Status of the VME-based electronics for the JLab GEM tracker

Paolo Musico - INFN/GE

Evaristo Cisbani - INFN/Rome & Italian National Institute of Health

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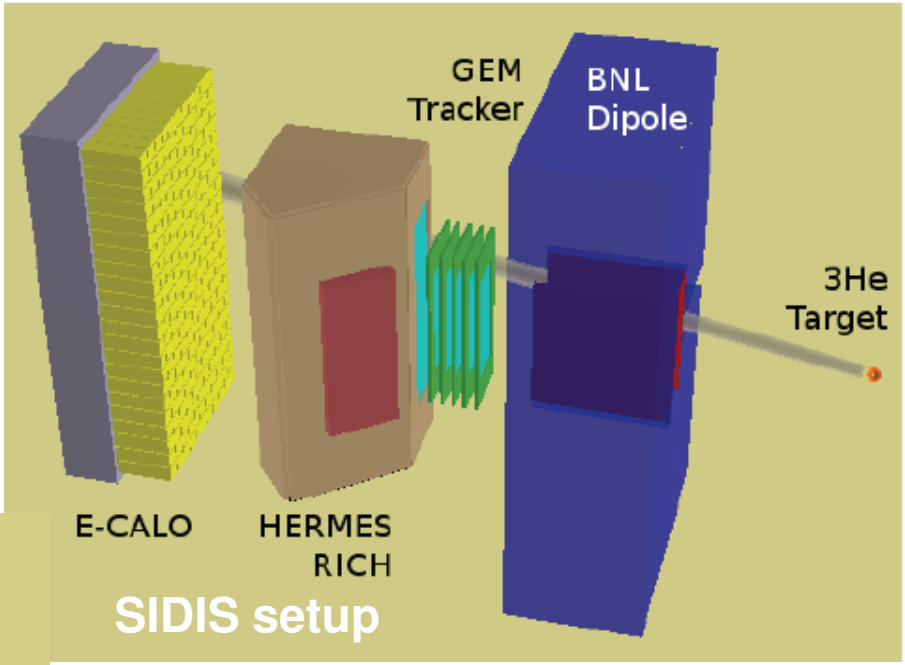
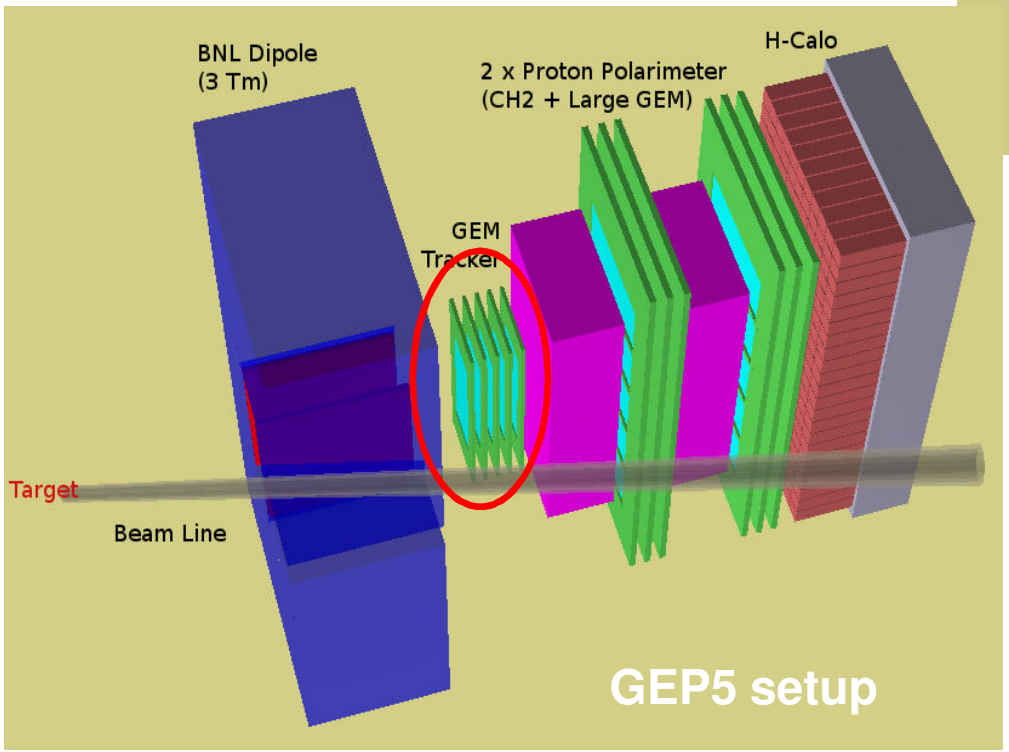
RD51 Collaboration Meeting

New SBS Spectrometer @ JLab

- High Luminosity (10^{38} /cm^2/s) (bg 400 kHz/cm^2)
- Forward angle
- Large acceptance
- Good angular and momentum resolutions (0.2 mrad, 0.5% @ 4-8 GeV/c)
- Flexibility (use the same detectors in different experimental setup)





hallaweb.jlab.org/12GeV/SuperBigBite/

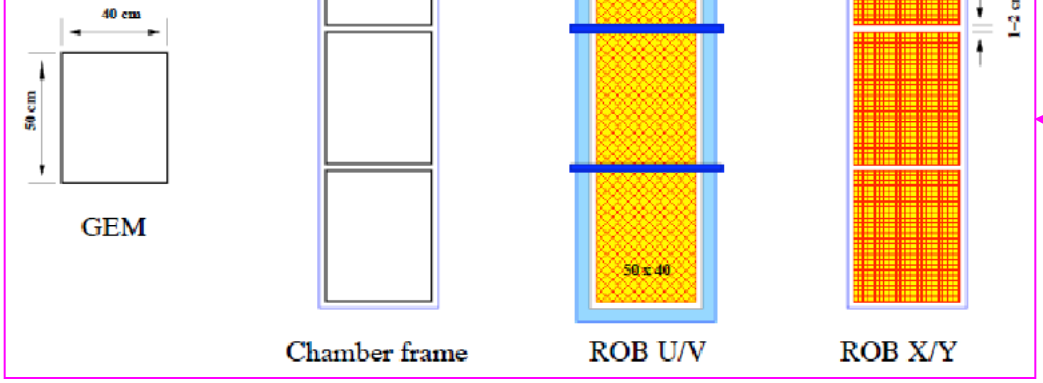
Two tracker geometries:

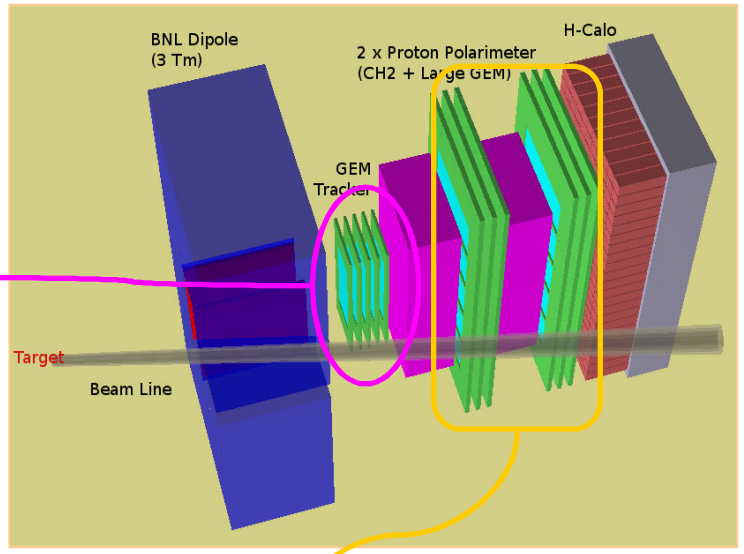
1. front tracker
2. second and third tracker

will use the same “base unit”

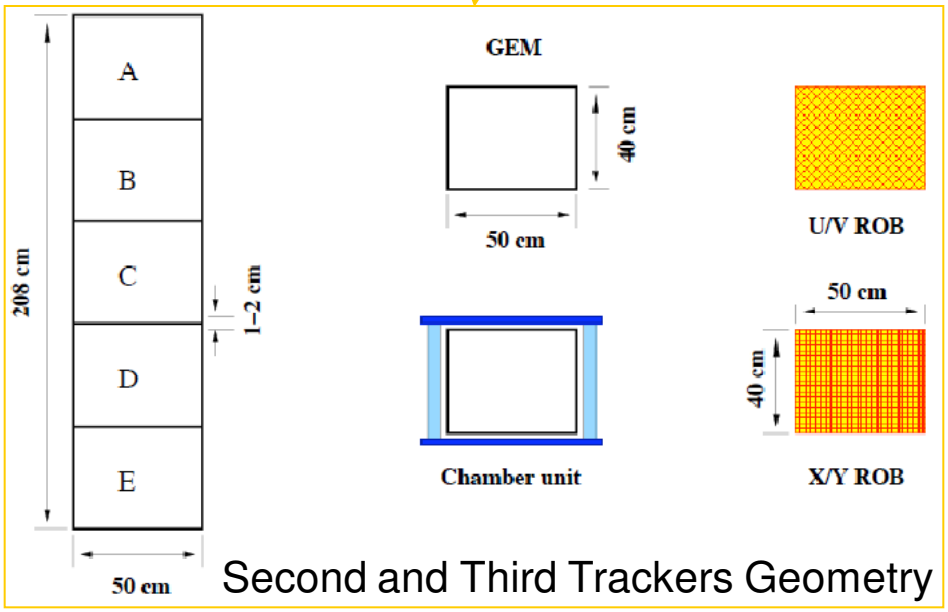
GEM Tracker Chamber Geometries

Front Tracker Geometry





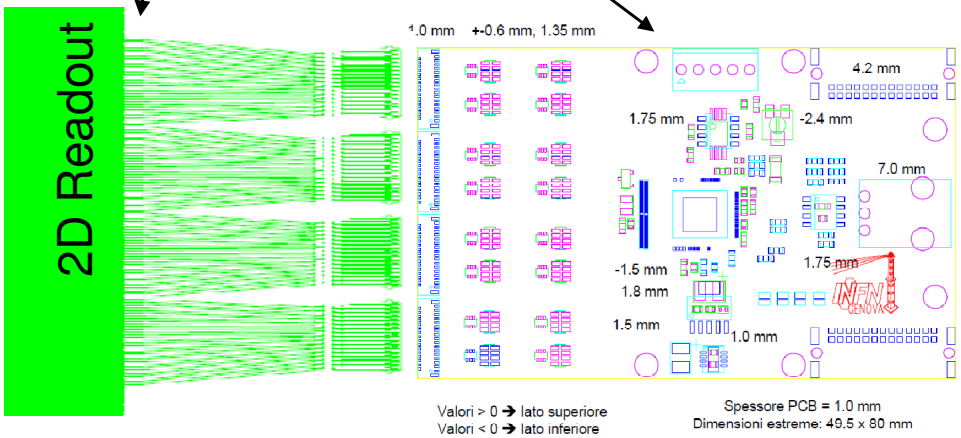
1. Single Module: 40x50 cm^2
2. Chamber combination of 3 or 5 adjacent modules
3. Both x/y and u/v 2D (a la COMPASS) readout strips
4. Electronics on the side (cyan) or beyond the dead areas (blue) at 90° degree

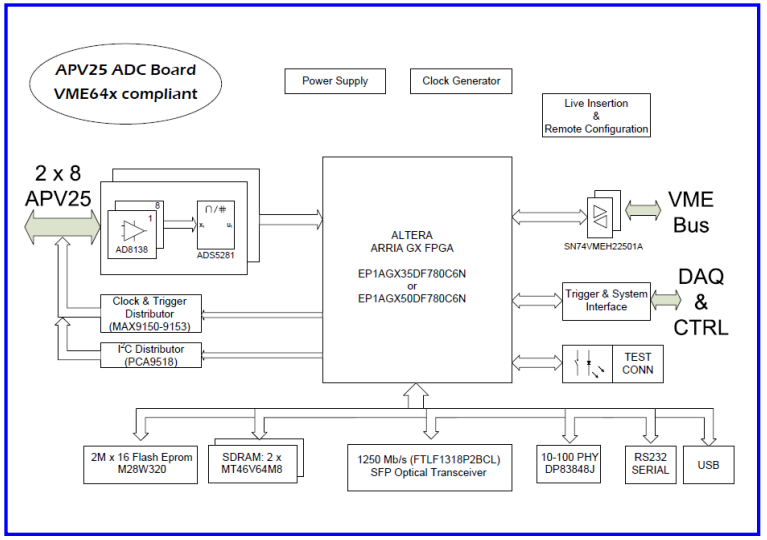


Second and Third Trackers Geometry

Electronics Components

GEM ⇒ **FEC** ⇒ **ADC+VME Controller** ⇒ DAQ





General Criteria:

- Minimize development time
- Minimize material of FECs (which are partially along the particle path)
- Be compliant to JLab DAQ
- Maximize flexibilty (at least during prototyping)

Thanks to Michael Böhmer and Igor Konorov

Electronics Components

GEM ⇒ FEC ⇒ ADC+VME Controller ⇒ DAQ

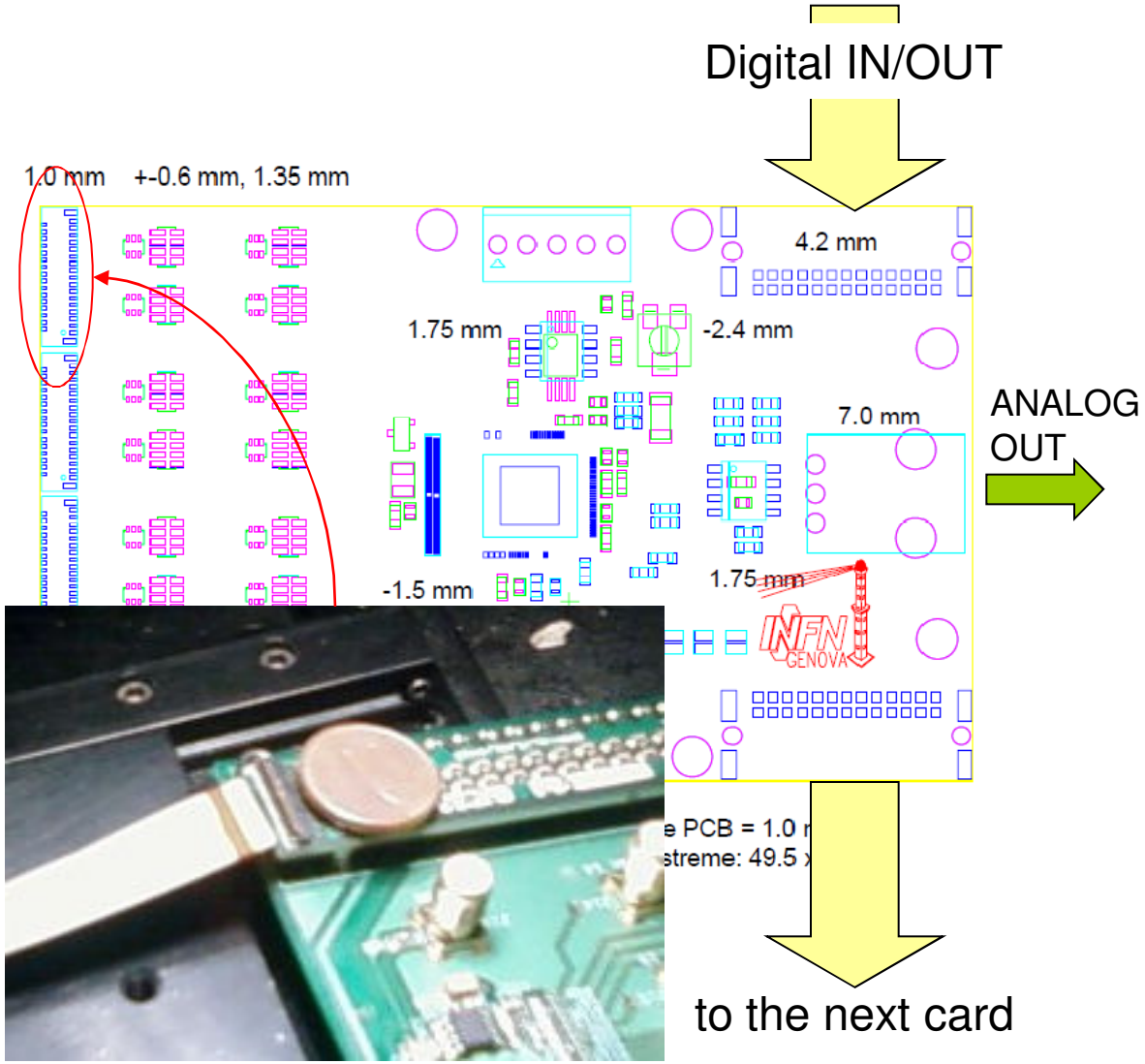
Front End card based on The APV25 chip (originally developed for SiD in CMS)

Bus like digital lines (CLOCK, trigger and I2C) & Low Voltages

Single differential line for the ANALOG out

ZIF connectors on the GEM side (no soldering on readout foil)

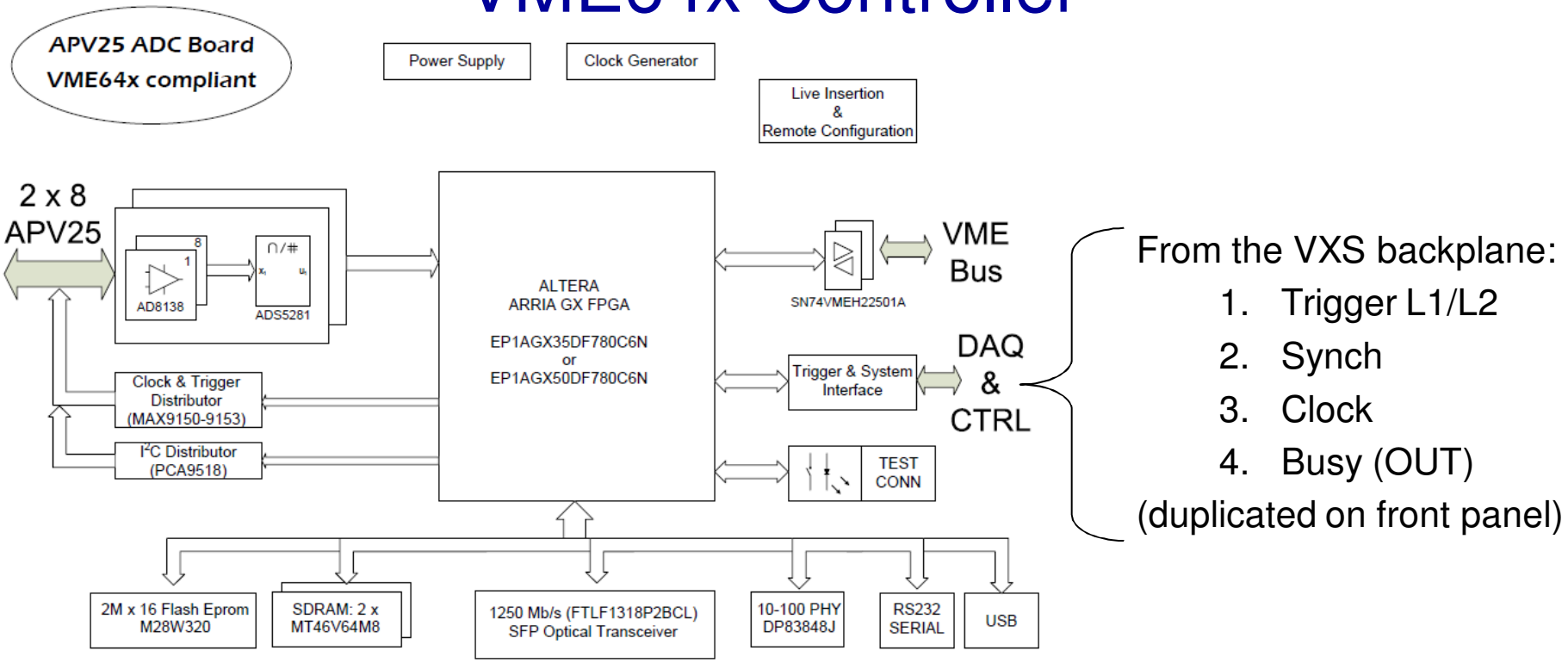
First front-end prototypes available end of November/09



EC2 verificare se i segnali digitali sono riformati nella Front End

Evaristo Cisbani, 11/21/2009

VME64x Controller



- VME controller hosts the digitization of the analog signals coming from the front-end card.
- It handle all control signals required by the front end card
- Compliant to the new JLab/12 VME64x VITA 41 (VXS) standard
- We intend to make it accessible by standard VME as well (with reduced functionality)
- Design with the possibility to detach the ADC subcomponent to extend FEC-VME64x distance (expected to be ~7 m)