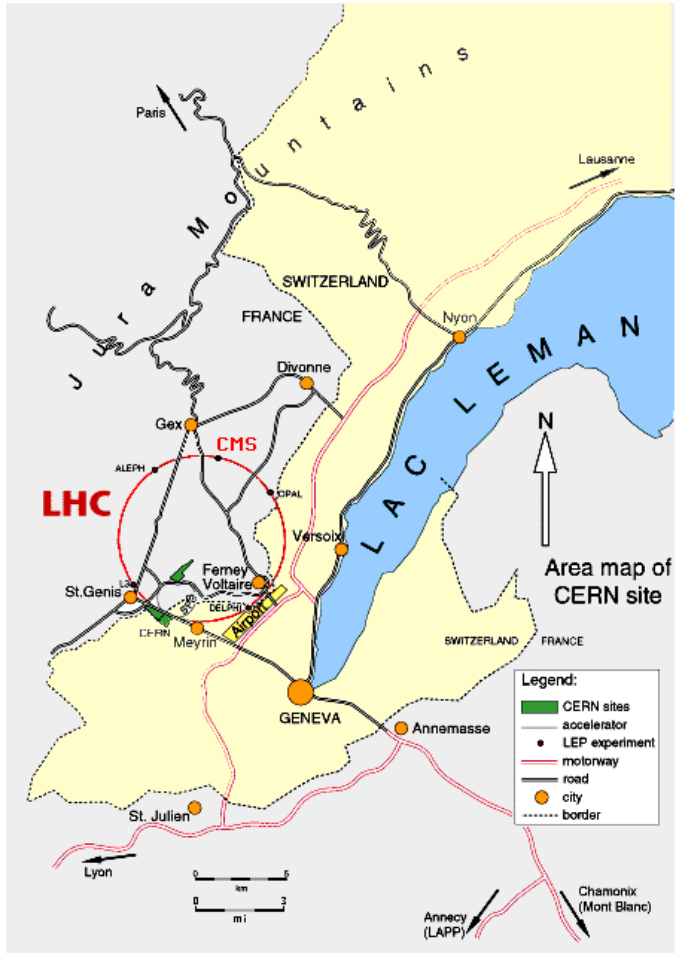
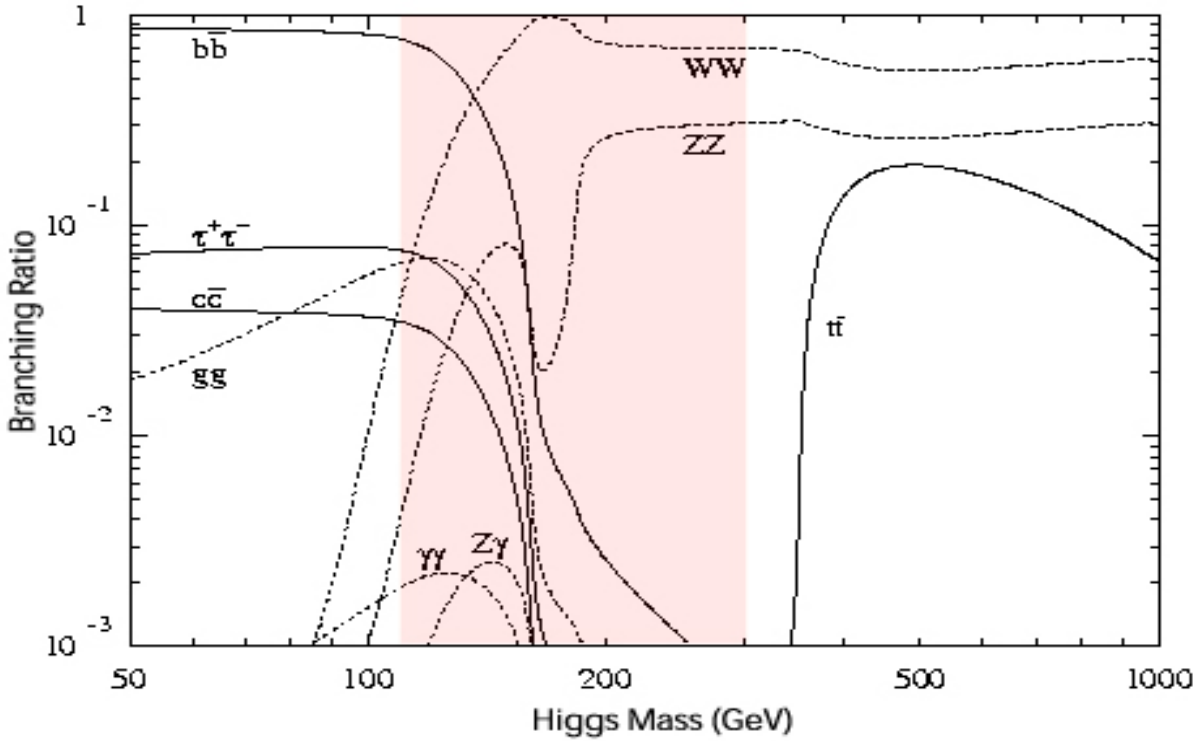
Simulation of the CMS Endcap Alignment Scheme Using COCOA

Overview of CMS

- CMS is a general purpose detector (designed to detect anything!) to be constructed at one of the LHC interaction points
- The detector will be used to search for the Higgs boson, to study t- and b-quark decays, and to search for physics beyond the standard model

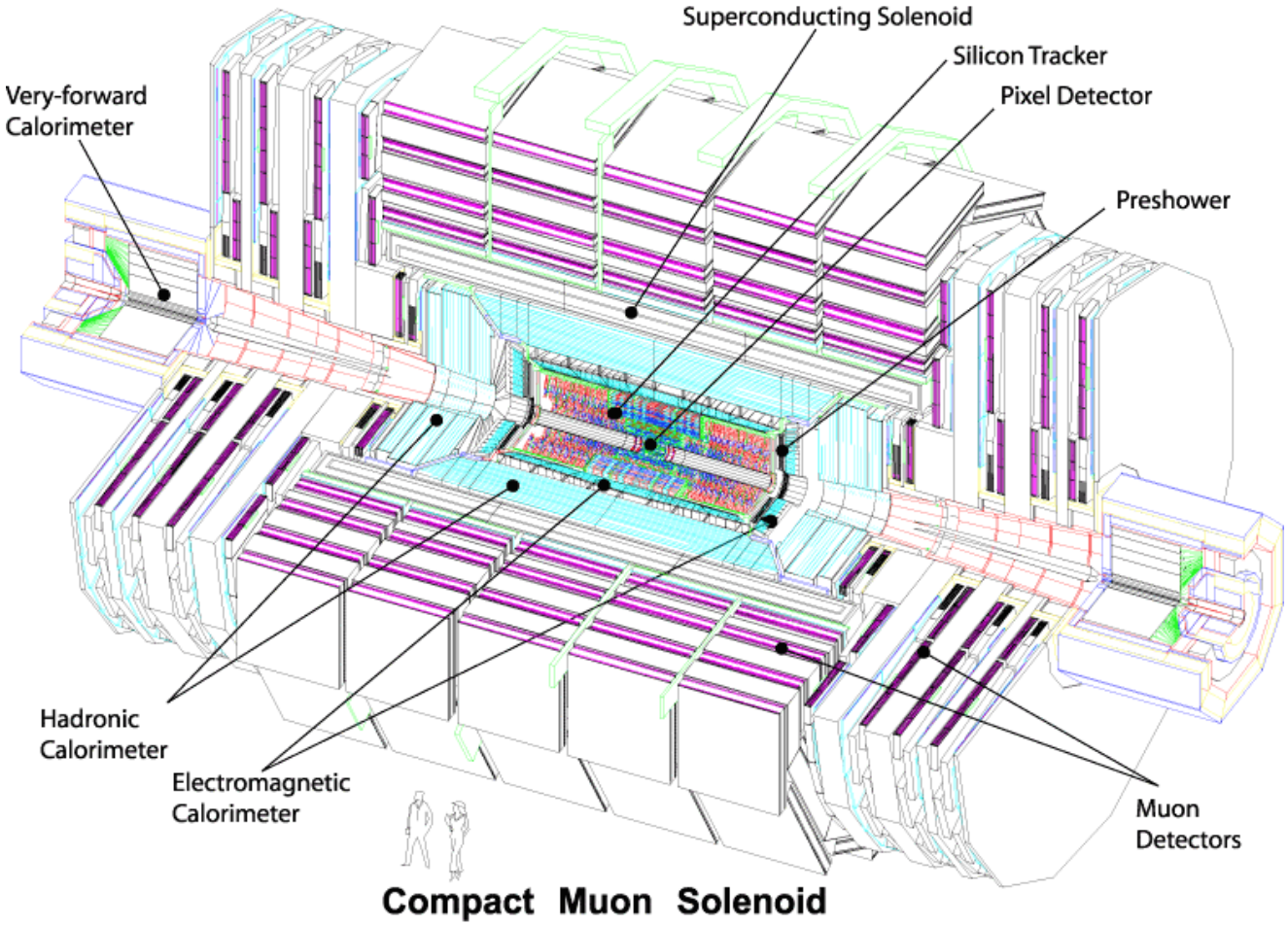


CMS: In Search of the Higgs Boson



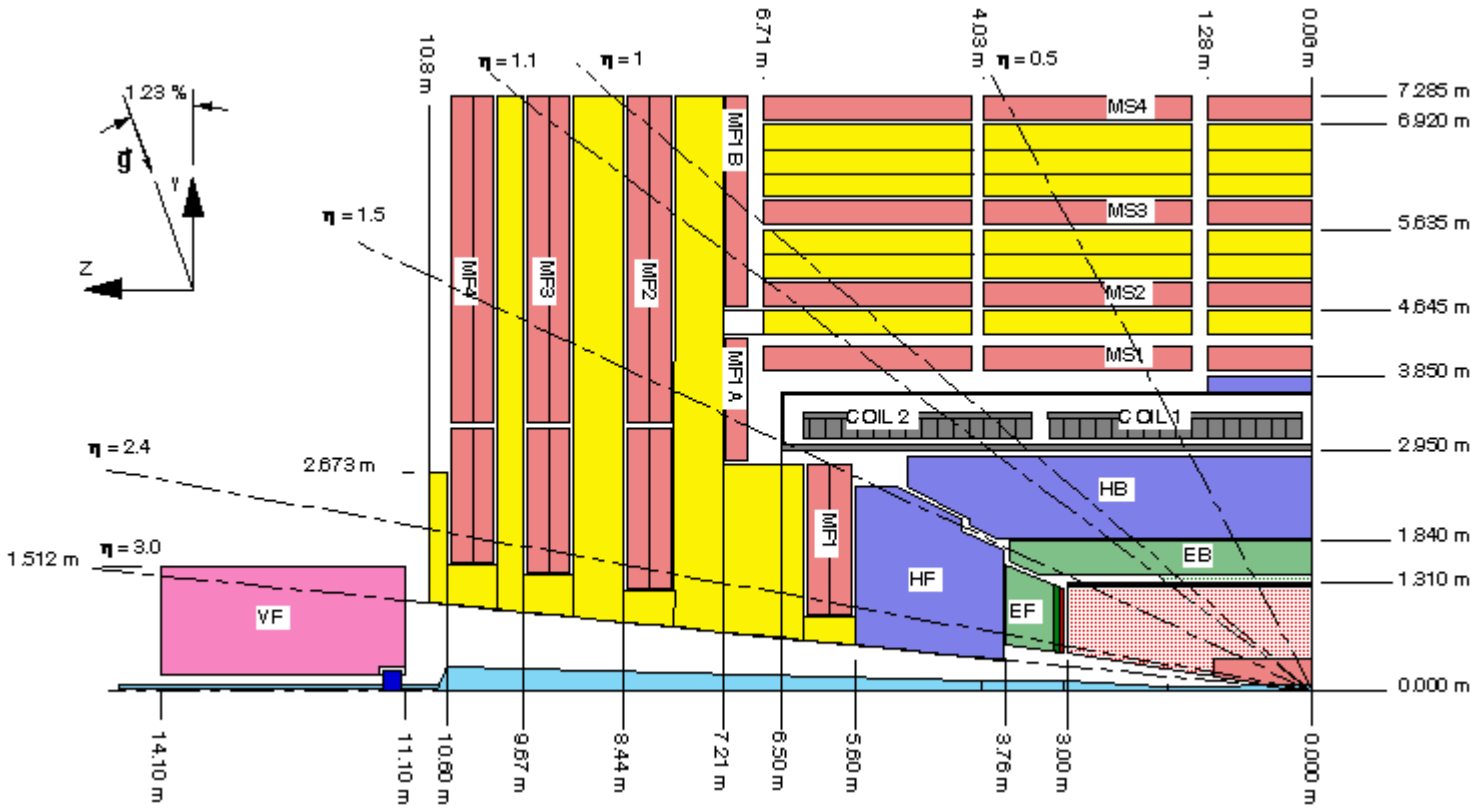
- Plot of the expected dominate branching ratios for SM Higgs particle as a function of possible Higgs masses (mH). The red band indicates the most likely mass region for mH based on the experimental evidence from LEP2000 and Figure 1 (114.1 - 250 GeV/c2) data .

CMS Detector Subsystems

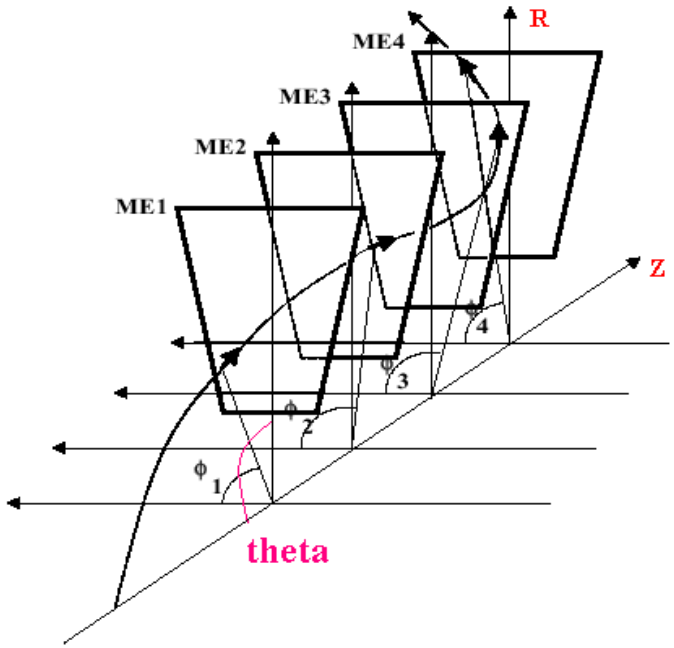


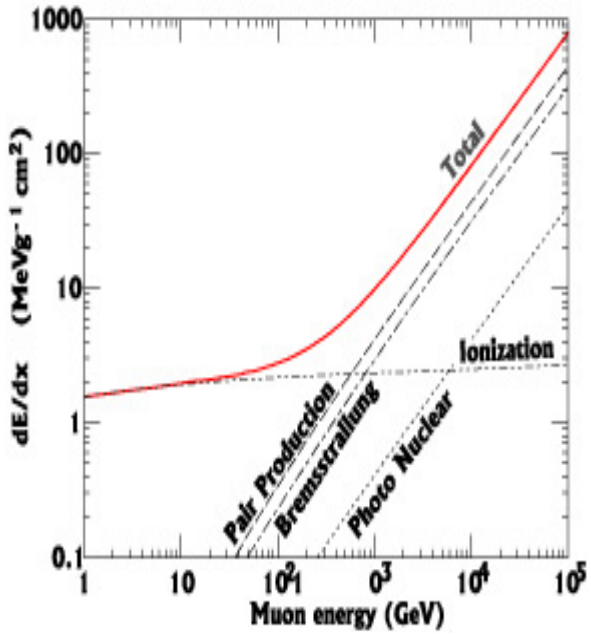
The Muon Endcap (Yolk disks)

Cathode Stripe Chambers



Trajectory of Muon Transversing the CMS Endcap





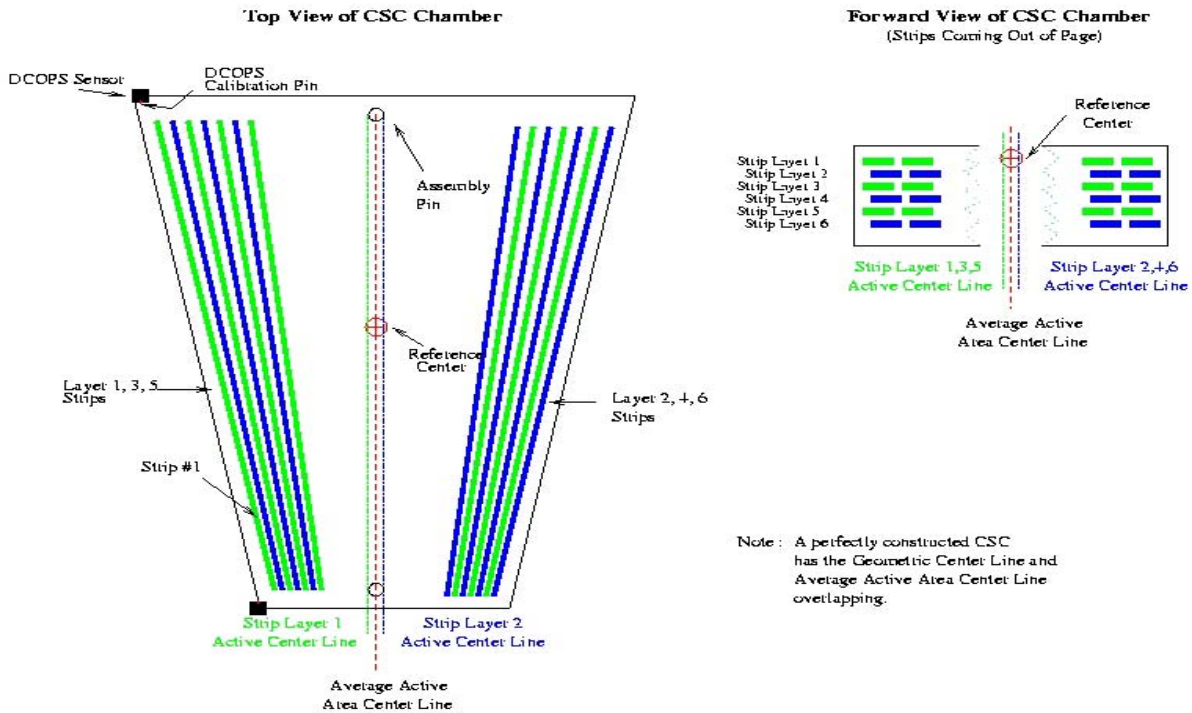
The graph shows the Energy Loss for a Muon Traversing a per unit Volume of Iron. The total energy loss is shown in red.

CMS Object Orientated Code for Optical Alignment

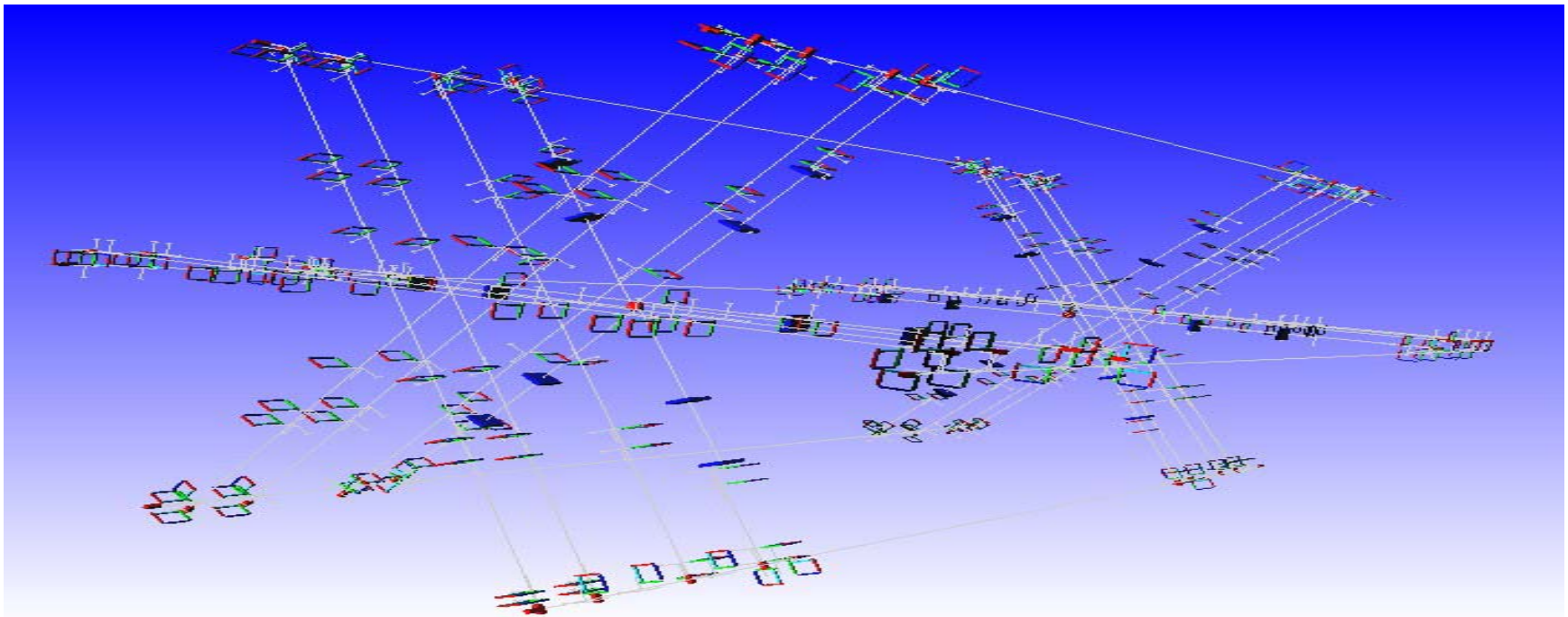
- COCOA is an Object Orientated software program designed to study and use in the CMS Position Monitoring System.
- Calculations in COCOA are based on a non-linear least squares fit model and allow the user to provide estimations of errors on a model system as well as a set of actual measurements taken by the system.

US
CMS

Simulated CSC Geometry



- The Simulated CSC Chamber Geometry and Local Coordinate System in the Idealized COCOA Model. The 'Average Active Center' of the CSC chambers is taken as the Reference Center for COCOA EMU simulations.



- The Simulated EMU Alignment System. This is a COCOA generated VRML representation of the simulated geometry used for the idealized simulations of the EMU Alignment System.

The Future of COCOA and CMS