FCC main quadrupole magnets: preliminary study at CEA

by Clément LORIN

In the framework of the FCC, a first target for the gradient of the main quadrupole magnets was set at 450 T/m which turned out to be too optimistic. Though challenging, a preliminary investigation shows that a 375 T/m gradient can be achievable with many different cos-theta designs all of them based on a double Nb_3Sn layer configuration, and should therefore be used as reference to define the machine optics. The study raises questions about technical aspects of the designs such as layer jump alignment (no easy-way bend of the cable), cable bending radius in magnet ends, and number of wedges (cost reduction) as well as grading of cable geometry versus conductor quantity.