

Summary session Friday

It all started with Amman & Ritson 1961.

Only one jargon in 1961:

- “space charge effect” (beam-beam parameter by today’s language)

Good old days at ISR – van der Meer scan 1974, overlap knockout, Steve Myers 1977

We have come a long way since then. The fun continues today except that it is now way more sophisticated.

Jargons 2013:

- pp, ep, pN, NN, eN
- Head on – Long range
- Beam-beam limit – tune shift – tune footprint
- dynamic beta – $\frac{1}{2}$ integer tune – flip-flop
- Crossing – Piwinski angle – crab cavity – crab waist
- Weak-strong – strong-strong
- Landau damping, impedance-beam-beam interplay, damper
- e cloud – beam-beam-beam interplay
- Simulations – Poisson solver
- Luminosity leveling – pile up
- Noise – halo – emittance diffusion – Tevatron modeling
- PACMAN – alternating crossing
- Dynamic aperture – smear – FMA
- Resonances – synchrotron – round/flat beam integrability
- Compensation – wire – e-lens
- beta squeeze, cogging, van der Meer scan
- Schottky – turn-by-turn – bunch-by-bunch -- BTF

Each jargon invoked a new concept or new idea. All are relevant at LHC. All are under study!

Workshop was well-organized: fun, focused, and functional. Talks were informative.

A few broad brush impressions (personal):

- Compared with 1961, 1979, the progress has been amazing. Beam-beam studies are order of magnitude more sophisticated and yet the tools (analysis, simulation) can be trusted to a corresponding degree!
- As studies progress, much attention now drawn to various interplay effects: Impedance, beam-beam, damper, octupole, chromaticity.
- Conceptually, beam-beam HO = beam-beam LR = e-lens = e cloud. Should all be treated using the same tool.
- Landau damping raises its dominating head once again." HO bunches are never unstable" (except ~ 1 sigma separation).
- Luminosity leveling is new challenge (somewhat unexpected).
- e-lens highly promising, but has two patches of clouds over its head:
 - (i) It is a 4D device but HO beam-beam (for small beta*) is 6D. Compensation is incomplete.
 - (ii) Loss of Landau damping when 100% implemented.
- others