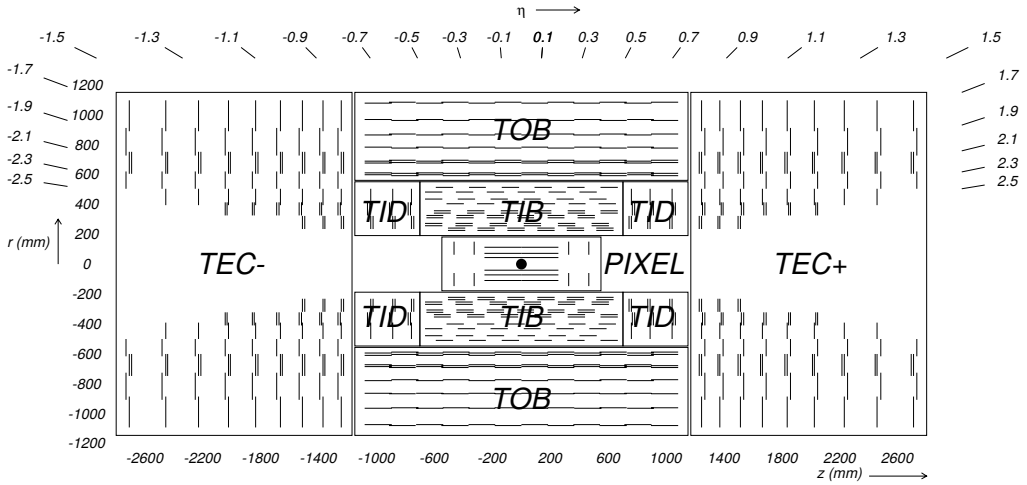

Figure 3.1: Schematic cross section through the CMS tracker. Each line represents a detector module. Double lines indicate back-to-back modules which deliver stereo hits.

layers 5 and 6. It provides another 6 r-ϕ measurements with single point resolution of 53 μm and 35 μm, respectively. The TOB extends in z between $\pm$118 cm. Beyond this z range the Tracker EndCaps (TEC+ and TEC- where the sign indicates the location along the z axis) cover the region 124 cm $< |z| <$ 282 cm and 22.5 cm $< |r| <$ 113.5 cm. Each TEC is composed of 9 disks, carrying up to 7 rings of silicon micro-strip detectors (320 μm thick on the inner 4 rings, 500 μm thick on rings 5-7) with radial strips of 97 μm to 184 μm average pitch. Thus, they provide up to 9 ϕ measurements per trajectory.

In addition, the modules in the first two layers and rings, respectively, of TIB, TID, and TOB as well as rings 1, 2, and 5 of the TECs carry a second micro-strip detector module which is mounted back-to-back with a stereo angle of 100 mrad in order to provide a measurement of the second co-ordinate (z in the barrel and r on the disks). The achieved single point resolution of this measurement is 230 μm and 530 μm in TIB and TOB, respectively, and varies with pitch in TID and TEC. This tracker layout ensures at least ≈ 9 hits in the silicon strip tracker in the full range of $|\eta| < 2.4$ with at least ≈ 4 of them being two-dimensional measurements (figure 3.2). The ultimate acceptance of the tracker ends at $|\eta| \approx 2.5$. The CMS silicon strip tracker has a total of 9.3 million strips and 198 m^2 of active silicon area.

Figure 3.3 shows the material budget of the CMS tracker in units of radiation length. It increases from 0.4 X_0 at $\eta \approx 0$ to about 1.8 X_0 at $|\eta| \approx 1.4$, beyond which it falls to about 1 X_0 at $|\eta| \approx 2.5$.

3.1.3 Expected performance of the CMS tracker

For single muons of transverse momenta of 1, 10 and 100 GeV figure 3.4 shows the expected resolution of transverse momentum, transverse impact parameter and longitudinal impact parameter, as a function of pseudorapidity [17]. For high momentum tracks (100 GeV) the transverse momentum resolution is around $1-2\%$ up to $|\eta| \approx 1.6$, beyond which it degrades due to the reduced lever arm. At a transverse momentum of 100 GeV multiple scattering in the tracker material accounts for 20 to

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