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## Prototype Strip Barrel Modules for the ATLAS ITk Strip Detector

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The module design for the Phase II Upgrade of the new ATLAS Inner Tracker (ITk) detector at the LHC employs integrated low mass assembly using single-sided flexible circuits with readout ASICs and a powering circuit incorporating control and monitoring of HV, LV and temperature on the module. Both readout and powering circuits are glued directly onto the silicon sensor surface resulting in a fully integrated, extremely low radiation length module which simultaneously reduces the material requirements of the local support structure by allowing a reduced width stave structure to be employed.

Such a module concept has now been fully demonstrated using so-called ABC130 and HCC130 ASICs fabricated in 130nm CMOS technology to readout ATLAS12 n+-in-p silicon strip sensors. Low voltage powering for these demonstrator modules has been realised by utilising a DCDC powerboard based around the CERN FEAST ASIC. This powerboard incorporates an HV multiplexing switch based on a Panasonic GaN transistor. Control and monitoring of these modules is implemented via the so-called Autonomous Monitor and Control (AMACv1a) ASIC fabricated in 130nm CMOS technology. All the lessons learnt during the demonstration of such modules are being carried forward to the design and implementation of the final chipset for the ITk strip detector, ABCstar, HCCstar and AMACv2.

In this contribution, we will discuss the development and design of such low mass integrated modules for use in the barrel region of the ATLAS strip detector and track the pit-falls and successes along the way. In addition, we will show the first results for such modules after they have been attached to the local support structure. Finally, we will outline the way forward towards the final module and detector design.

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