Thesis Projects: ATLAS Experiment Tracker Upgrade

The Large Hadron Collider at CERN will soon undergo an upgrade in order to deliver an even more intense beam for proton-proton collisions. The ATLAS experiment is completely replacing its inner detector, that measures the tracks and momentum of particles produced in collisions, and is currently building the new Inner Tracker (ITk). This is both in order to accommodate the resolution needed to clearly image events with many more simultaneous proton-proton interactions, and to increase the radiation tolerance of the detector. **The ATLAS group in Lund is involved in quality control of silicon strip modules, consisting of both readout electronics and the silicon sensor itself, before they are installed in ATLAS.**

Part of the project involves **hardware work in a clean room**, inspecting and testing electronics, seeing how the modules perform under mechanical stress while being warmed up and cooled down in our environmental chamber, as well as exploring the long-term stability of modules. **There may be opportunities to travel and participate in tests of modules in real beam lines at either CERN or DESY (Hamburg).**

The project also involves analysis of test results from various institutes building and testing modules, to determine the pass/fail conditions during module quality control, and to track module performance during production.

We're looking for someone interested in learning about particle detector hardware, and willing to work on building a real silicon tracking detector, **that has previously worked with data analysis in Python and has familiarity with shell scripting.** C++ and SQL database experience can open up some additional projects.

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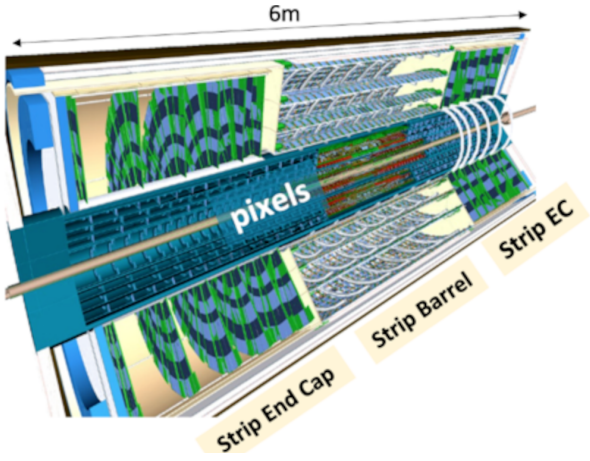

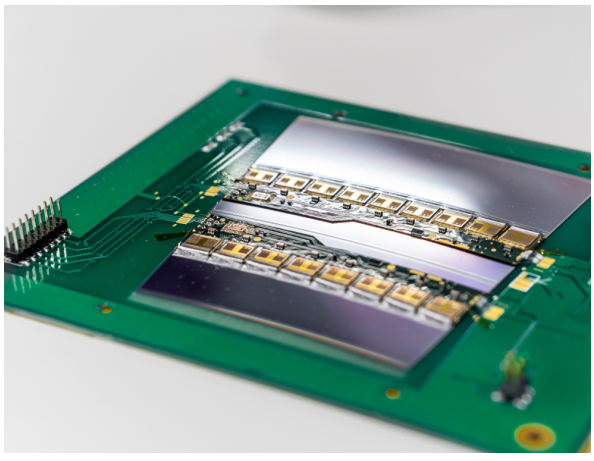

Left: ITk layout, showing the inner pixel detector and the outer silicon strip detector. Right: Silicon strip module for the endcap section.