Timing Measurement for FTM

status of FTM

- 4 layers of 250 μm, active area of $\sim 200\,\mathrm{cm}^2$
- readout: $10 \times 10\,\mathrm{cm}^2$, 200 strips ($X\&Y$), 400 μm stripwidth, 500 μm strip pitch
- 3 layers out of 4 stable at 600V $\Rightarrow$ 120 kV/cm on Amp layer of 50 μm of kapton.
- 2015 TB result (VCI 2016, NIM A 845 (2017) 313) smaller prototype at 650 V.
- simulations indicate gain of $\sim 10^4$, although we cannot measure gain with X-ray setup, furthermore detector (etching) imperfections might lead to lower gain
- considering to open/repair 4th layer at CERN with Rui and to ask other 8 layers to have a total drift volume of $12 \times 250\,\mu\mathrm{m} = 3\,\mathrm{mm}$ needed for efficiency

Measurements

- Timing with 2 layers (repeat/confirm VCI 2016, NIM A 845 (2017) 313)
- Timing with 3/4 layers
- Timing with 12 layers
- Auxilliary: Gain Scan, Transparency, ...

Test Beam Setup

FTM TB Setup

- FTM $\longrightarrow$ FATIC chip $\longrightarrow$ MOSAIC Readout Board $\longrightarrow$ PC
  - here all items ok
- 2 Fast Scint. or MCPs $\longrightarrow$ fast discr $\longrightarrow$ FATIC (FTM Frontend)
  - have to lend / buy fast scintillators or MCPs for timing reference
    Price? Would like to discuss with PicoSec TB experts
  - need to find fast discrimanator that outputs LVDS signal
    (needs to stay within 100 ps resolution) suggestions welcome
- GEM Trackers & Trigger Scintillators $\longrightarrow$ SRS $\longrightarrow$ PC
  - have to ask GEM Trackers and Scintillators to CERN CMS GEM group
  - SRS (Bari?) since CERN CMS GEM SRS in use for Detector Prod in 904

Synchronization?

- Problem to solve is synchronization between SRS and MOSAIC DAQ board?
- e.g. is it possible to send same (SPS?) clock signal to SRS and MOSAIC?
- MOSAIC can accept ext. clock, need to investigate & test for SRS
- Would like to discuss this setup more in detail with RD51 TB & SRS experts

Test Beam Requirements

- **sociological:**
  we would like to discuss our setup with experts to avoid surprises
- **beam:** high momentum muons, will also eat pions
- **gas:** Ar:CO_2 (70:30), Ne:iC_4H_10 (90:10) flammable (premix)
  CERN/RD51?
- **trakers:** triple GEM, likely from CERN-CMS-GEM
- **HV:** will bring our own N1471 and N1471H
- **DAQ:** SRS: if RD51 available we won't have to ship ours (Bari)
- **FE:** VFAT & Turbo (high rate): likely available from CERN-CMS-GEM
- **Rack/Crates:** Need to be checked ...
  not sure about neither setup neither CERN-CMS-GEM availability
- **space:** setup: 1 m length, space for rack, CR: desk for 2 persons
- **test:** would like to test SRS-MOSAIC synch at CERN (RD51 lab?)
  will try to do as much as possible in Bari with MOSAIC experts
- **installation:** normal **shipment:** CERN internal transport

Beam Dates

- **April/May:** comes too early, will not participate
  - Federica will defend her thesis during the first week
  - even delay with one week will not allow us to prepare properly
  - electronics will not be ready for April/May
- **August:** not ideal, we are italians, we risk our mariage, but . . .
  - but are **working on finding a team for august**. we have one student with a 3 month INFN contract, looking into the possibilities of having Federica at CERN (finished thesis, so finished INFN association, so cannot travel :-( )
  - we are also contacting Pavia, Ghent, CERN, etc
  - FATIC electronics expected to be ready by June, idea: test FATIC + SRS in July, ready for test beam in August
- **October:** we consider as back-up
  - since we are a young and rather unexperienced team we will likely participate also in test-beam in october.
  - We are in favour of one additional week. we have no time constraints, but it might be more a money problem . . . (needs to be understood)