

Construction of an actively cooled MAPS device operated in vacuum near a storage ring beam

Tuesday 1 July 2014 11:45 (30 minutes)

The Luminosity Detector for the PANDA experiment at FAIR/Darmstadt is a tracking device 11m downstream of the interaction point. Since we are measuring elastic pbar-p scattering as a reference channel to determine the luminosity, we need to reconstruct tracks near the non interacting antiproton beam which is stored in the HESR (high energy storage ring). We would like to share our experience in the construction of a prototype which involves:

- a stiff rectangular vacuum box for very low pressure down to 10^{-9} mbar
- construction of a conical laminate from very thin aluminum and mylar
- differential pumping to protect a thin transition foil from bursting
- moving heavy tracking devices precisely in vacuum
- cooling of active silicon pixel sensors in vacuum
- construction of very thin tracking layers
- issues of large CVD-diamond wafers
- thermal contacts of passive heat conductors to actively cooled heat sinks
- leaky connections, Swadgelok experiences, cooling with ethanol at -25°C
- alignment of detectors in vacuum in respect to the experiment

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