ABSTRACT: "Beam Losses and Collision Debris Studies in Europe"

In view of a new 100 km long hadron collider, which is expected to operate at a centre-of-mass energy of 100 TeV and to deliver a base-line peak luminosity of 5 x 10^{34} $cm^{-2}s^{-1}$, beam-machine interaction calculations will play a key role for the design of the various accelerator and experiment components, to ensure their correct behavior and to assess their robustness on a given time scale.

These studies concern various source terms, require an accurate description of complex and extended geometries and imply a continuous synergy between different competencies. Collision debris particles deposit their energy in the insertion region elements and in particular in the superconducting magnet coils with risk of quenches and accumulated damage to be evaluated. The energy deposition strongly depends on some key parameters, such as the magnet aperture, the quadrupole lengths, the crossing scheme and the thickness of a possible shielding. In the arcs, the copious flux of synchrotron radiation photons will also generate a not negligible amount of gas, which will interact via nuclear scattering with the stored beams, developing high energy particle showers in the accelerator components. The design of intercepting beam devices, as beam dumps and the whole collimation system, has to rely as well on energy deposition studies, to assess the performance and the robustness of the different elements. Finally the estimate of the background in the experiments due to the machine is a key ingredient for the detector components design.

Based on the experience acquired in the application of the FLUKA Monte Carlo code to the present and upgraded LHC, preliminary results concerning the insertion region triplet and the beam-gas interaction in the arc cell have been obtained for the FCC-hh. With the development of a final focus triplet layout, first estimates of peak power and dose on the quadrupole superconducting coils have been produced, assessing the effect of a tentative shielding. On the other hand, energy deposition on the arc magnets due to beam-gas scattering will be discussed, considering a new asymmetric design for the beam screen.

Plans of future work will be summarized.