Status of WP8

Tracking detector power distribution

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Outline

Reminder on WP8 tasks

Status of deliverables

Progress towards final demonstrators

WP8 Collaboration

http://cern.ch/SLHC-PP

Participants:

AGH-UST Krakow

CERN

PSI

RWTH Aachen

STFC-RAL

Universität Bonn

WP8 tasks

Tracking detector power distribution

Task 8.1: DC-DC conversion

"Evaluation phase"

An evaluation of different conversion approaches will be made, singling out the critical difficulties and developing conceptual solutions to overcome them. Exploration of partnerships with industry.

"Prototype phase"

Development of prototype converters for the alternative solutions. The on-chip DC-DC converter, integrated in modern CMOS technologies, will also be prototyped to assess the feasibility of this solution. Prototypes will be integrated in detector modules and tested at the system level. A report will detail the performance of the prototypes, with conclusions on the final viability of each conversion approach and recommendation for LHC upgrades.

Task 8.2: Serial Powering

" Generic studies"

Specification and development of AC-coupling or opto-decoupling elements; investigation of grounding and shielding techniques for serial powering schemes; system evaluation of serial powering systems based on commercial shunt regulators.

"Development of custom radiation-hard power electronics"

Design, submission and characterization of custom radiation-hard shunt regulators, power devices and AC–coupling circuitry. Several design iterations in different technologies are foreseen. The concept of a generic high-current serial powering ASIC, with various protection and slow-control features, capable of powering S-ATLAS and CMS2 pixel and strip detectors, will be evaluated.

"System design and characterization of super-modules"

Implementation of custom electronics in tracking detector super-modules. A super-module will consist of a significant number of detector modules powered in series. The super-module performance will be fully characterized.

Deliverables

http://cern.ch/SLHC-PP

SLHC-PP
Project number 212114
Date: February 1st 2008

Deliverables task 8.1	Description	Nature	Delivery date
8.1.1	Evaluation report on DC-DC conversion technologies	R	M12
8.1.2	Prototypes and viability report	P, R	M30
8.1.3	Integration in full-scale detector modules	D	M36

Deliverables task 8. 2	Description	Nature	Delivery date
8.2.1	Evaluation report on generic serial powering studies and specification of serial powering components	R	M12
8.2.2	Custom serial powering circuitry and evaluation of generic high-current serial powering ASIC	P,R	M24
8.2.3	Full-scale super-module with custom serial powering circuitry	D	M36

Deliverable 8.2.2

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SLHC-PP

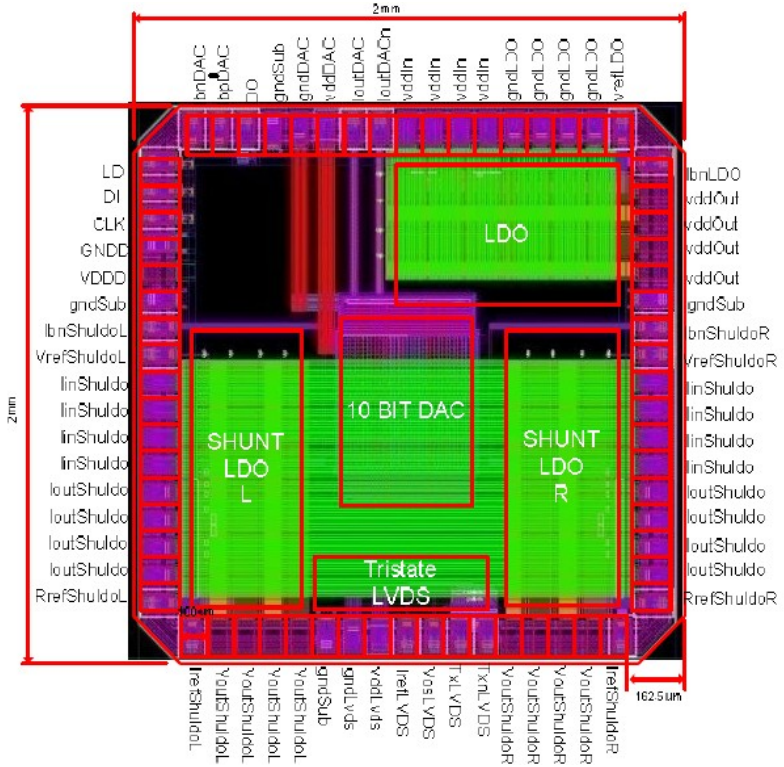
DELIVERABLE REPORT

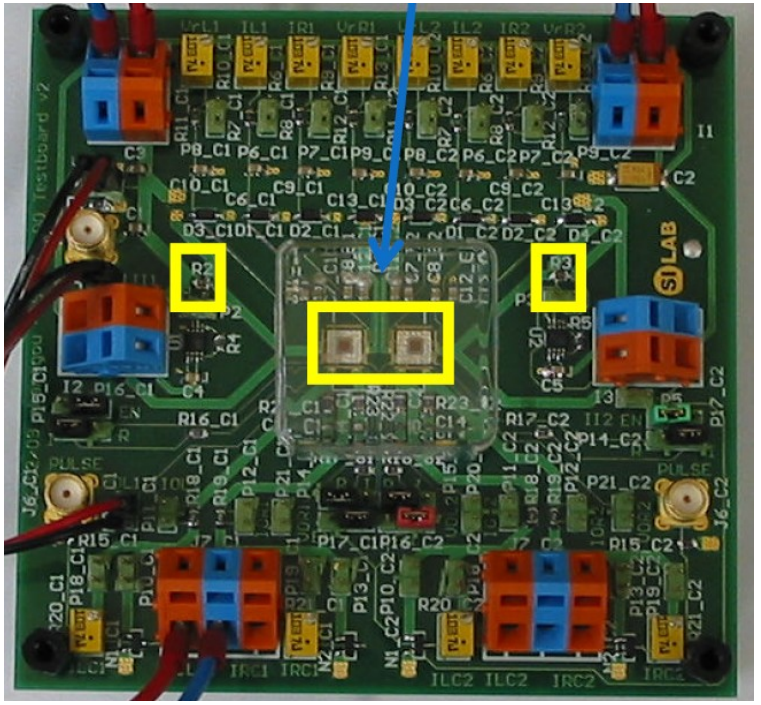
EU DELIVERABLE: 8.2.2

Document identifier:	SLHC-PP-8.2.2-1065829-v1.0
Contractual Date of Delivery to the EC	End of Month 24 (March 2010)
Actual Date of Delivery to the EC	31/3/2010
Document date:	31/3/2010
Deliverable Title:	Custom serial powering circuitry and evaluation of generic high-current serial powering ASIC
Work package:	WP8: Tracking detector power distribution
Authors:	W. Dabrowski
Document status:	Released
Document link:	https://edms.cern.ch/document/1065829

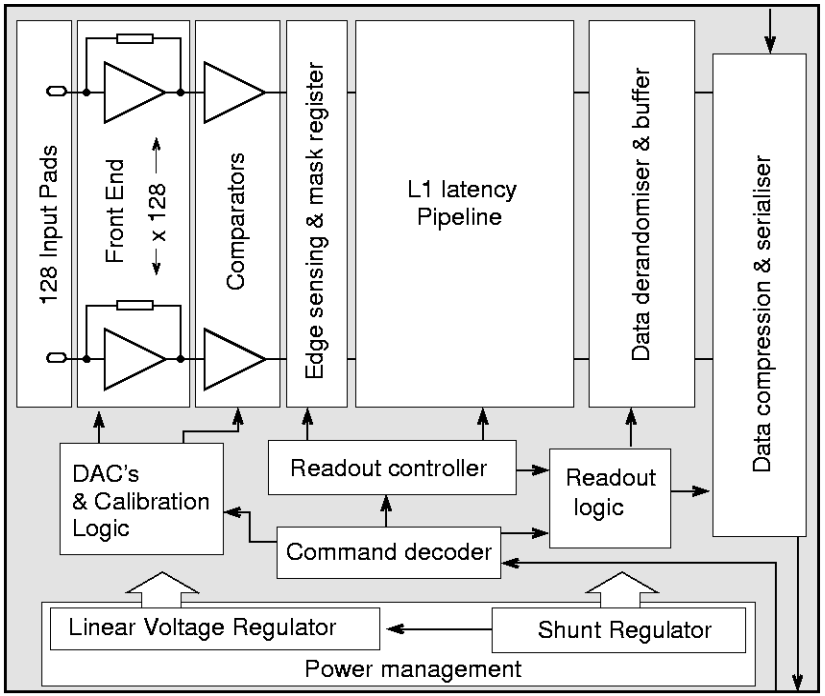
Deliverable 8.2.2

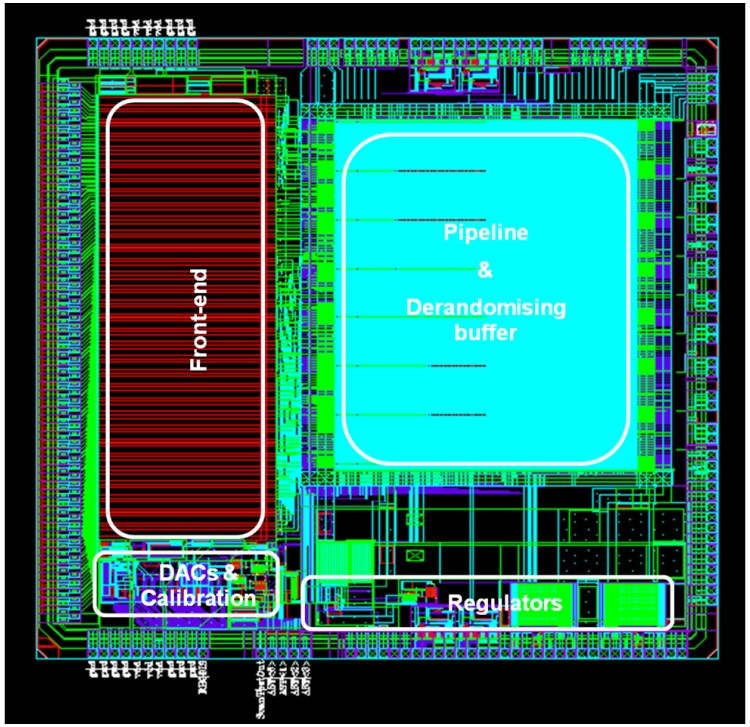
ShuLDO ASIC for serial powering of pixel modules



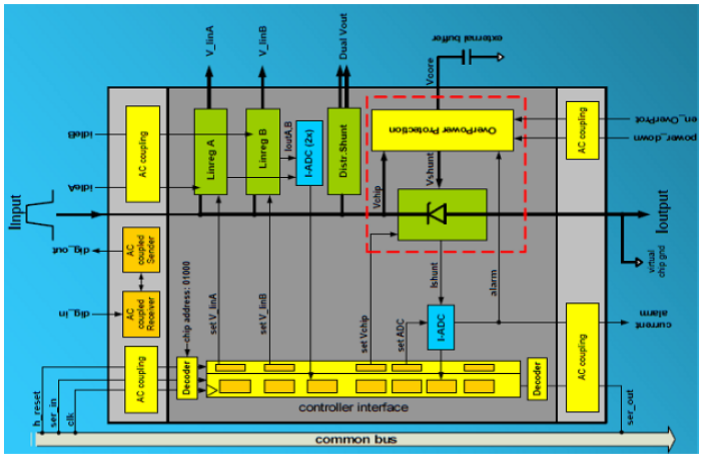


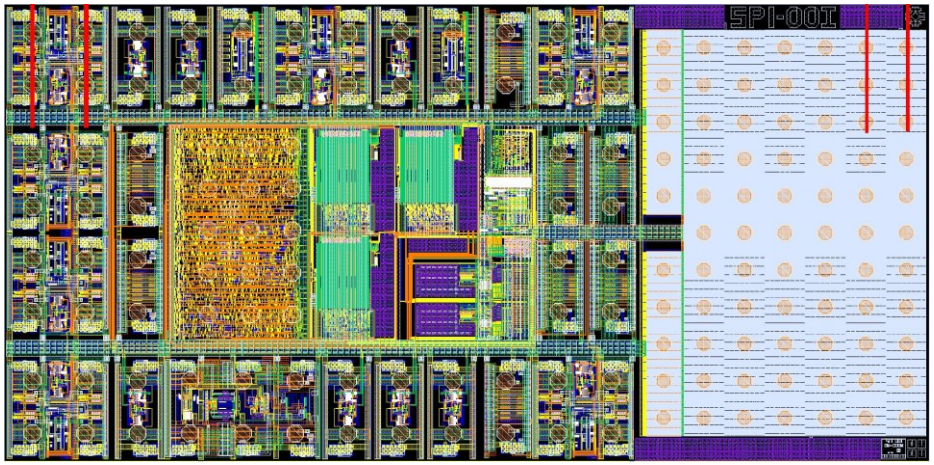
ABCN-25 ASIC comprising serial powering circuitry for readout of silicon strips modules





SPi ASIC – a generic serial powering interface chip





Deliverable 8.1.2

http://cern.ch/SLHC-PP

SLHC-PP

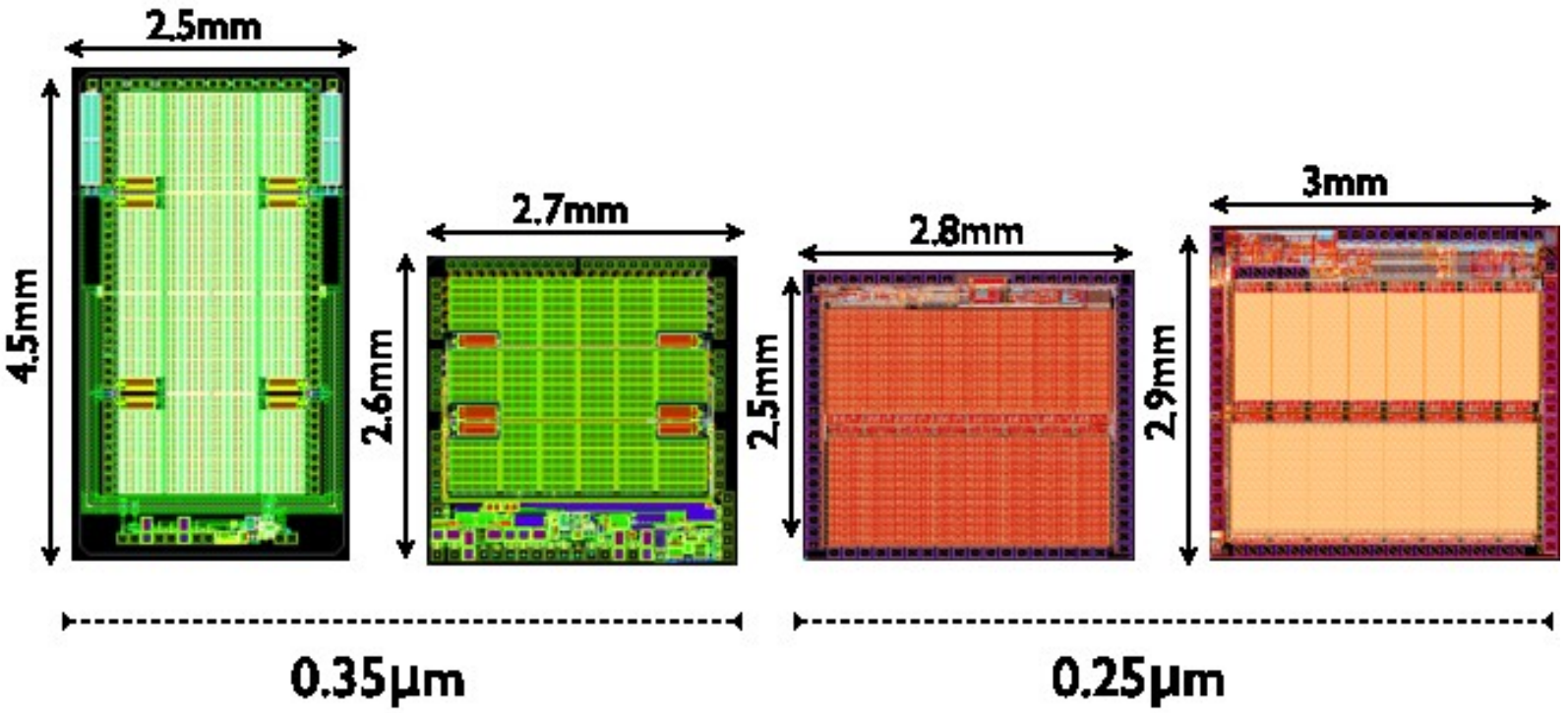
DELIVERABLE REPORT

EU DELIVERABLE: 8.1.2

Document identifier:	**SLHC-PP-8.1.1-1093314-v1**
Contractual Date of Delivery to the EC	**End of Month 30 (Sept. 2010)**
Actual Date of Delivery to the EC	**30/09/2010**
Document date:	**30/09/2010**
Deliverable Title:	**Prototypes and viability report**
Work package:	**WP8: Tracking detector power distribution**
Lead Beneficiary:	
Authors:	**G. Blanchot, W. Dabrowski, F. Faccio, K. Klein**
Document status:	**Released**
Document link:	https://edms.cern.ch/document/1093314/1

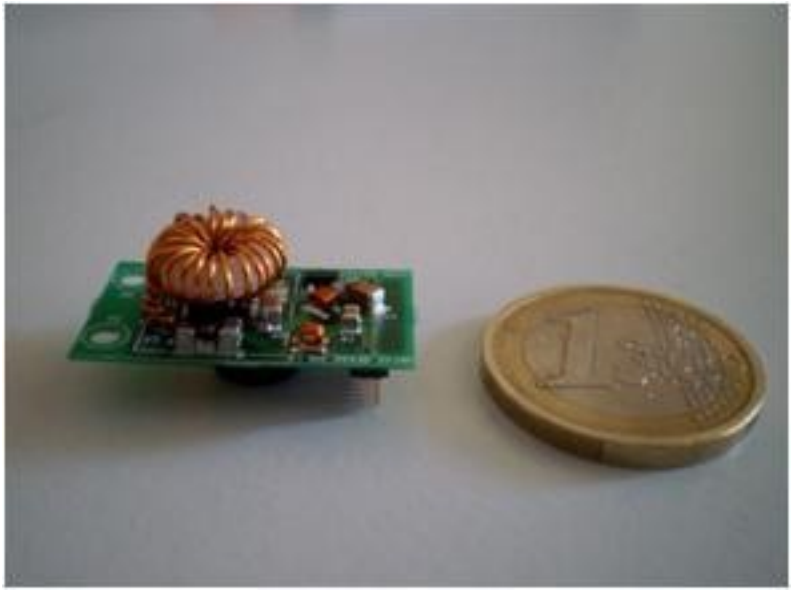
Deliverable 8.1.2

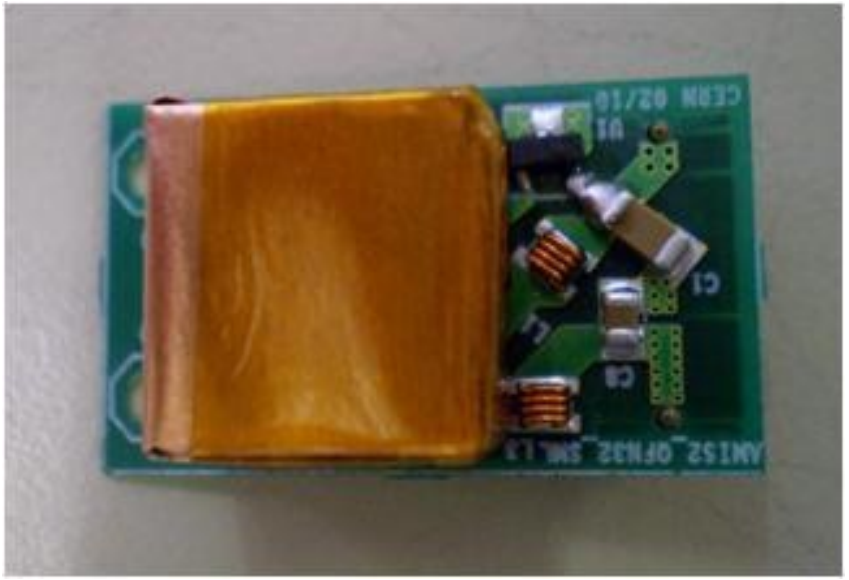
Four prototype ASIC for DC-DC converters



Deliverable 8.1.2

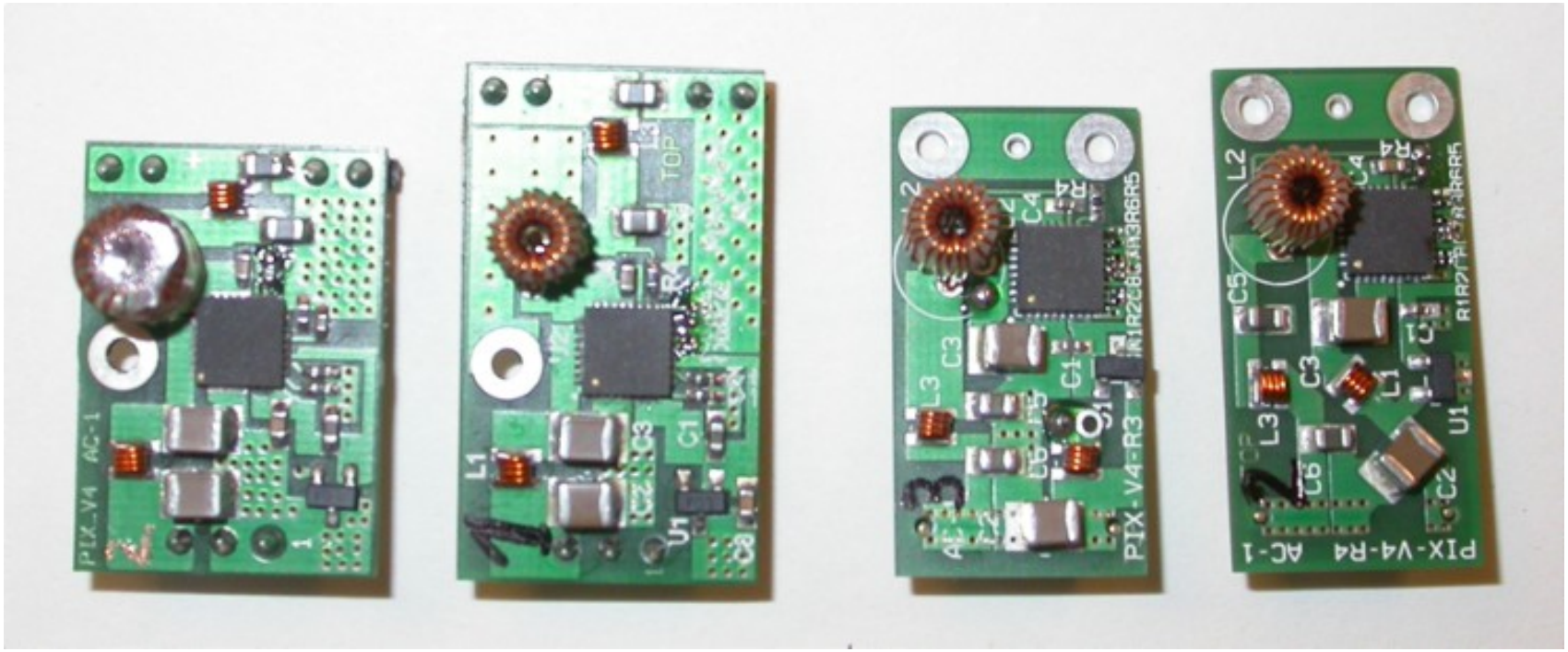
AMIS2 DC/DC converter prototypes with 500 nH coil (left) and with shield (right).





Deliverable 8.1.2

Buck converter prototypes from RWTH Aachen

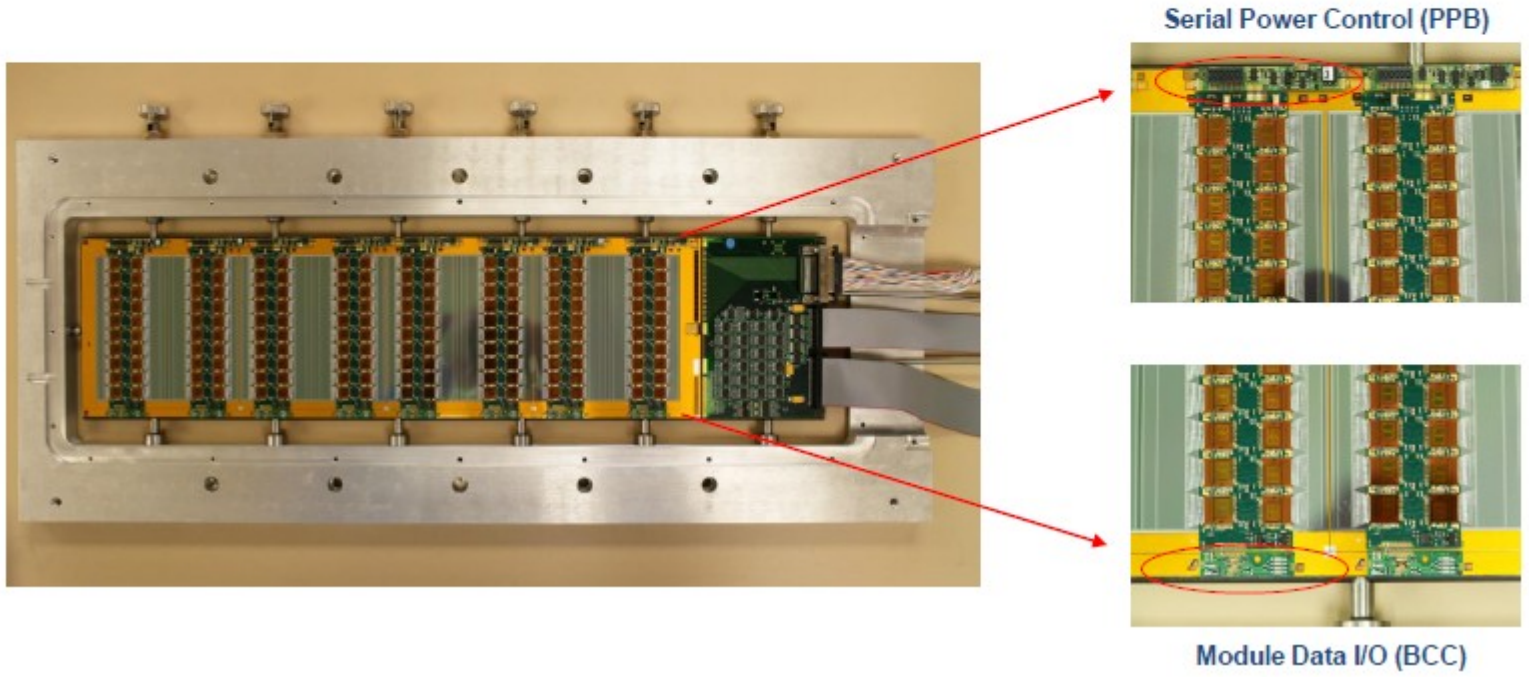


Status of final demonstrators

Serial powering - ATLAS short strips

Stavelet: A test bed for serially powered multiple module studies

- 4 modules glued directly onto a stave assembly
  - Carbon structure with integrated cooling
  - Auxiliary support electronics: Serial power control (e.g. bypass), module data I/O
- Integrated bus cable
  - Serial power distribution, Sensor bias, Data I/O (multi-drop and point-to-point LVDS)

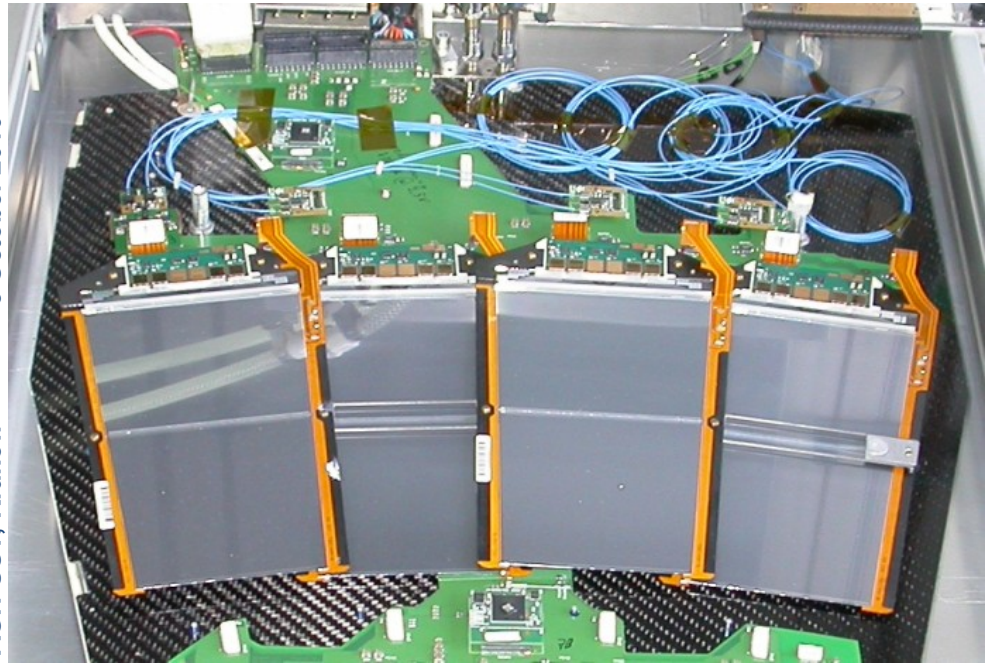


Ashley Greenall, TWEPP 2010

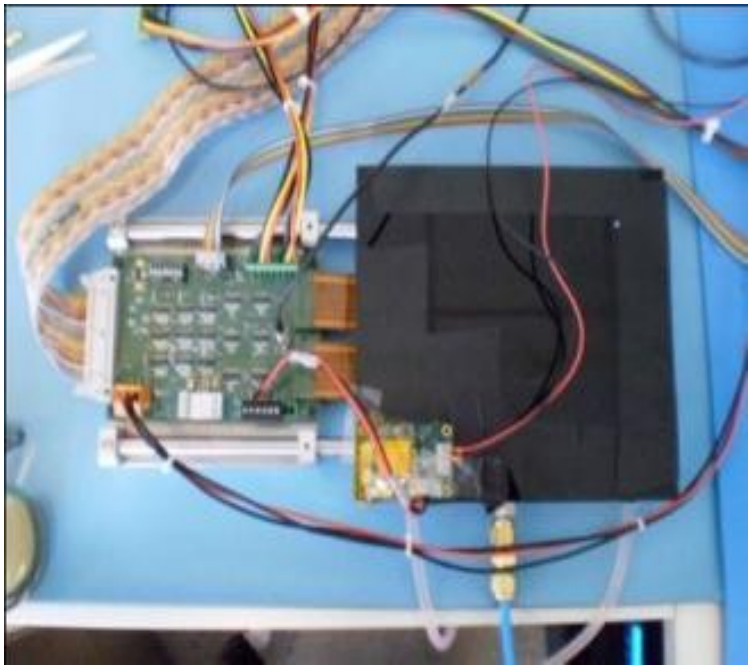
Status of final demonstrators

DC-DC powering

CMS silicon strip module (RWTH Aachen)



Atlas short strips module (University of Geneva)



Summary

- All tasks of WP8 are on schedule.
- Work on final demonstrators to be delivered by M36 is progressing well.
- Activity of WP8 if fully coherent with the ATLAS and CMS R&D programs on development of new concepts and technologies for the inner trackers.