FCC-hh General Design Meeting

Notes from the meeting held on 18th February 2016

Andy Langner - L*=45m IR optics design

A. Langner presented a new IR optics design with an L* of 45m. The L* was chosen based on the conclusions from a beta-star reach study by R. Martin, to choose the smallest value that does not restrict detector design, and then to increase the triplet length until DA becomes a problem. Preliminary studies of beam-beam effects suggest that L*=45m is compatible with a detector + spectrometer dipole and orbit corrector for the spectrometer. The triplet design is based on to the L*=61m optics, with a similar effective L* (distance from IP to center of the triplet), and an increased triplet length by 50%. The matching required to increase the length of the IR region from 1400m to 1500m. It is still under investigation if the increase in length is really needed. Crossing angles have been calculated preliminary for the different cases (horizontal/vertical crossing, and spectrometer dipole). More detailed beam-beam studies are pending. Triplet aperture increased to 40sigma (w/o crossing angle). However D1 and D2 apertures is not fixed yet. Lattice files are available and will be moved to the official repository once the apertures for D1/2 are fixed. More optics files will follow (so far only 30cm).

D. Schulte comments for now we will ignore the 100m additional space, but we should further investigate optimal L* / triplet length.
R. Kersevan comments that one should take into consideration that a >20m magnet is not possible, and that the shielding cannot be continuous. D. Schulte agrees, one should consider to put gaps in the lattice. I. Besana mentions that she has already preliminary results and that she put gaps for the shielding at least in the triplet interconnections

Helmut Burkhardt - Geant4 developments, Forward options

H. Burkhardt presented Geant4 which is a tool for the simulation of the passage of particles through matter that is widely used at many facilities. Validation and improvements for very high energies up to 100TeV are needed for FCC. Most parts already work for 100TeV and beyond but a few restrictions need to be removed for FCC (high energy e+e-, …). Synchrotron radiation simulations are already extended from electrons to all long-live charged particles. The second part of his presentation is about the forward physics options. He raised the question whether one could add more IRs for FCC, as for LHC with TOTEM, ALFA etc. This might even be designed to run in parallel with high beta optics, without dedicated time.
D. Schulte comments, that these options are already considered. H. Burkhardt continues to present two options for forwards physics..
1st scenario would be a dedicated very high beta-star (few km) operation for cross section measurements. This would require few dedicated runs with fewer bunches and without crossing angles. The 2nd scenario has a moderately high beta-star of about 100m operation for forward and diffractive physics. This might be compatible with standard physics and would not need special runs. M. Syphers mentioned that the Supercollider project had in its design two low-beta insertions plus two “medium-beta” insertions, much like the ones being discussed today, so their design parameters may be relevant. He believed even larger-beta insertions were looked at as well.