With their high density and small energy band gap, silicon sensors collect \( \sim 10^8 \) (e–h pairs)/\( \mu m \) within some tens of nanoseconds collection time. Silicon is therefore perfectly suited to be used as thin and high rate detector material. The missing ingredient, very high spatial accuracy and two particle resolution, is achieved by a very fine structuring of the silicon wafer surface into a strip pattern. In the 1980s this was initially achieved by the so-called surface barrier diode method. The surface barrier diode structure is a straightforward technique but rather delicate. After final cleaning and etching a metal (Au, Cu) strip pattern is applied to form a surface Schottky barrier junction. The pattern can be achieved by evaporation through a mask \([86]\) or a bit more like the planar process with metal etching after applying photo-impression technique \([9]\) as with printed circuit boards.

A new development – planar technology \([92, 98]\) – as used in integrated circuit fabrication allowed a more robust device with higher structure precision. This technique was finally used to produce the silicon sensors for the NA11 and NA32 experiments at the SPS at CERN to identify lifetime and mass of the charm mesons \(D^0(\bar{c}u), D^-(\bar{c}d), D^+(\bar{c}d), D^+_{s}(\bar{c}s), D^-_{d}(\bar{cs})\).

The detectors are made of high-ohmic (3 k\( \Omega \) cm) n-doped silicon single crystal wafers of 2\( \text{''} \) diameter and 280\( \mu m \) thickness. Using the planar process, p-doped strip diodes, covered by aluminium contacts, are implanted into one side of the wafer. The sensor is DC coupled. On the other side a common aluminium contact is evaporated. The sensor is reverse biased to deplete the diodes of free charge carriers. The bias voltage also generates an electric field in the n-bulk. In order to reduce the number of electronic channels the principle of capacitive charge division has been used. Only every third (sixth) strip is equipped with an amplifier in the central (outer) region of the detector. Charges arriving at intermediate strips induce signals in the neighbouring readout strips proportional to their mutual capacitance. The strip pitch is 20\( \mu m \) arriving at an effective readout pitch of 60 (120)\( \mu m \) central (outer).

The resolution was measured to be 4.5 (7.9)\( \mu m \) central (outer); the two particle separation was 60 (120)\( \mu m \). A photo is displayed in Fig. 2.1.

Fig. 2.1 Photograph of a mounted NA11 detector. \([92, 98]\) The sensor seen in the center is 2436 mm\(^2\) in size with 1200 diode strips and readout of every third (sixth in the outer region) strip, resulting in 4.5\( \mu m \) (7.9\( \mu m \)) resolution. Relaxing the readout electronic connection density to 120\( \mu m \) with a physical pitch of 60\( \mu m \) is realized by connecting the even strips on one sensor side and the odd ones on the other...
We are pleased to invite you to a colloquium at the occasion of the

**70th birthday** of Robert Klanner which will take place on the

**29th of May, 2015**

3 pm - 5 pm

in the DESY auditorium

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**INSTRUMENTATION COLLOQUIUM**

**Program:**

„The HERA polarized internal target“ (Paolo Lenisa)

„Detectors for precision measurements at ZEUS“ (Wolfram Zeuner)

„The early stage of silicon strip detectors“ (Roland Horisberger)

A musical intermezzo, organized by Brian Foster, will accompany the event.

The talks are followed by small refreshments served in the foyer.