

Ekata Nandy on behalf of the CBM collaboration



mCBM experiment

- mCBM is a part of FAIR phase 0 program
- A CBM full-system test-setup at the SIS18 facility of GSI/FAIR
- Real size prototypes or pre-series productions of all CBM detector systems

Major objectives

- To commission and optimize the complex interplay of the different detector systems with the triggerless streaming data acquisition
- Validate time based event reconstruction & track reconstruction at high particle density environment
- Control software packages

mMUCH data analysis

- Data analysed for Pb+Au collisions at 1.06 AGeV.
- Analyzed 2020 data (MUCH could not join 2021, but ongoing 2022 campaign)

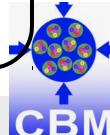
mCBM experimental setup

Photograph of mCBM 2020 setup

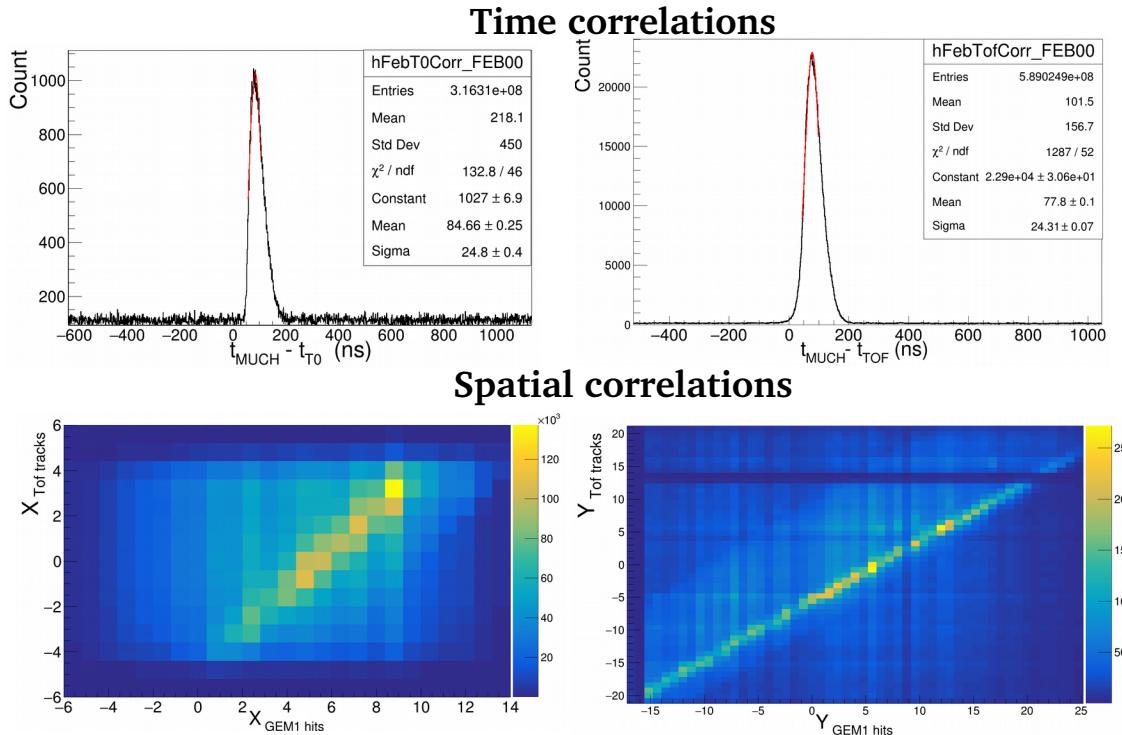
Simulation generated mCBM setup

Two Real size trapezoidal GEM modules for the first station of MUCH have been installed

Triple GEM with 3:2:2 gas gap



Free streaming data transport in mCBM: time & spatial correlations



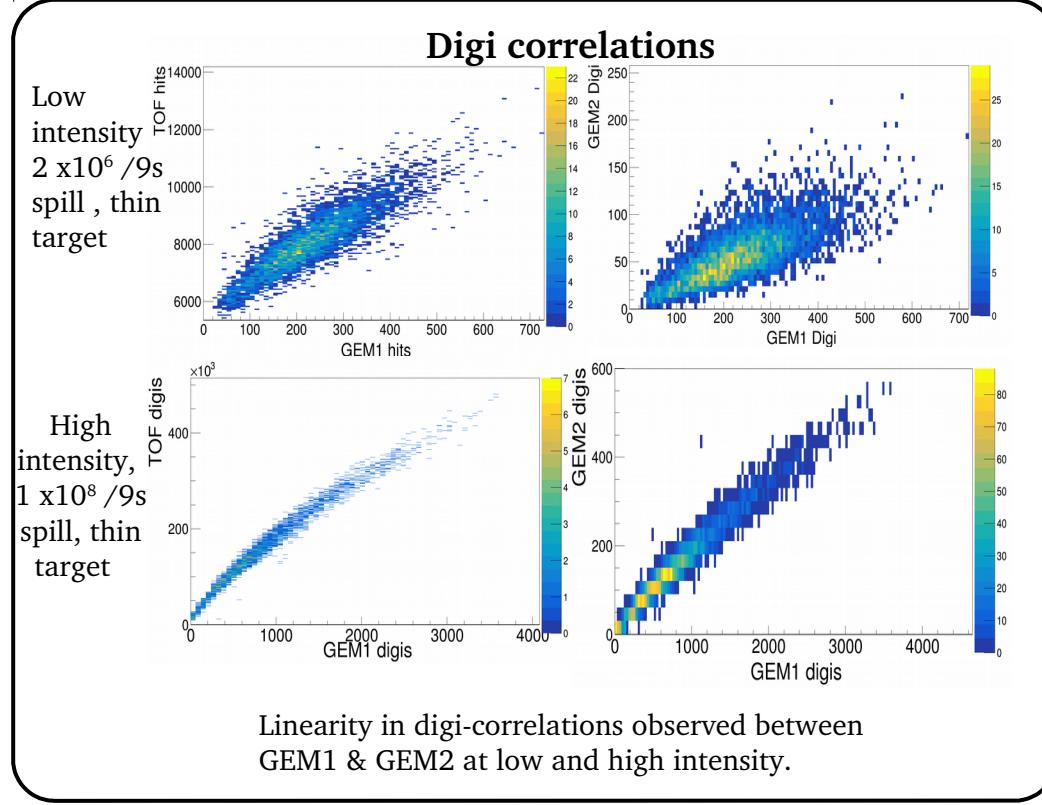
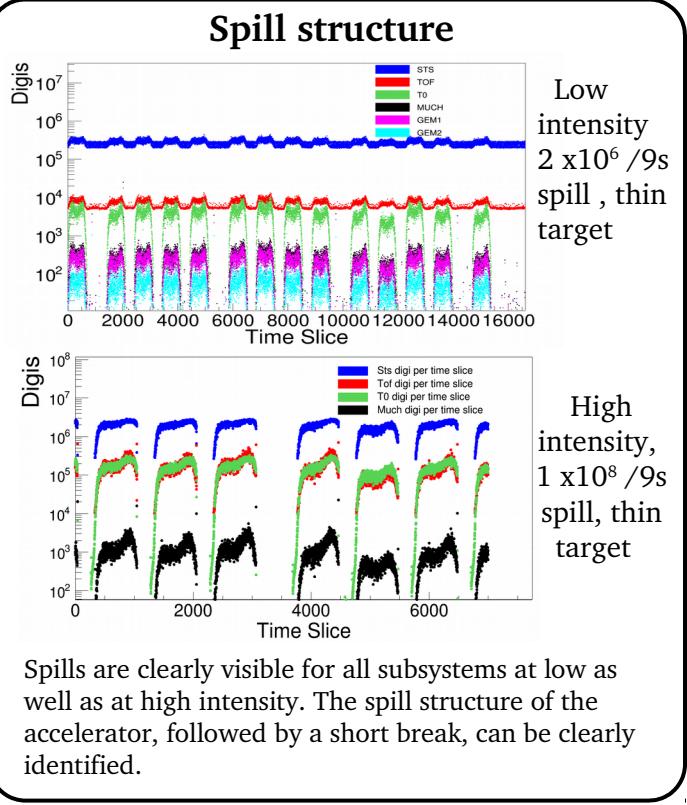
- Time and spatial correlations are extracted for mMUCH with other subsubsystems

- A clear time correlations is observed between MUCH-T0 and MUCH-TOF with narrow time correlation width

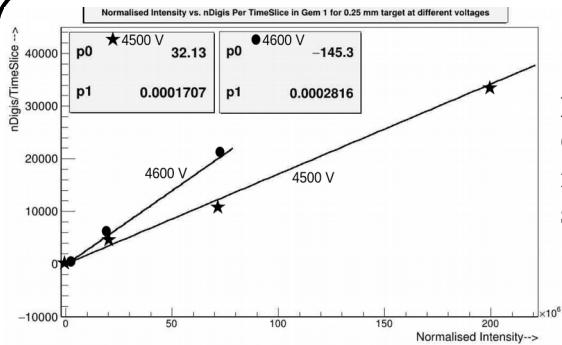
- Spatial correlations of reconstructed GEM-hits with projected mTOF tracks at GEM plane shows a clear correlation band in both X and Y

- Time and spatial correlation proves synchronicity of data streams

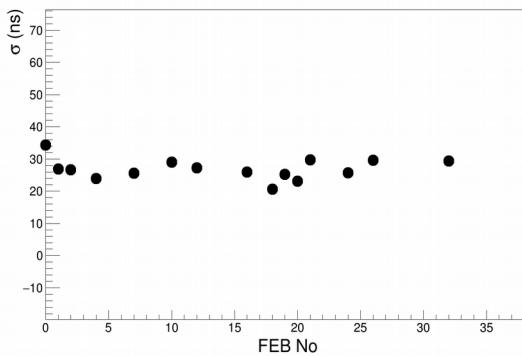
Spills & digi correlations of mMUCH with other sub-detectors at low & high intensity



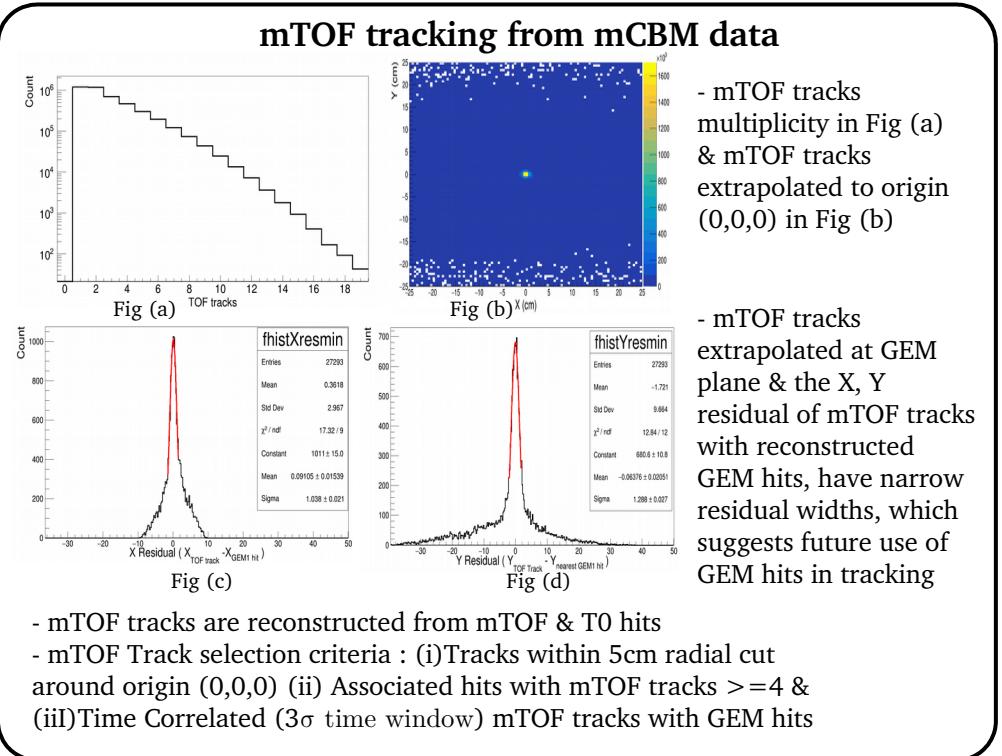
MUCH performance & tracking using mCBM data



Linear response of GEM module wrt intensity – not saturating



Uniformity of time correlation width across different FEBs in GEM



Summary & outlook



Summary

- Two Real size trapezoidal GEM modules (mMUCH) designed for the first two layers of the CBM MUCH system have been installed within the mCBM experiment
- Successful test of the triggerless-streaming read out system under realistic conditions; time and spatial correlations demonstrate synchronicity of the subsystem data streams
- Clear spill structure observed for GEMs, at low as well as at high collision rates
- No saturation with rate observed for GEMs

Outlook

- GEM Efficiency determination using mTOF tracks will be performed
- Systematics of GEM efficiency with MUCH HV & threshold scan from next mCBM 2022 campaign will be performed

Acknowledgement

Apar Agarwal, CBM-MUCH collaboration, GSI team.

Thank you

