DEPENDENCE OF THE E-CLOUD BUILD UP ON BUNCH CURRENT AND SPACING

G. Rumolo, in SPSU-PAF Study Team (20/11/2007)

- IS IT TRUE THAT DOUBLING BOTH BUNCH SPACING AND BUNCH CURRENT WE ARE IN THE SAME SITUATION CONCERNING THE E-CLOUD BUILD UP ?

- EFFECT OF BUNCH SPACING WITH FIXED BUNCH CURRENT

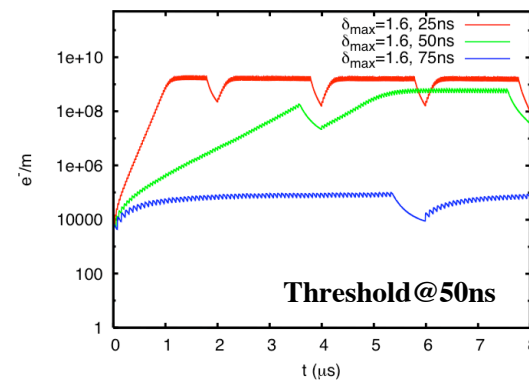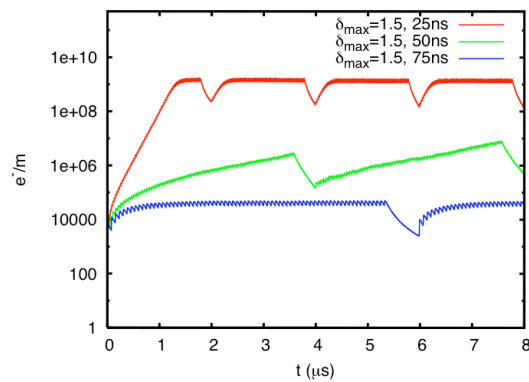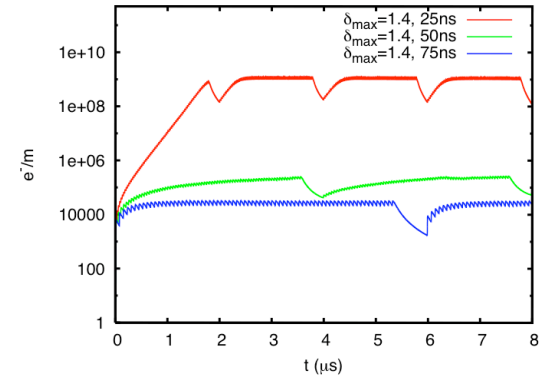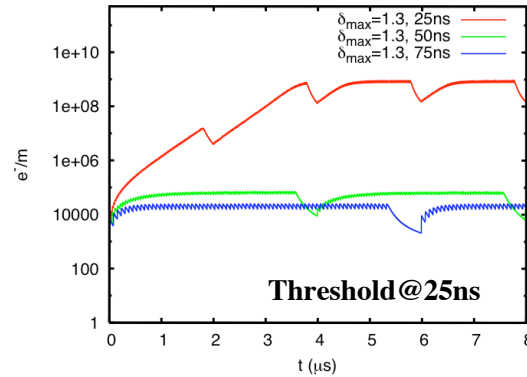- EFFECT OF BUNCH CURRENT WITH FIXED BUNCH SPACING (FOR DIFFERENT SPACINGS)

$\Rightarrow$ THANKS TO: G. ARDUINI, E. SHAPOSHNIKOVA

$\longrightarrow$ The effect of bunch spacing on electron cloud build up is evident:

$\Longrightarrow$ More largely spaced bunches give rise to lower build up
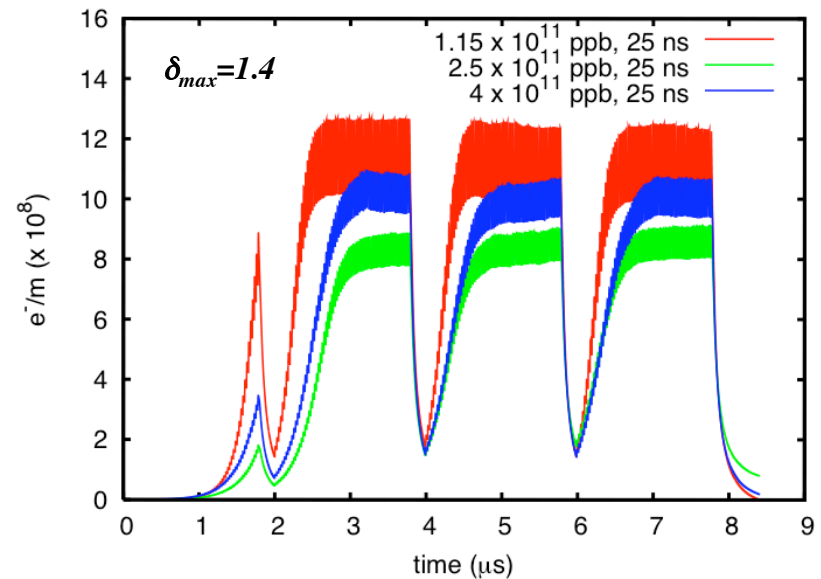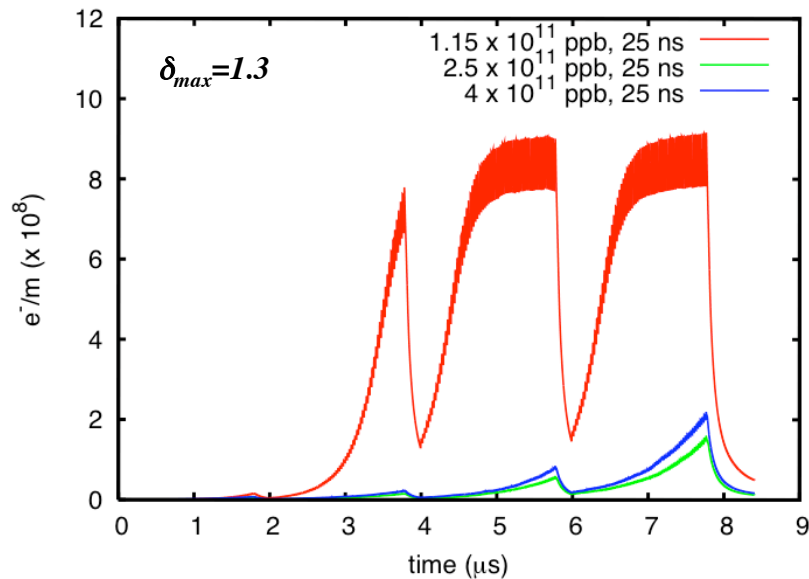
$\Longrightarrow$ The build up threshold in terms of maximum SEY is higher
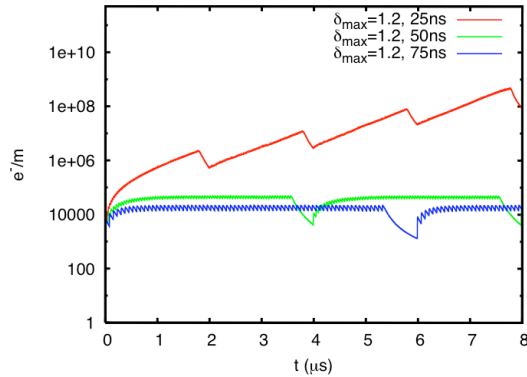
→ The effect of bunch current can be studied fixing the bunch spacing

⇒ **25 ns**

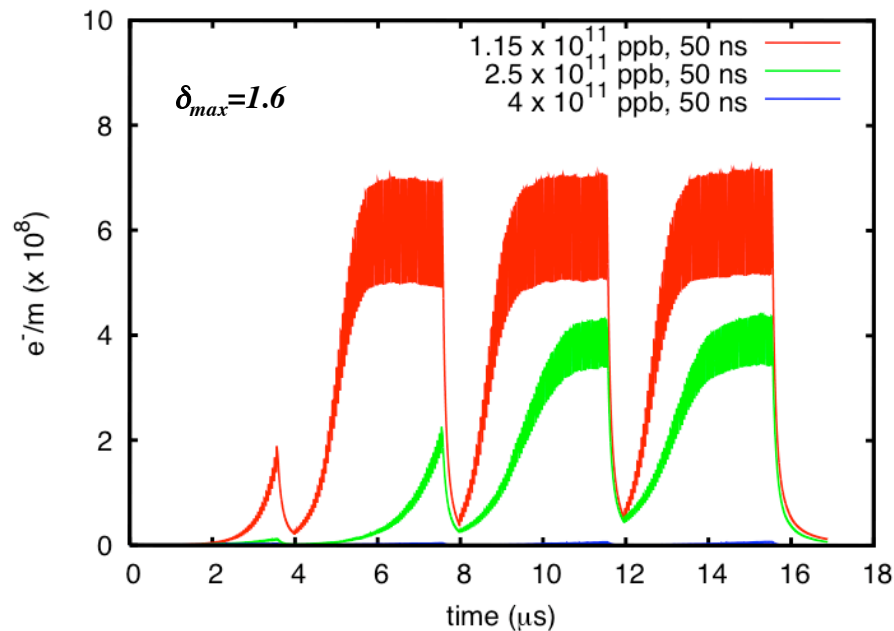→ The effect of bunch current on the e-cloud build up is not trivial

⇒ **higher current does not mean more e-cloud**

⇒ **dependence is not monotonic**

→ The effect of bunch current can be studied fixing the bunch spacing
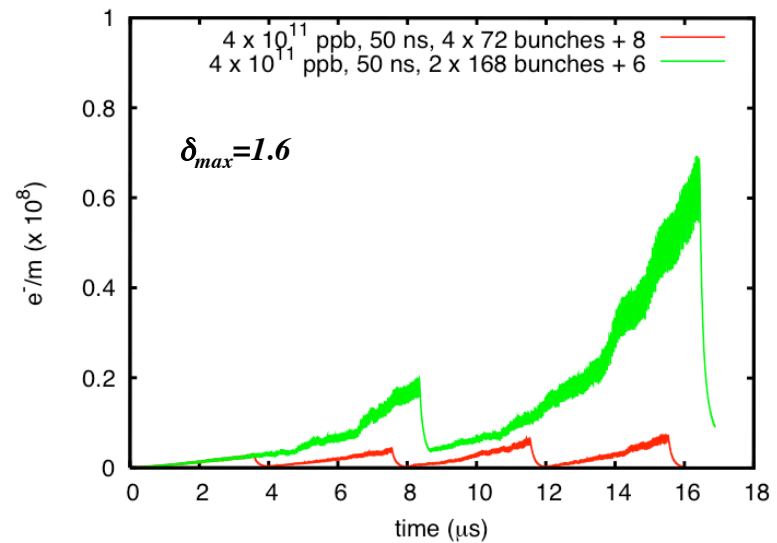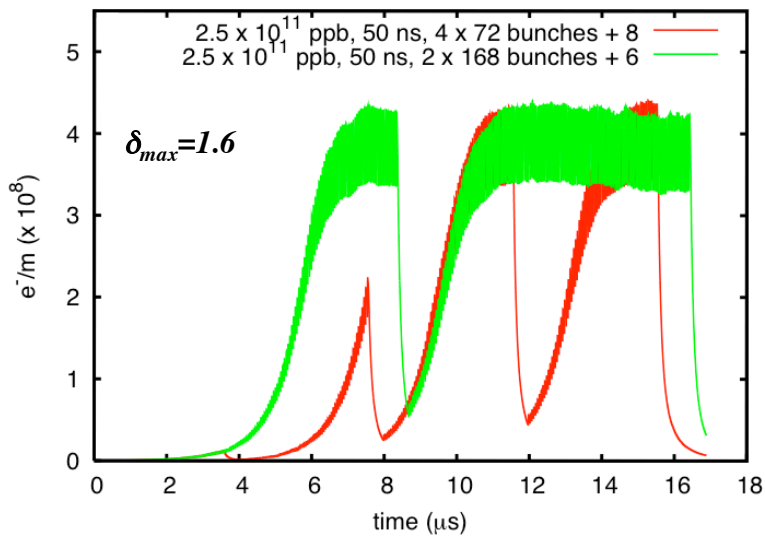
⇒ **50 ns**

→ At 50 ns spacing the effect seems to be even opposite to what one would expect:

⇒ There is less electron cloud with increasing bunch population

→ The effect of the batch structure does not seem to play a significant role
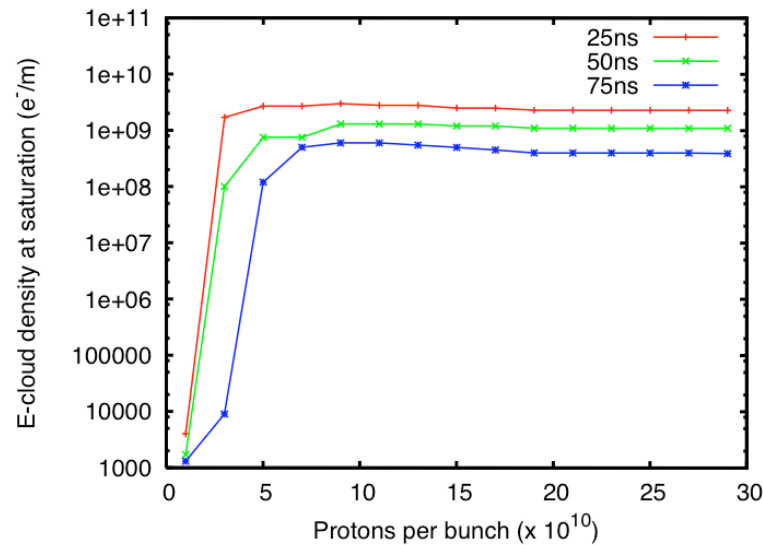
⇒ **50 ns**

→ Less build up with higher bunch population...

→ For an unscrubbed surface ($\delta_{max}=2.0$) how does the build up threshold change with the bunch spacing ? (G. Arduini -to compare with existing data)
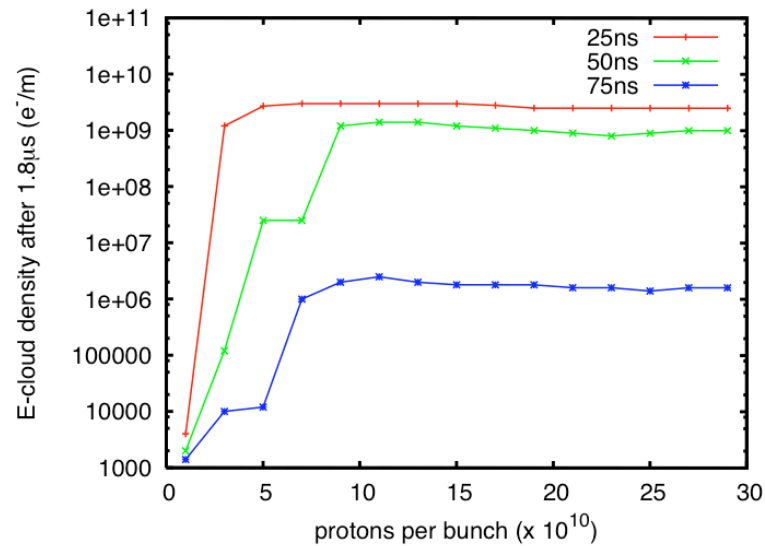

→ Build up thresholds from ECLOUD are **3 x 10^{10} @25ns, 5 x 10^{10} @50ns, 7 x 10^{10} @75ns**

→ Measured ones:

	25ns	50ns	75ns
N_{th}	3 x 10^{10}	6 x 10^{10}	1.2 x 10^{11}

→ Measurements were taken with only one batch in the SPS
(72 bunches @25ns, 36 bunches @50ns, 24 bunches @75ns)

→ However, after 1.8 μs the e-cloud @75ns never seems to be at saturation

→ On which observation the measured thresholds are based ? (vacuum in the arcs, e-cloud monitor(s), ...)

SOME CONCLUSIONS

The dependence of e-cloud build up on bunch current and spacing is not trivial (at least close to the threshold SEY's)

→ dependence on bunch current is **not monotonic @25ns**

→ dependence on bunch current shows **lower cloud build up with higher currents @50ns**

⇒ SPS measurements of e-cloud thresholds with different bunch spacings show a quite good agreement with simulations for 25 and 50 ns, but a discrepancy needs to be explained at 75 ns.