

Transverse Emittance Blow up

"What do we understand on the emittance growth?"

To describe and follow the evolution of the LHC luminosity, a model based on the effects of intra-beam scattering, synchrotron radiation, elastic scattering and luminosity burn-off, was developed. These effects are the main mechanisms leading to beam emittance growth and losses. Concerning the beam emittance growth along the LHC energy cycle, the evolution of the measured emittances are presented for the Run 2 and they are compared to the model results. This comparison is useful for estimating the extra emittance blow up, i.e. on top of what is expected from the effects included in the model, both at Flat Bottom (450 GeV) and at Flat Top (6500 GeV) energies. The agreement of the model with the data during collisions, assists in understanding the impact of different degradation mechanisms on the delivered luminosity. The comparison of different emittance measurements coming from the BSRT, ATLAS/CMS luminosity and emittance scans, is used as a data quality validation test.