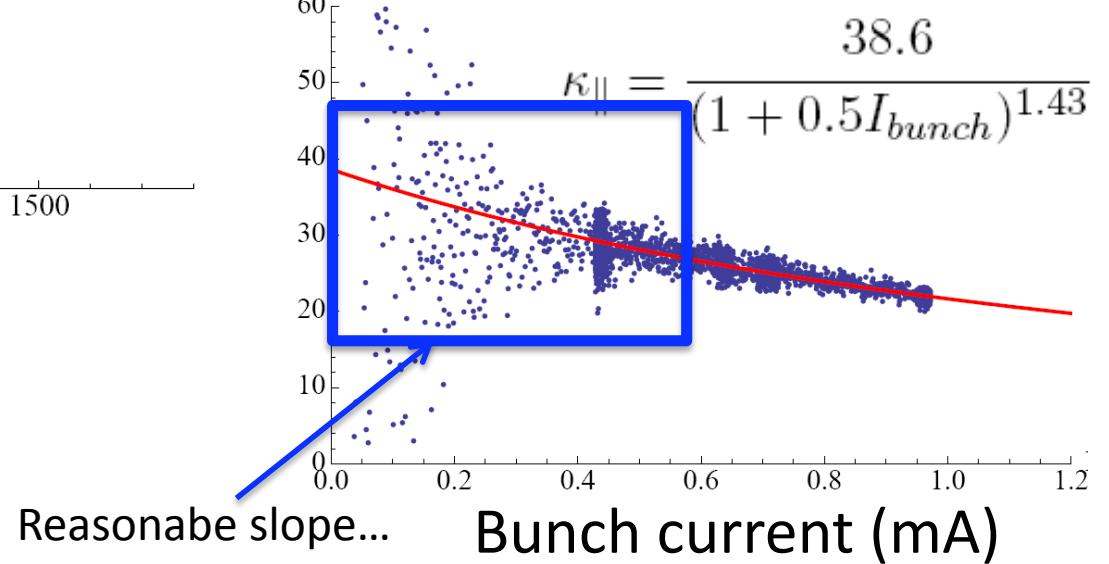
Total HOM power (kW)



Total HOM power (kW)

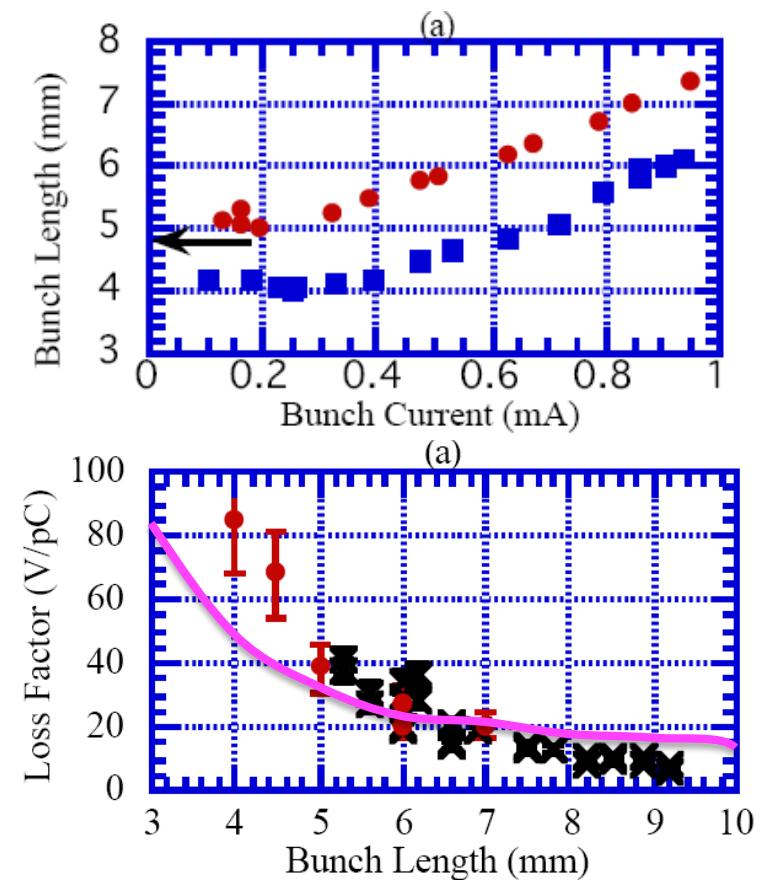
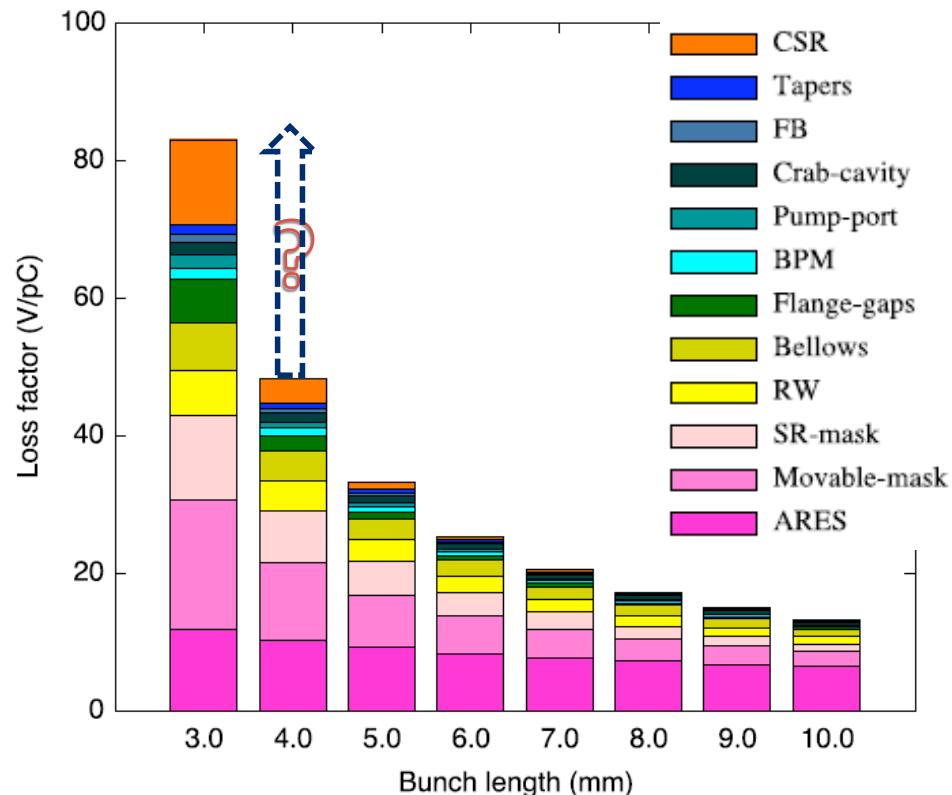


Total Loss factor (V/pC)



Loss factor from calculated wake potential

- Calculated loss factor is much smaller than measurement when $\sigma < 5\text{mm}$, but higher when $\sigma > 7\text{mm}$
- Loss factor due to CSR decays quickly when bunch length increases



Ieiri & Koiso, 2003

-
- Conclusions
 - Beam phase shift method and RF power balance method agree at $I_b=1$ mA.
 - Measured loss factors (Oct. 26, 2009) at KEKB LER look more close to those calculated from numerical wake potentials(?)
 - Streak camera data showed similar bunch lengthening as experiments in Nov., 2008