Summary Session II :
Observations, laboratory measurements, modelling

Observations & Diagnostics : PS, RHIC, PSR, APS, SPS
Some "old" machines show new effects

Modelling : e-cloud build-up, secondary electron yield, heat load

Very extensive compilation and modelling of secondary emission data (N.H., M.F., I.C.)

Issues : generation and survival of electrons during bunch gaps
- Thresholds (multipactor electron signal, vacuum pressure, beam stability,…)
- Beam conditioning (scrubbing) of surface
- Comparison of observations with simulations

Discussion : micro wave as diagnostic tool for conditioning or as a remedy
- Use of NEG-film, TiN coating
- Survival time of electrons (PSR)

Future steps and issues for LHC

Obtain good data on 'observables' : heat load in SPS , WAMPAC, COLDEX, strip detector
Electron cloud stripes in SPS monitor -> urgent decision on LHC beam screen slots
Reproduce thresholds (vacuum pressure, electron signal, beam stability)

Scrubbing effect :
Detailed scenarios for LHC (bunch intensity & spacing, beam energy < 2 TeV no S.R.)
How to achieve δmax below 1.3
Discrepancies of real machines (SPS, B-factories) with lab data? What is their seec?
Dominated by photo-electrons rather than secondary electrons?
-> SPS beam time will be vital

Seec measurements : in situ & Lab. Note : technical surfaces & practical systems

Ions for LHC (RHIC - LEIR similarities?)

Heat load <-> scrubbing

Heat load and dose rate are related

$$D(C/s/mm^2) = \frac{P(W/m)}{F(mm^2/m) < E >}$$

For LHC beam screen F~5 10^4 mm^2/m

P(cryo-budget) = 0.5 W/m and for the cloud <E> ~ 100 eV

N. Hilleret et.al. find 10^{-2} C/mm^2 for a well scrubbed Cu surface <1.3 for δmax

➔ should take about 30 hours to accumulate this dose

➔ If heat load is limiting us in the LHC, scrubbing should go fast, otherwise no problem

This also applies to vacuum scrubbing of the surface.

SPS : low duty cycle; takes longer.