- **Optics studies for the LHC ring and the SPS-LHC transfer lines:** optics model definition and maintenance of the official LHC optics database. Development of a machine model based on the measured magnetic field imperfections.
- **Beam dynamics studies for the LHC ring:** effect of the magnetic field imperfections on the single-particle stability, in particular with the aim of defining target field quality for the various classes of magnets in the LHC ring.
- **LHC magnets studies:** Definition of sorting strategies based on measured mechanical aperture and field quality of each magnet. Analysis of magnet performance (mechanical aperture and field quality) during the whole production and slot assignment based on the production data.
- **Injection studies and support for collimation studies:** performance analysis of the injection process and collimation in the LHC transfer lines. Maintenance of the LHC ring aperture model.
- **Software development and support:** development, maintenance and support of MADX and SixTrack codes. Development and support of the dedicated environment for numerical simulations.
- **Commissioning:** definition of beam parameters and tolerances for operating the LHC machine. Participation in the specification of the requirements for beam instrumentation and procedures for machine commissioning (beam based measurements).