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FASP based data acquisition

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Fast Analog Signal Processor

- Fast : shaping time of 100 ns optimally selected for < 250 ns response time and full charge/particle integration.
- Analog : Max. signal detection, base line correction, fast recovery on overflow, etc.
- Signal Processing : Max. signal holding (Flat-top), channel-wise trigger logic (chip select)
- Specialties : Non-diagonal response matrix for triangular pad geometry, neighbor trigger (small signal processing based on topology), CHIP to CHIP analog/digital communication.

General Event Time-stamping Serializer

- Digital companion of FASP : control and command I/O with FASP
- Packs 2 FASPs : packs signal-time information for 32 chs
- Data volume scales with hit rate.
- Freezing in silicon to be discussed.

Front End Electronics

- ●FASP v03
- GETS
 - 🔹 Firmware
- TESTS
 - 🔷 Rate









v03 prepared for mCBM has

- improved analog circuitry and
- a new processing logic for neighbor read-out.

See A. Bercuci et al.; FEE readiness of Bucharest TRD chamber for mCBM, CBM Progress Report 2018



CHIP-wise QA







Production projection

- Currently 6 chips/2 FTE/2 weeks !

- 1 type Module 1 (e.g. at mCBM) is operated by 180 FASPs or 2880 channels

- bonding externalized
- QA need development

Channel-wise QA

CBM





TRD-Buch : FASP based FEE







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FASPRO : FASP FEB



MSO 5204B Mixed Nessure Search DP.S (Sept A very preliminary but successful first test - CLK 80 MHz - CHIP 2 CHIP communication works (finally) - Bugs in mounting the FMC+ connector. Fixing at producing firm



FASPRO : FASP FEB



CHIP

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CHIP

communication

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27 Mar 2019

TRD-Buch : FASP based FEE

GETS : Tests @ close to 100 kHz particles/cm²



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<u>STATUS</u>

- 1. Delay on building the GETS board for mCBM due to shipping delays (1 year) of new FPGA from microSemi PolarFire
- 2. Days before the FPGA arrived
- 3. GETS board (housing 2 GETS) is first priority
- 4. Deadline Nov. 2019 for mCBM installation
- 5. We consider freezing the system and casting it to silicon for CBM but decision still needs evaluation.

6. We try to keep the solution as flexible as possible for as long as we can ...



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BACKUP



RATE → real life signals @ 100 kHz/cm²



