ATLAS upgrade, 3D and Medical Applications

Achievements since 2011

WP 3/4: Detector Development and Applications

Develop new detectors for dark matter detection

Research applications of these detectors (medical imaging)

Angela, Nicola, Trygve, Heidi (Laura, Ben)

Task 1 - Silicon development

- AEgIS aim to measure the effect of gravitation on anti-Hydrogen.
  - Design of the first prototype AEgIS silicon strip detector
  - Testbeam results from May 2012 with the Mimotera detector
- 3D silicon development in preparation of ATLAS upgrade activities

Task 2 - Photomultiplier development

- Building a small pilot test-bench for characterisation of CTA cameras

WP 4 - Applications

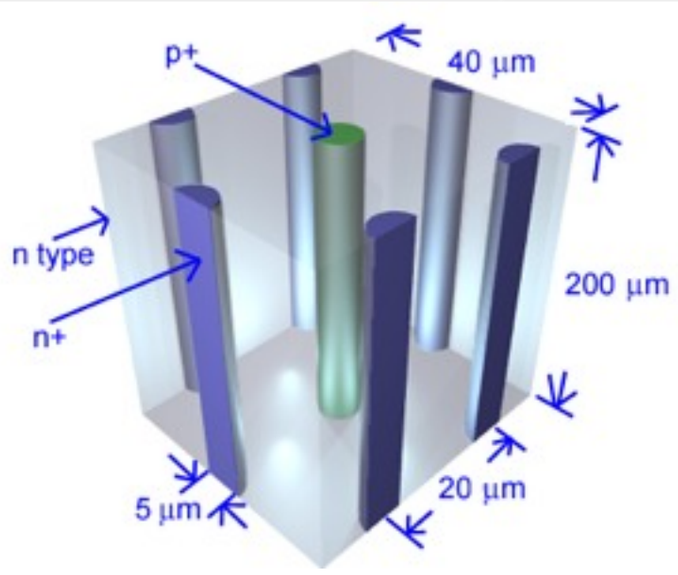
- Preparation to build at PET test-bench for tests of SiPMs for medical applications

STRENGTHENING THE CORE ACTIVITIES OF OUR DETECTOR LABORATORY

Building a small detector group

Work-package 3a: ATLAS upgrade and 3D development

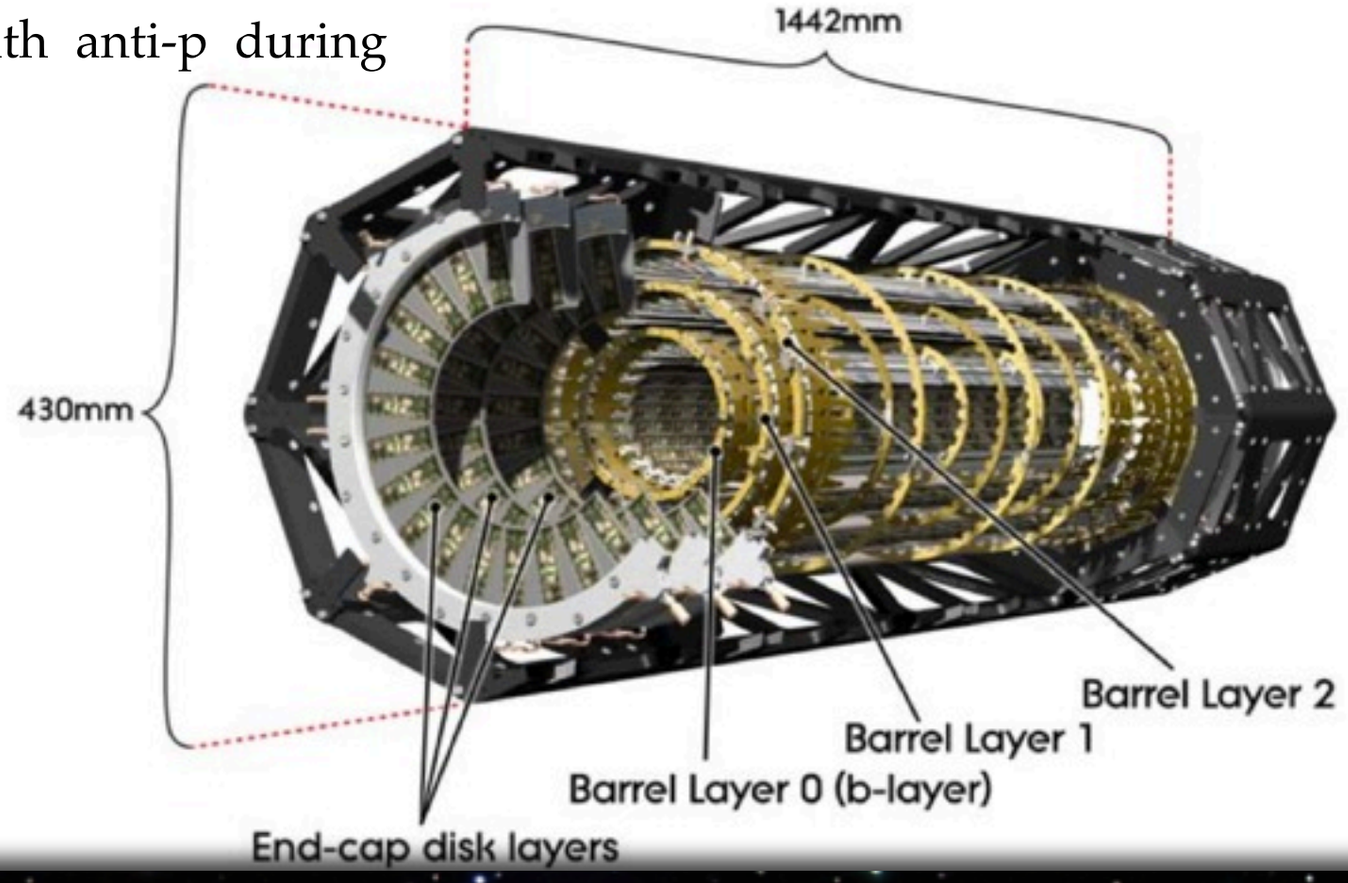
- 3D silicon detector development is that these detectors has passed the detector review and are accepted for installation during 2013
- We have just received a grant to participate in 3D detector development for dosiometry together with SINTEF and a number of international partners.
- This means that we can employ one postdoctor to work on 3D in Bergen, hopefully late 2012.
- Our plan is also to test a 3D detector with anti-p during testbeam 2012



3D characteristics :

- Radiation hard
- Active edge (small dead area)
- Fast collection, low charge loss
- Increased signal speed

...



Longterm research plans - WP3 & 4

2009

Run 1

2013/14

Run 2

2018

Run 3

~2022

Run 4

2030

ATLAS/LHC schedule

Start of LHC - 7/8 TeV

Silicon strip

First data 2011 (7 TeV) and 2012 (8 TeV)
Norway was involved in the construction of the Inner Detector

Long shut down - 14 TeV design luminosity

To prepare for design energy and nominal luminosity Inner B-Layer (IBL) insertion with silicon 3D technology which we in Norway worked on

Silicon 3D

Phase 1 upgrade

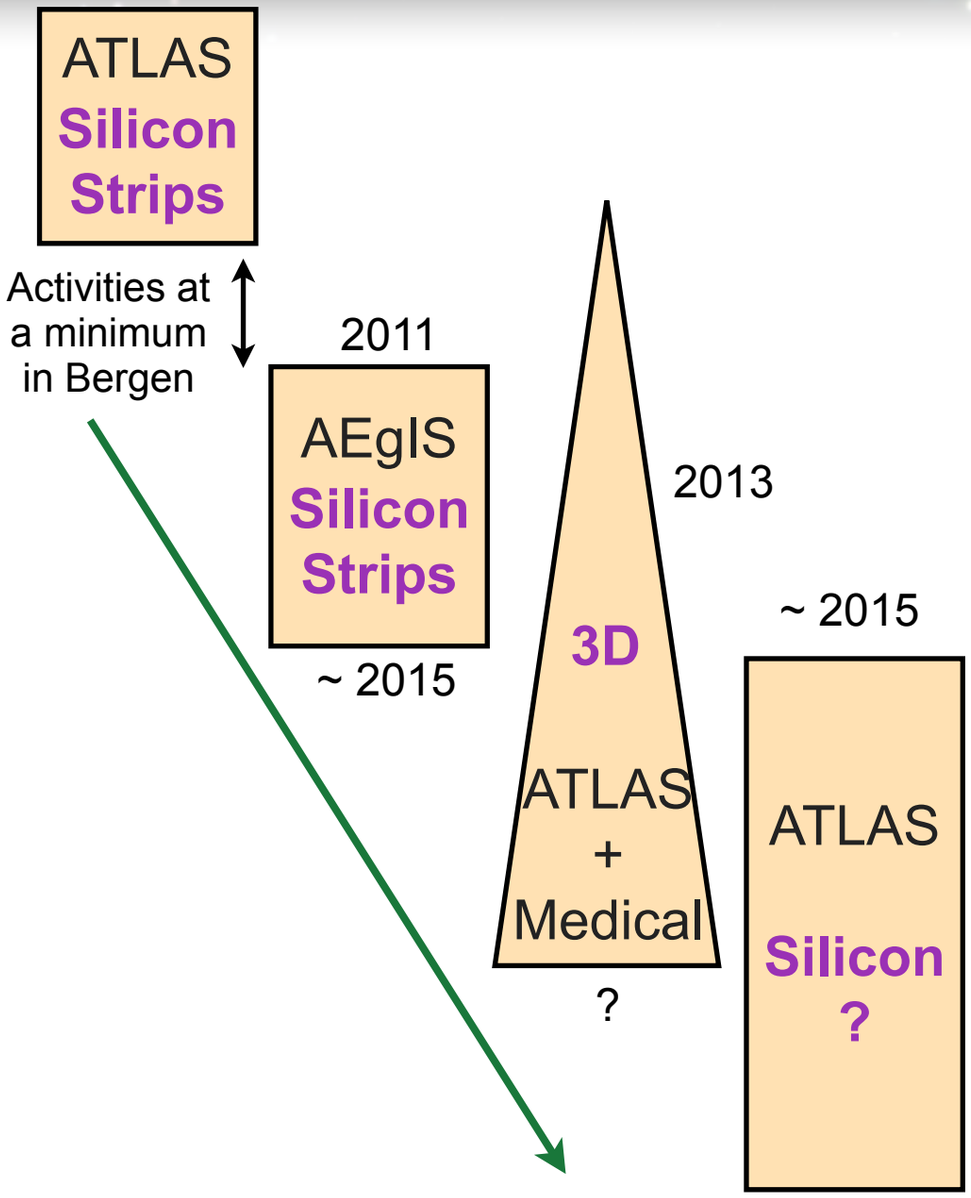
Norway will be involved in the ATLAS Forward Physics (AFP) upgrade project which includes 3D detector development

Silicon 3D

Phase 2 upgrade - 14 TeV high luminosity

The whole of the Inner Detector will be replaced and Norway will be involved in this work

Silicon pixels, strip or 3D



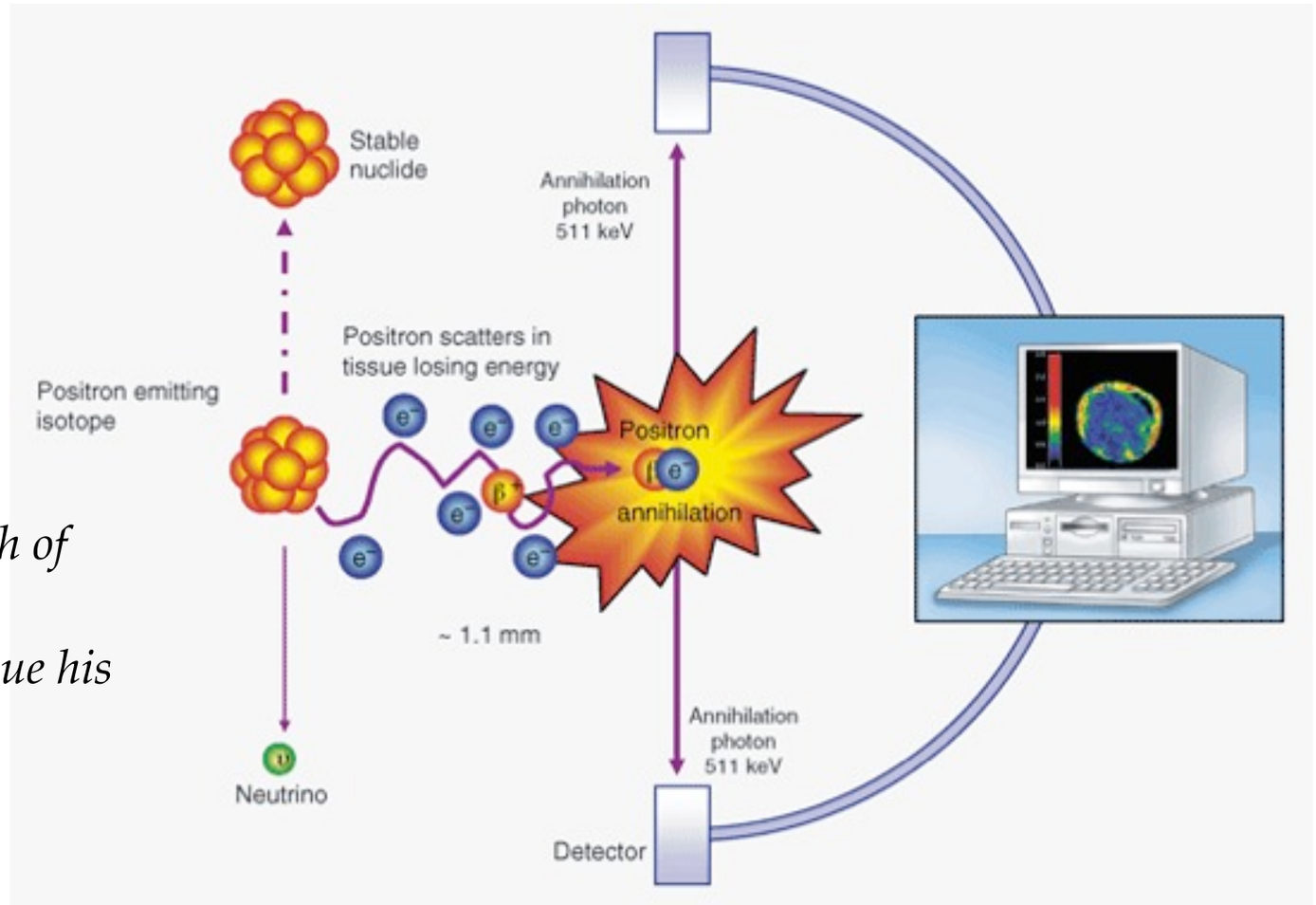
Support detector development with additional funding sources

WITH DAMARA

WP4 - New applications

Work-package 4: New applications for particle and astroparticle detectors

- Two students from Université Paul Sabatier, as part of their Master degrees.
- A test setup for coincident measurements, one important step towards having a possibility to test different detectors for the use in Positron Emission Tomography (PET).
- The two students achieved coincidence measurements with this particular setup and the help of the rest of the detector laboratory group
- They were very pleased by the working environment in Bergen and told me when leaving that they were most impressed by the people of our institute, being always extremely helpful and positive.



Completed outcome:

-1 final internship for a Master degree for Laura 6th of September 2011, project report, 2 talks, and poster

-1 finished internship for Ben, acceptance to continue his master, project report, 2 talks, and poster

Impact & benefits for society

Detector development ensure our participation in big experiments and is our link to industry applications
Also it is our main link to the other groups at the institute