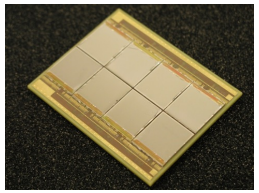
Nikhef detector R&D for future e^+e^- colliders

2001 Involved in the Tesla electron-positron collider project at DESY and the symposium

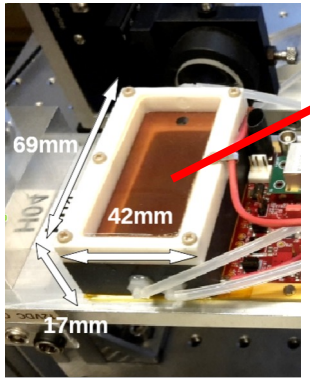
2002 Start of R&D on GridPix detectors since the first working prototype detector made by Harry van de Graaf, Jan Timmermans et al. GridPix = Gaseous detector with grid and silicon readout chip.

2002-2024 Gradual development of the GridPix detector for a Pixel TPC with 6 theses and an EUDET grant (2004-2008) by Alessandro Forniani (2005), Max Chefdeville (2009), Martin Fransen (2012), Spiros Tsigaridas (2017), Cornelis Ligtenberg (2021)

Pixel TPC



(Octopuce)

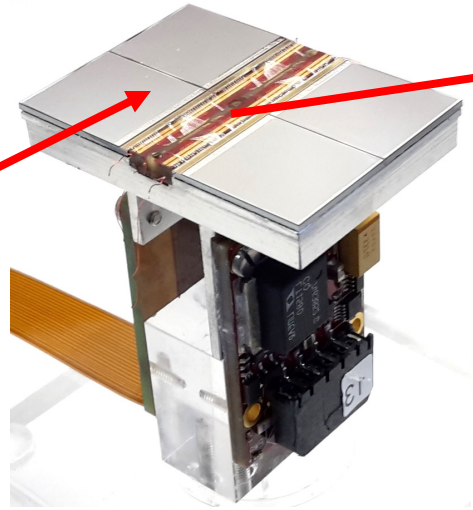


(TimePix1)

TPX3 chip

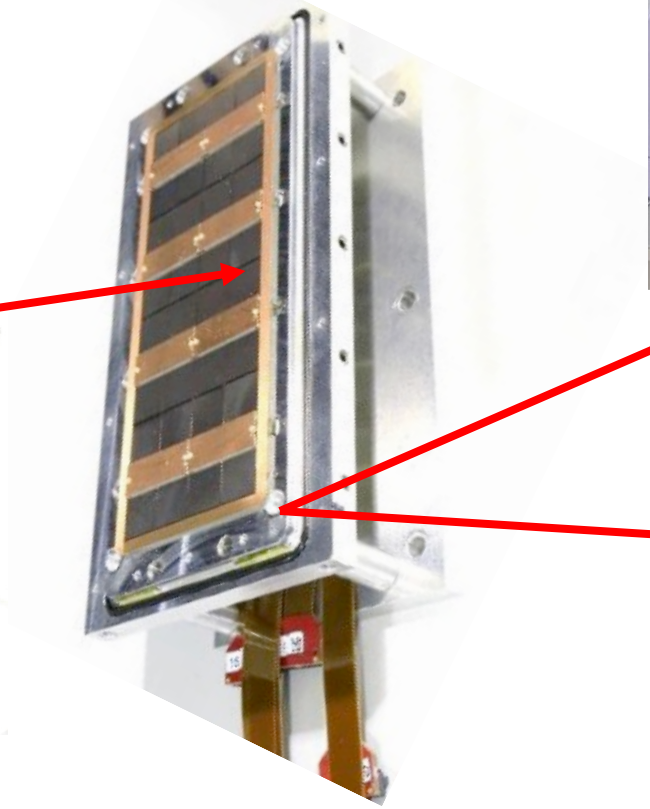
(2007-14)

2017



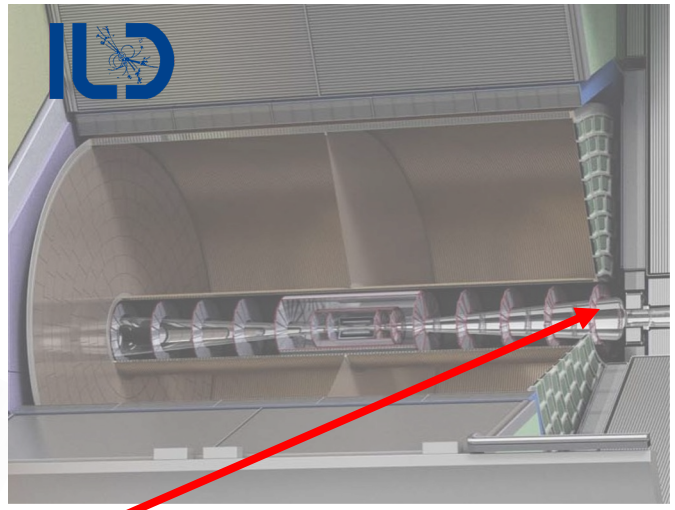
Quad

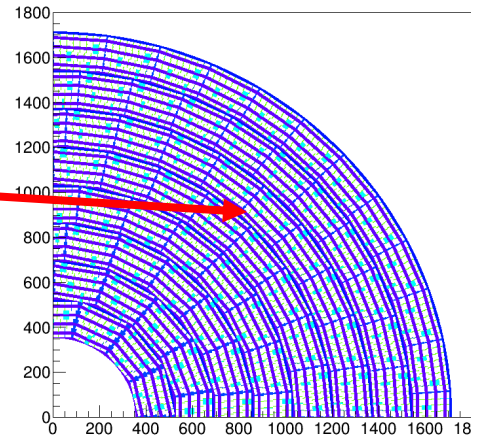
2018



Module

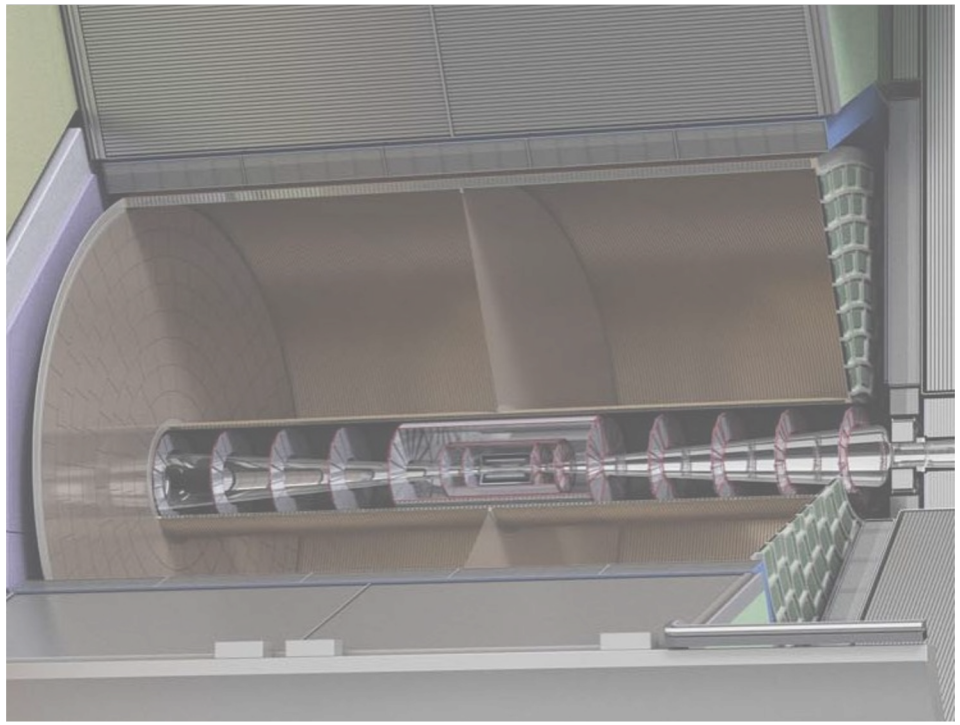
2019





TPC plane

Pixel TPC



- Material budget is
  - 0.01 X_0 TPC gas
  - 0.01 X_0 inner cylinder
  - 0.03 X_0 outer cylinder
  - < 0.25 X_0 endplates (incl readout)
- Note the very low budget in the barrel region. Material budget can be respected by different technologies like GEM, MicroMegas and Pixels
- TPC is sliced between silicon detectors VTX, SIT and SET
- pixel readout is a serious option for the TPC readout plane @ ILC/FFC-ee/CLIC/CEPC colliders

Nikhef detector R&D for future e^+e^- colliders

2007 LCTPC collaboration since 2007: R&D collaboration for a TPC at a linear collider

2007 Participation in the ILD experiment: Nikhef expressed interest in the TPC, silicon tracking and the forward calorimeter. ILD developed a detector concept with a (Pixel) TPC for a linear electron-positron collider (thesis Ligtenberg)

2021 ILD works on a detector concept at a circular electron-positron collider (FCCee/CEPC). Nikhef contributes actively to a Pixel TPC for the CEPC (FCCee)

2012-2015 CLIC accelerator: the Rasnik alignment method to the beam adjustment system and thesis Glenn Vanbavinckhove (2012) on Optics for colliders (LHC,CLIC)