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The next generation TRD detectors

Performance and application in CBM

Alex Bercuci

40th CBM Collaboration Meeting
13th October 2022

Overview

The read-out principle of MWPC with inductive pads
- overview of the current situation on the scientific community
- the idea of triangular pads and paired-pads read-out

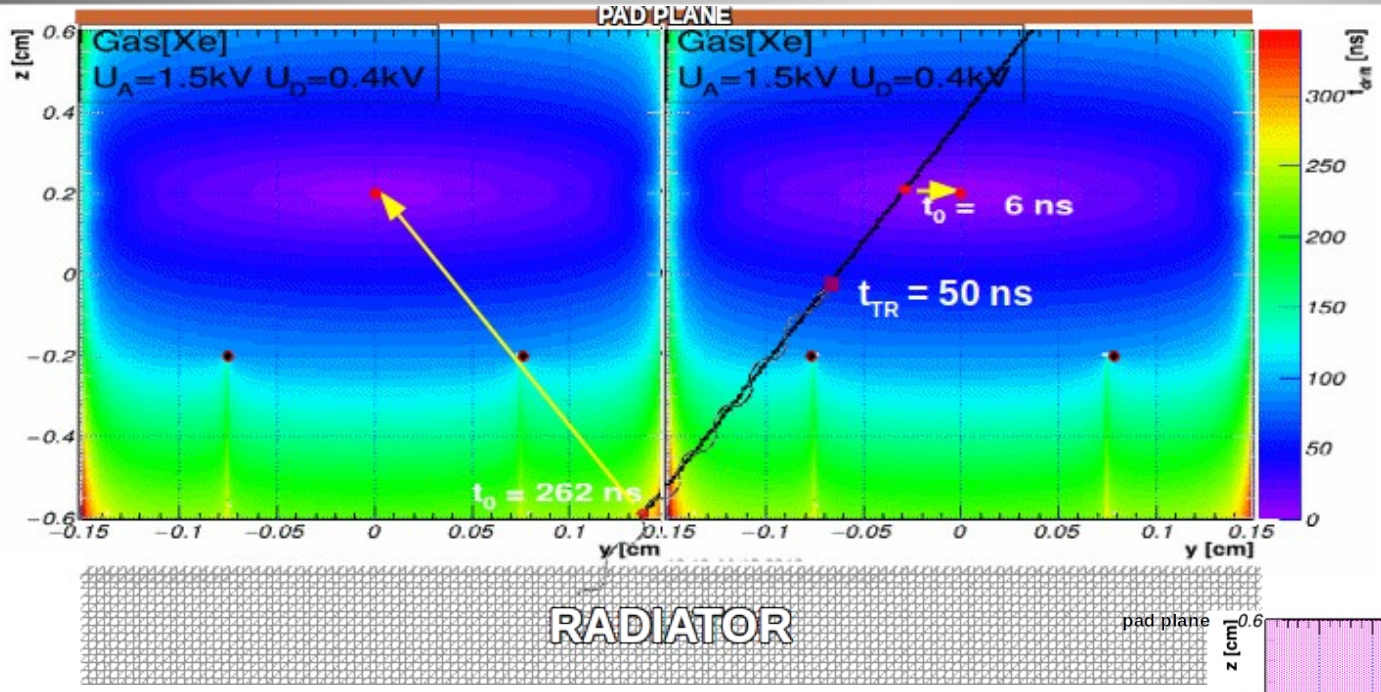
Highlighting measurements
- propaganda measurements from PS(2014) to SIS18(2022)

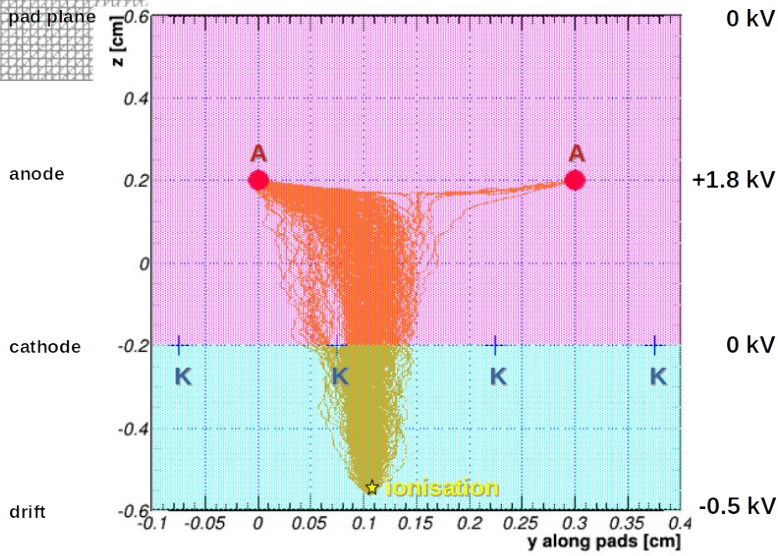
The quality gain in observables determination by increased read-out resolution
- systematic effects in position, energy and time discerned with the new read-out

Testing the CBM-ish TRD2D with mSTS @ mCBM
- chamber alignment

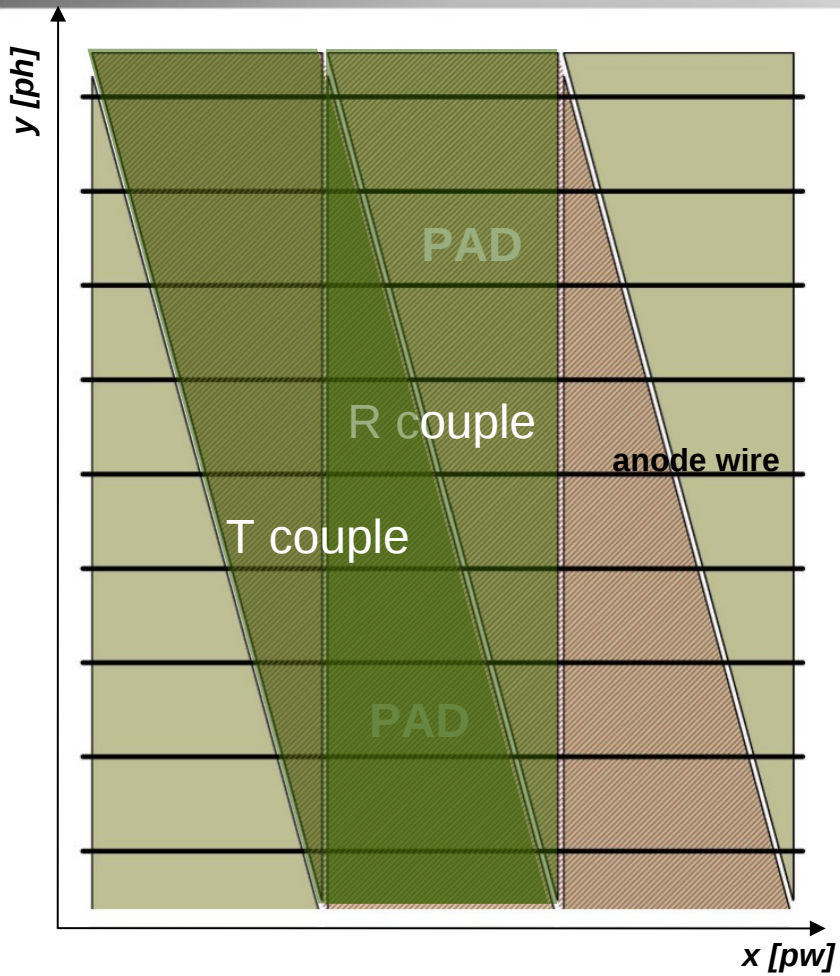
CBM outlook
- the kinematic region coverage of the TRD2D and its potential for physics discovery
- current performances and implementation

Multi-Wire Proportional Counters with inductive read-out pads





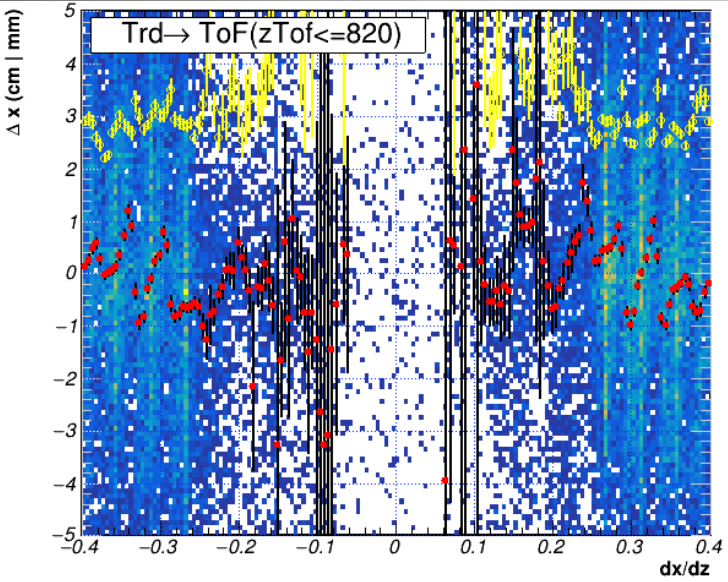
TRIANGULAR pads read-out and PAIRED signal amplification

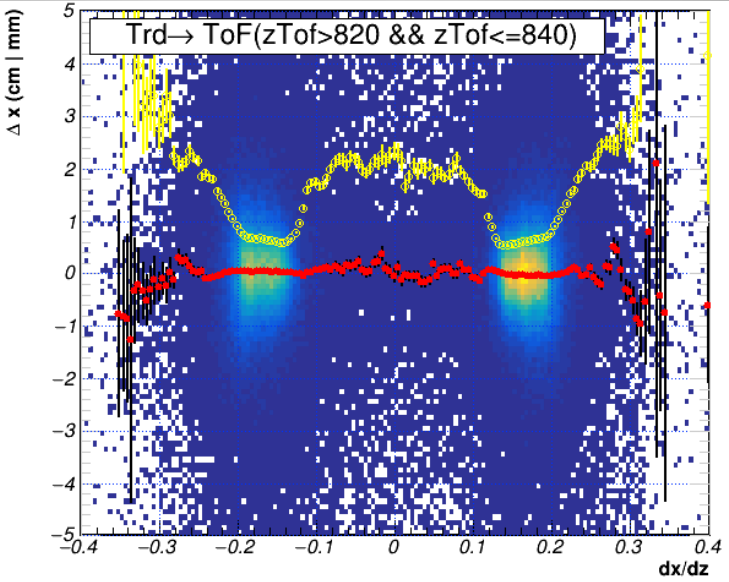


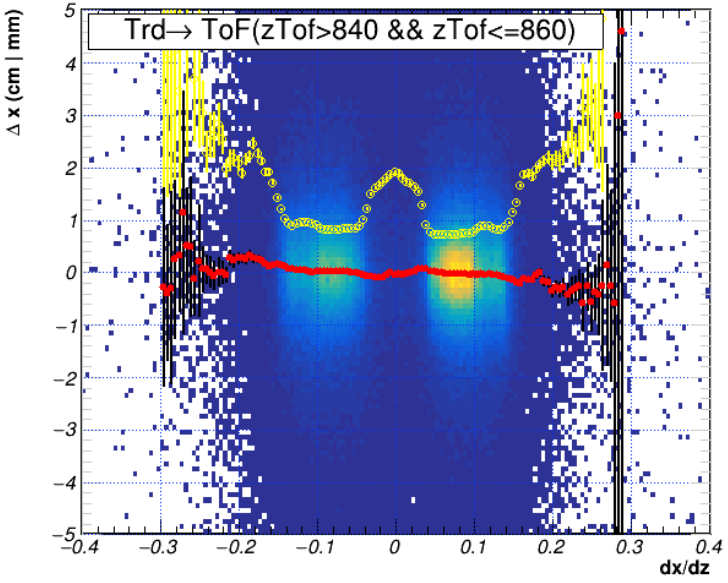
Features of triangular pad design

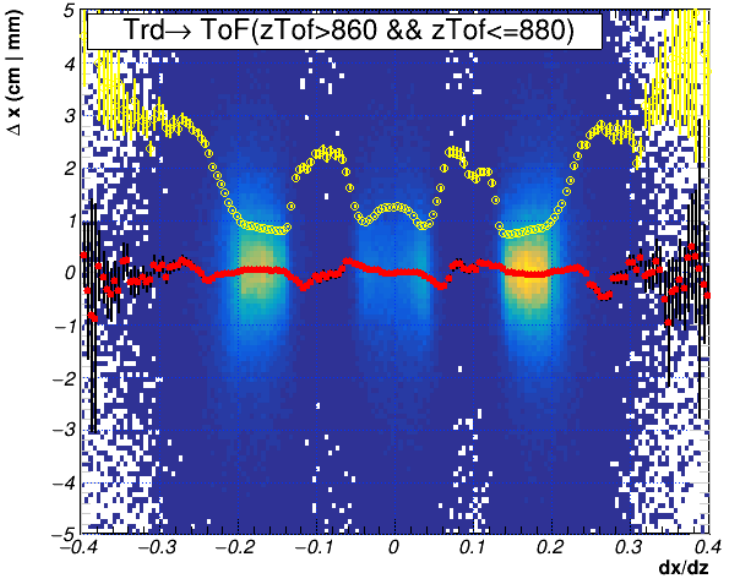
- Pad size/position coupled with anode wire pitch
- Our best match 27 mm height for 9 x 3mm anodes
- Individual pad read-out version on FASP-01
- R/T coupled pad read-out version on FASP-02 for better S/N and uniform charge response

Trd → ToF roads (x)





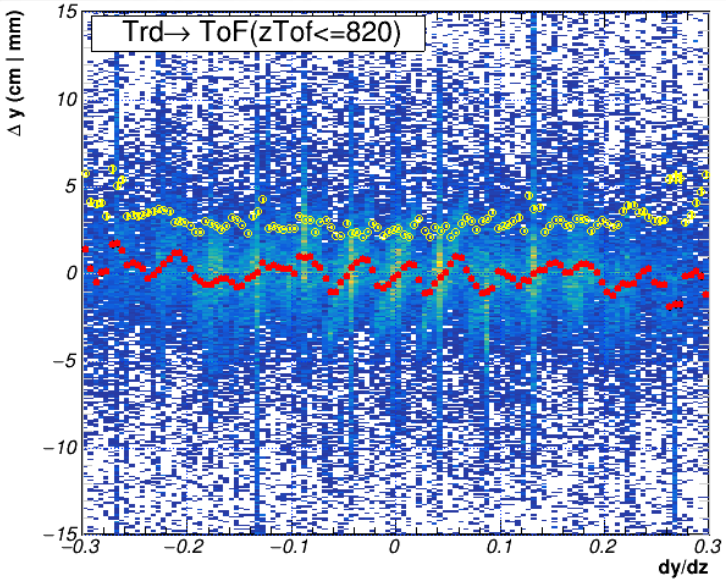


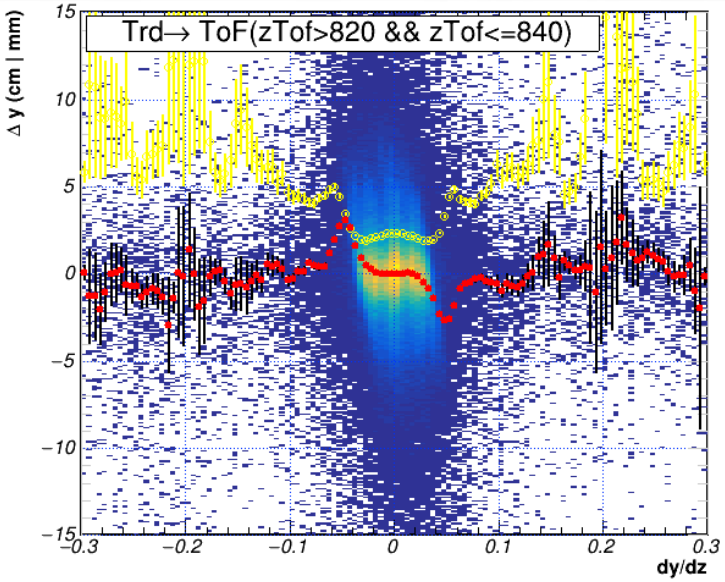


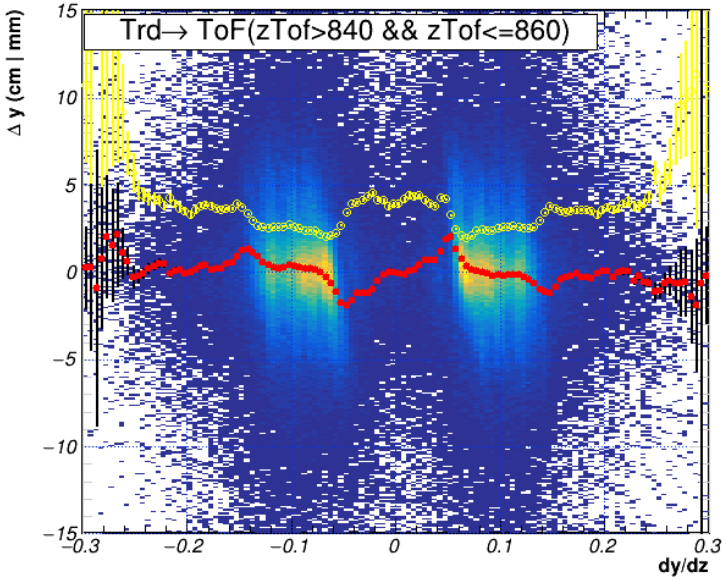
Mean value of the gauss fit on each dx/dz projection

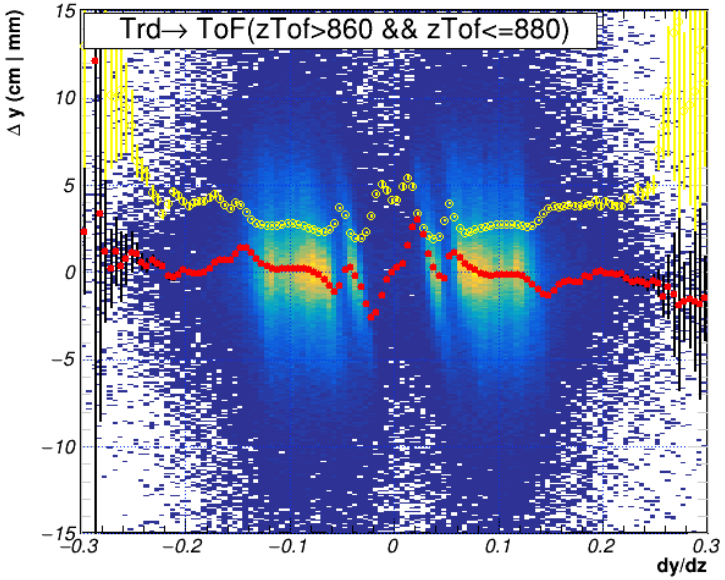
Sigma parameter of the gauss fit from above

Trd → ToF roads (y)





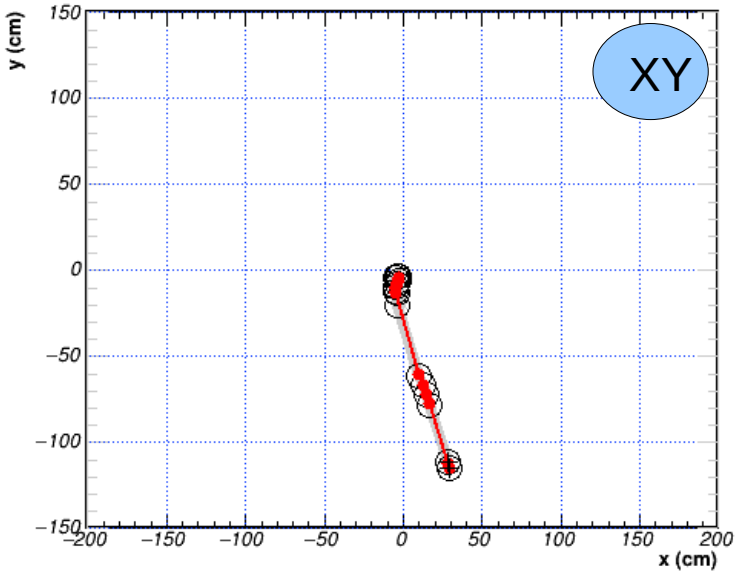


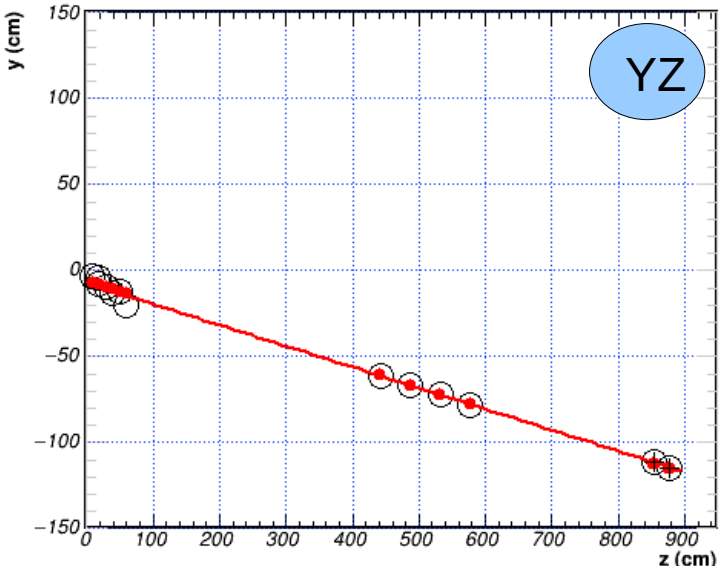


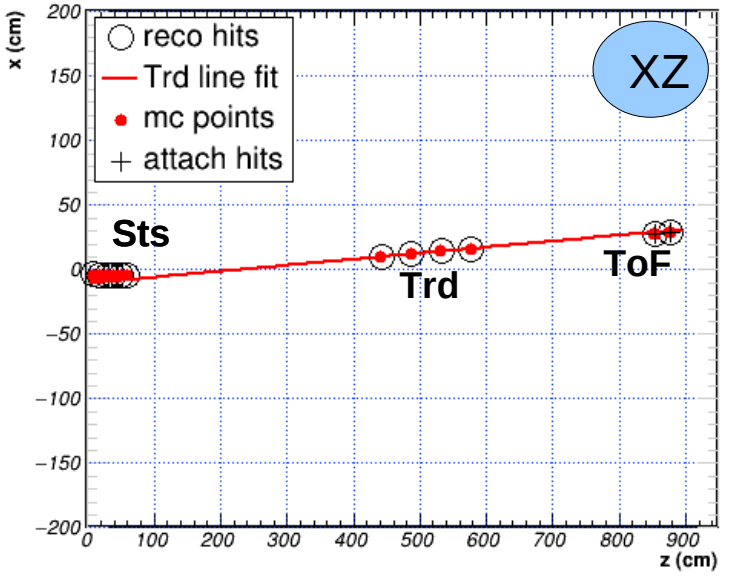
Mean value of the gauss fit on each dx/dz projection

Sigma parameter of the gauss fit from above

The track example







ToF hit attach efficiency

← select 1to1 Trd tracks to MC
← select primary MC tracks
← select 4 Trd hits tracks

→ positive values show no of hits to track
→ 0 show no hits even though there exists MC points
→ negative values show hits attached to NO ToF hits tracks