The ALPIDE particle detetor was psecially designed for the upgrade of the inner tracking system (ITS) of ALICE, an experiment of the LHC at CERN. The upgrade of ITS officially strated the year ?? And aims to finish in 2020. However, due to unconventional global outbreak of the covid-19 virus project end date has become some what uncertain.

Nonehteless, the ALPIDE chips has gone through prototyping and testing since the start of 20?? And is ready to be implemented in the ITS design once CERNS fascilities reopens.

* + (has it started? What is the status?)

The ALPIDE chip shows characteristics beyond ITS detector requirements.

* + [List characteristics] list in table?

Though the sensor was originally designed for the ITS, its exceptional properties has sparked interests in the field of medical physics. A local pCT research group in Bergen at the Institute of Physics and Technology (IFT), Bergen University is currently working on the design of a proton CT implementing the ALPIDE chip in a .....??

* + **READ what they are doing and ask if you can mention it**

In this study the ALPIDE chip is implemented in a neutron detector design. In principle, a neutron detector can be ,ade from any particle detector combined with a neutron converter. The detector design in this thesis uses a planar neutron detector design, where a converter material is closely position and parallel to the detector surface, the converter a thin foil of natural gadolinium and the detector an ALPIDE sensor. The ALPIDE is a semiconductor and is thus based on the ionization of the epitaxial layer to produce a voltage signal. Neutrons are non-ionizing particles and are invisible to the ALPIDE. Placing a gadolinium foil in the beam path causes neutron capture and consequently the production of secondary ionizing particles which may be detected by the ALPIDE. Reaction products of neutron capture in gadolinium are prompt gamma-rays (energy range) and electrons (energy range) from the process of internal conversion and auger. The detection volume (epitaxial layer) of the ALPIDE is large in comparison to the ??keV elecron range and insignificant next to highly energetic gamma-rays. The electron spectrum of thermal neutron capture is largely dominated by 79keV conversion electrons from Gd-15? Capture. Electrons emitted from neutron capture are emitted isotropically and travel in all direction, some continue through the foil away from the detector and are lost, others make their way to the sensor.

SKRIV PÅ NYTT: Those who escape the foil and reach the detecor first travels throguh a small air gap and are exosed to elastic scattering with airmolecules and interactions with the aluminium layer covering the sensors. Energy loss in Al and air is insignificant, and the deadlayer has purposefully been minimized to minimize energy loss in such that the energy deposited to the epiaxial layer is representative of the total energy ????

In a silicon semiconductor ?? deep, a 79keV electron travels no further than um and deposits most its energy to the detection.

* + Energy deposition of electrons and gamma in silicon, aluminium ...
  + How can the alpides charactersitcs improve neutron detection?
  + This doesnt belong here.... Add as a last section in ALPIDE chapter to tie everything togheter.