

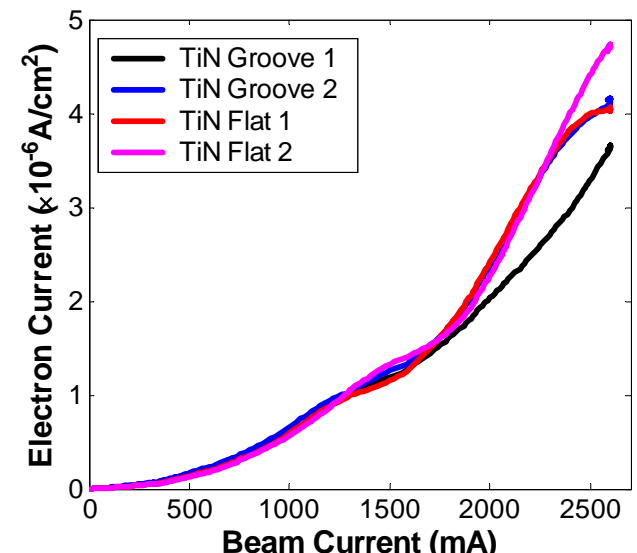
Estimation of the Primary electrons (photon-electron)

Method:

1. Normalized electron current by the calculated photon-flux at each collector
2. Compare the electron current at low beam current, where there is no multipacting

Results (relative Photon electron same amount of photons):

1. Flat 1 : 1.0
2. Flat 2: 0.8 (why 20% smaller than Flat 1)
3. Groove 1: 0.055 (1/18.26) ← Photo factor
4. Groove 2: 0.055 (1/18.35)

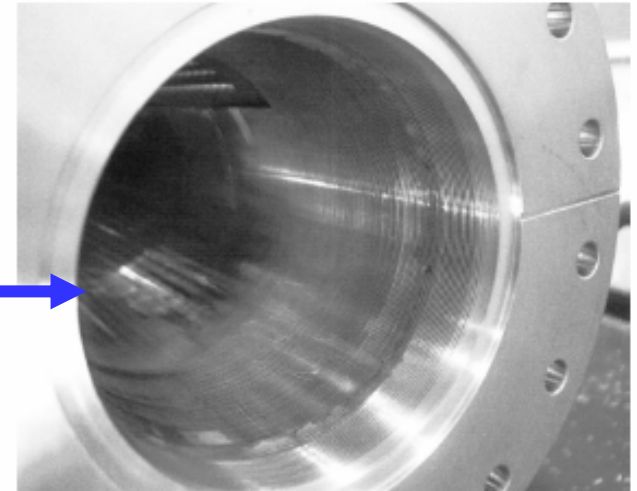


Examples of Reduction photon electron

Sawtooth surface

Application of a sawtooth surface to accelerator beam chambers with low electron emission rate by Y. Suetsugu, et al., J. Vac. Sci. Technol. A 21(1), 186 (2003).

The reduction was by a factor of **24~27**



Ante_chamber (Y. Suetsugu, et. al. EPAC2006)



The reduction of photoelectrons due to the ante-chamber was a factor of **100** at low beam current! **KEKB upgrade plan**

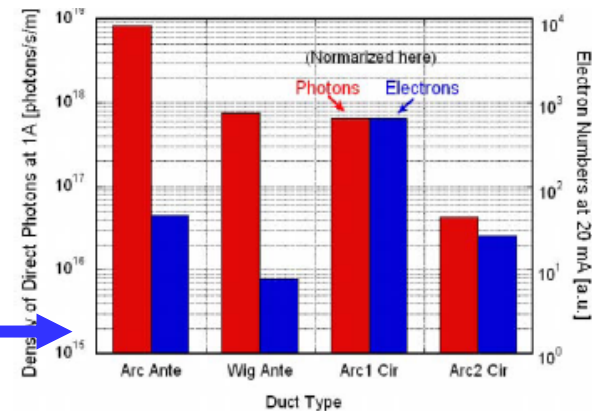
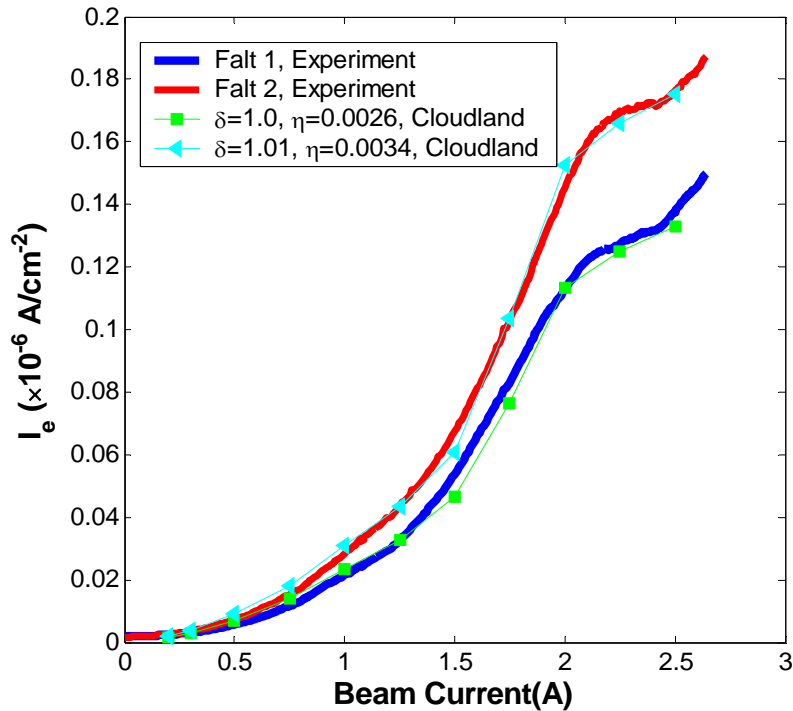
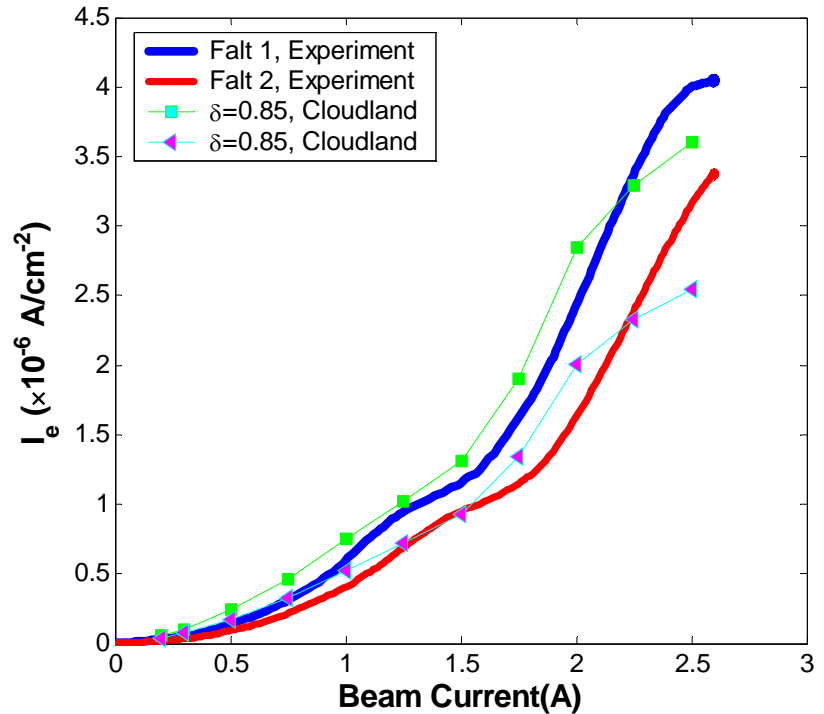


Figure 3 Comparison between measured electron numbers and line densities of direct photons for four types of beam ducts. The electron numbers were normalized to photon numbers at "Arc1 Cir".

SEY estimation



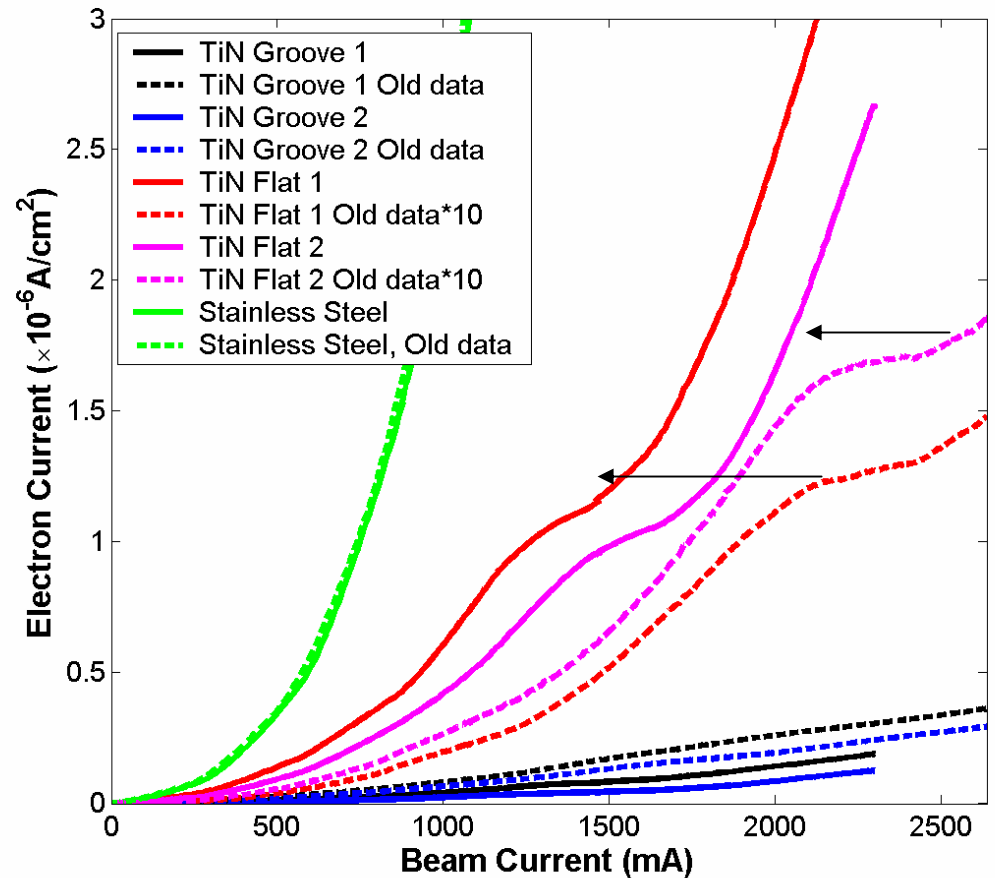
Before alignment



After alignment

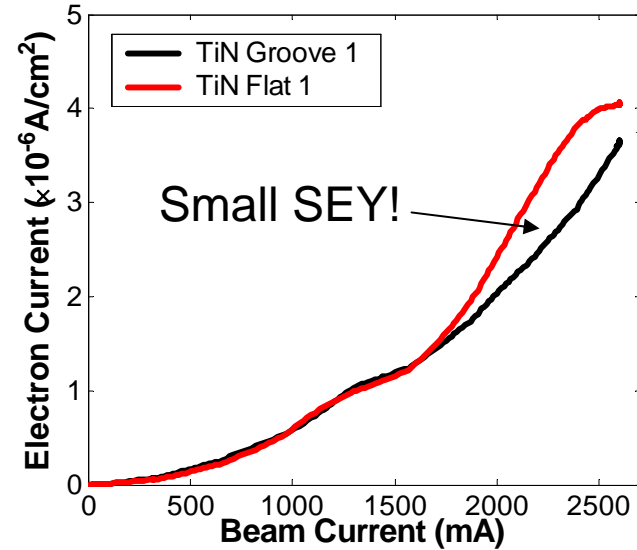
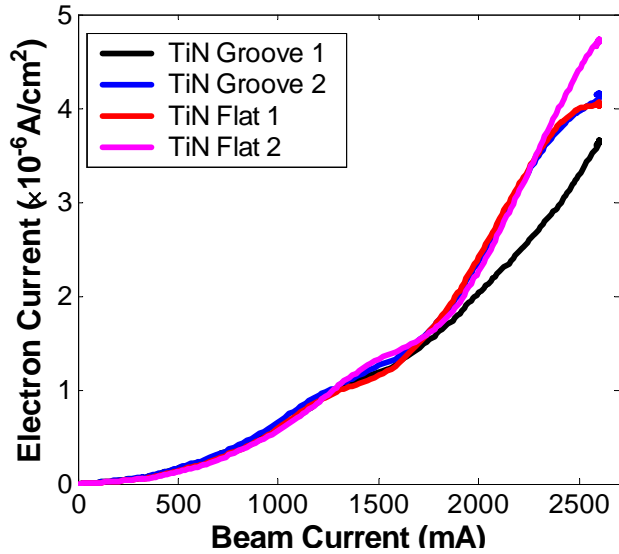
Fitting after alignment

- E-current in the flat chambers increases by a factor >10 ; the shape also changed!
- However, We don't have clear reason to change the shape of e-current line in simulation.

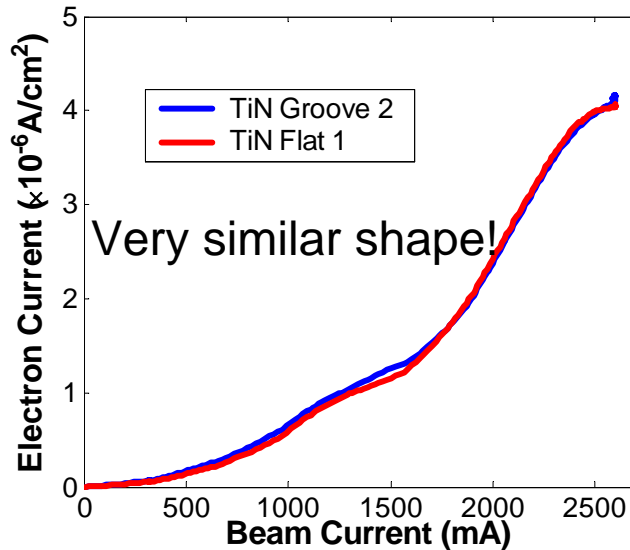


E-current line shape—(SEY)

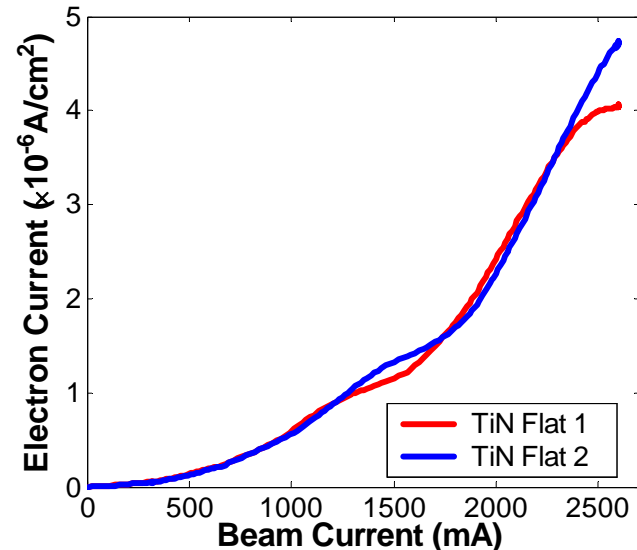
07-31-data



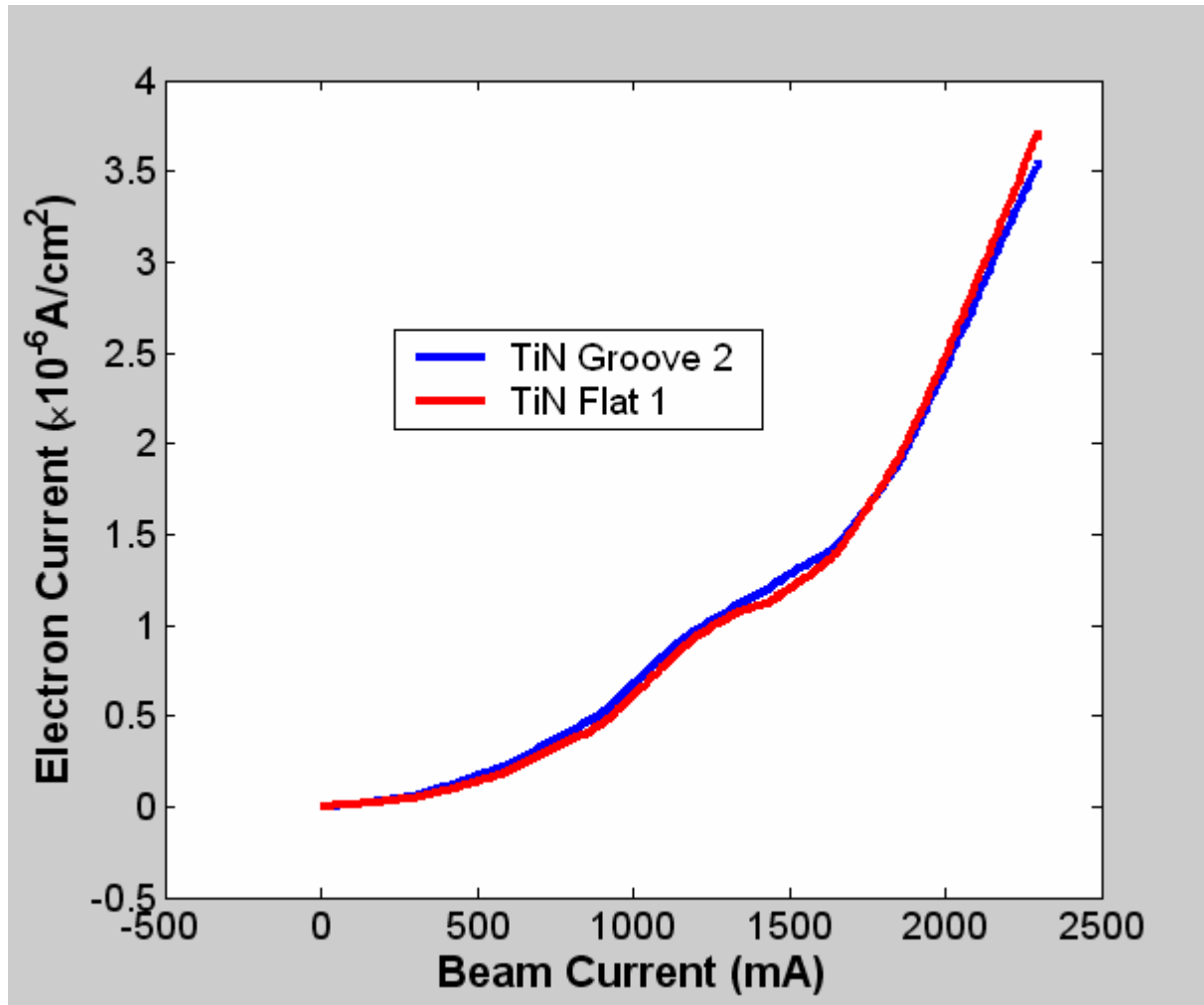
Cross at high beam current?



) mee



Data 07-25-2007



SLAC ILC R&D meeting Oct. 29, 2007

Summary

- The e-current in grooved chamber is 18 times smaller than the e-current in flat 1; the effect of rectangular surface is similar as the sawtooth surface.
- There is no significant secondary electron (SEY) reduction in grooved chambers

Chamber	Normalized Primary electrons	SEY reduction
Flat 1	1	
Flat 2	0.8	
Groove 1	1/18	some ¹
Groove 2	1/18	No

1. Electron current at high beam current (Groove 1 chamber)
2. What is the difference of groove 1 and Groove 2?