Preliminary Thoughts about CERN-Test Beam in October

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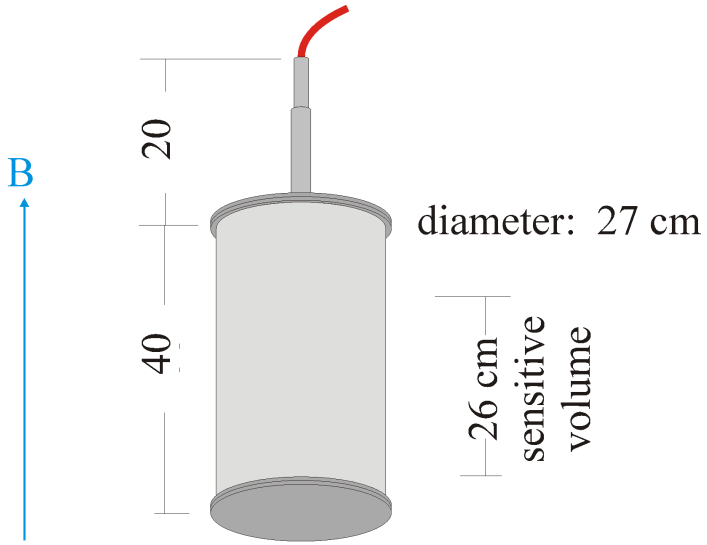
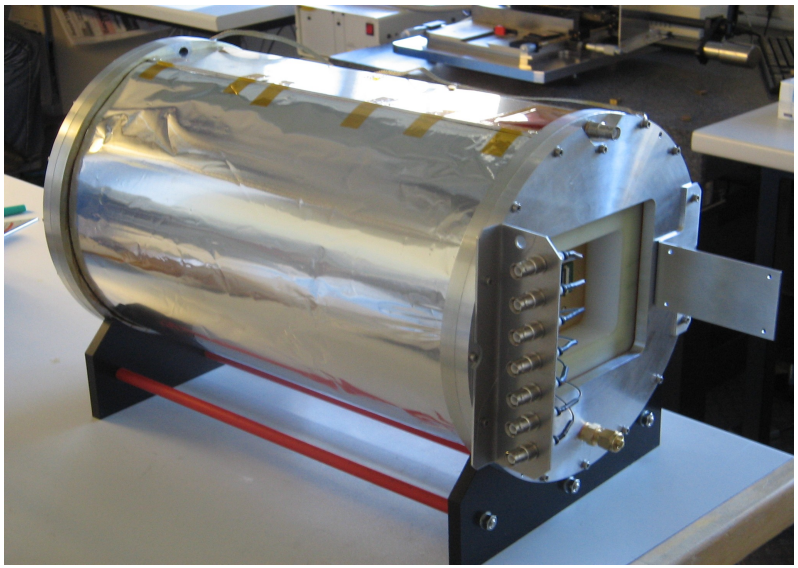
TPC Prototype at Bonn



readout endcap:
1-8 Timepix chips
possibly pads connected
to ALTRO electronics

Fieldcage:

- drift distance: 26 cm
- inner diameter: 23 cm
- material budget: 1 % X_0
- up to 30 kV => drift field of 1 kV/cm



Currently:

Ar : CO_2 70:30

E_{drift}: 500 V/cm

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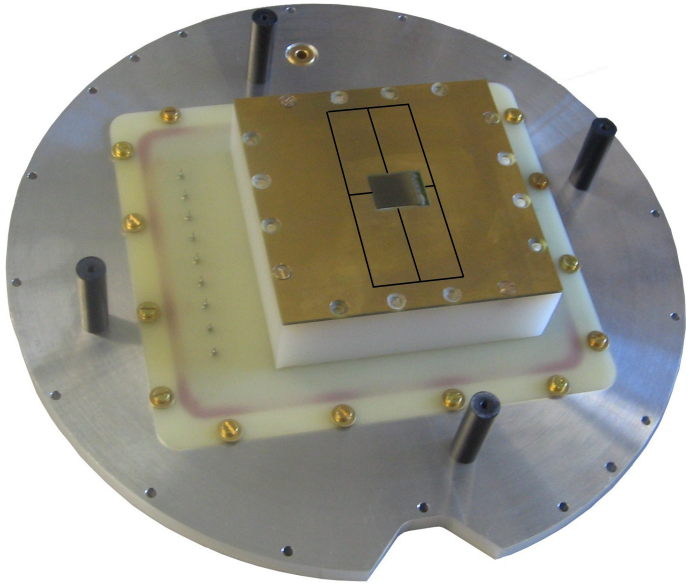
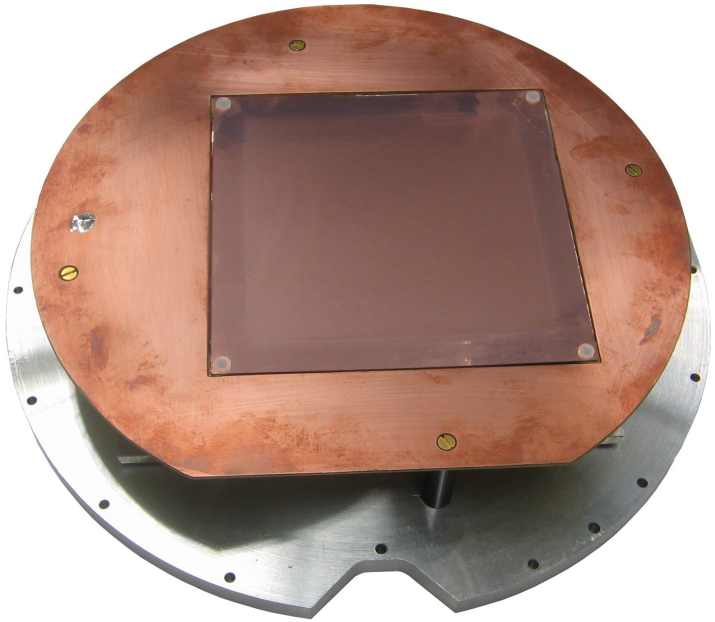
Gas Amplification and Readout





readout:

single TimePix chip

gas amplification:

3 GEMs 1mm apart

390 V across each GEM

transfer fields: 2.5 kV/cm

induction field: 3 kV/cm

Currently working on larger active readout area: 4 – 8 chips

+ regular pads conn. to ALTRO electronics

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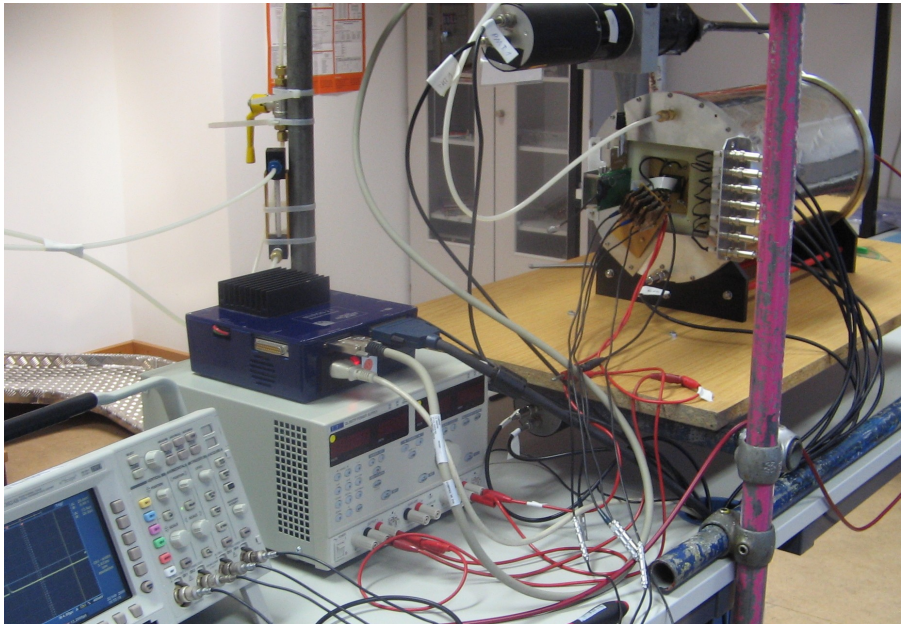
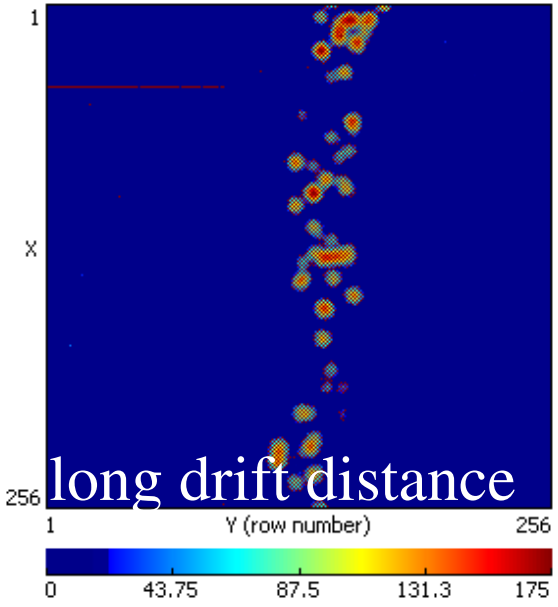
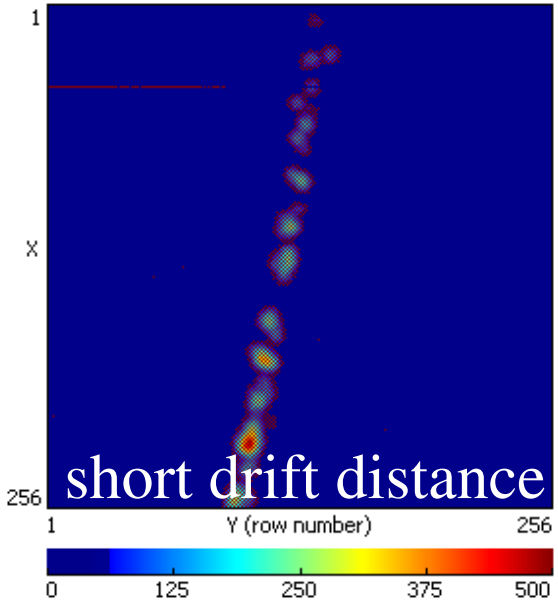
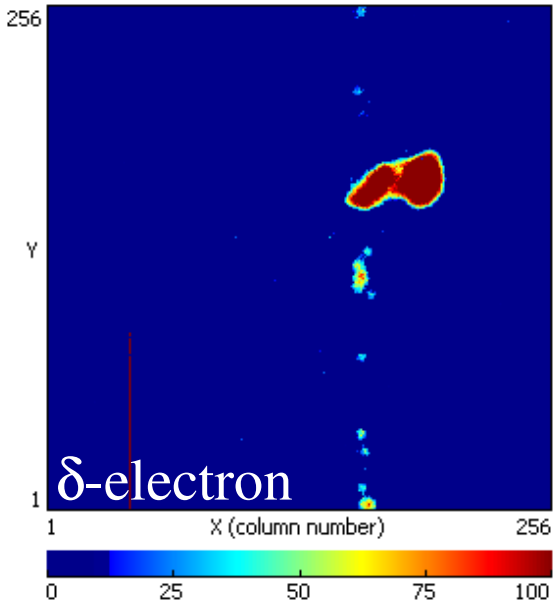
Test stand with cosmic rays









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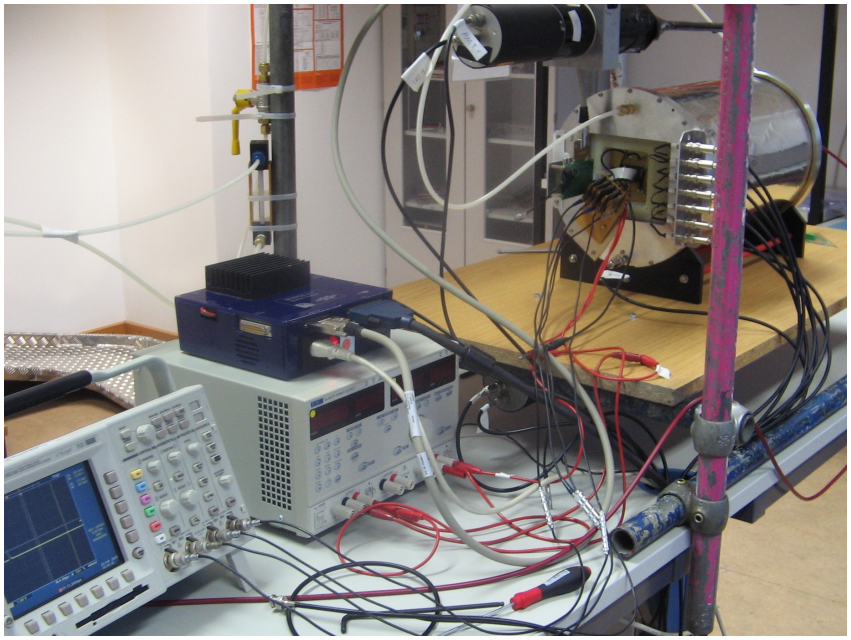
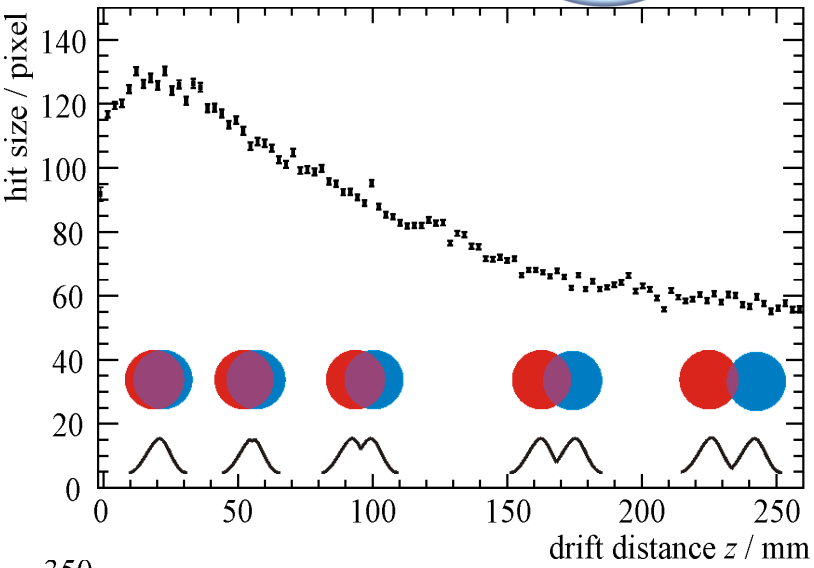
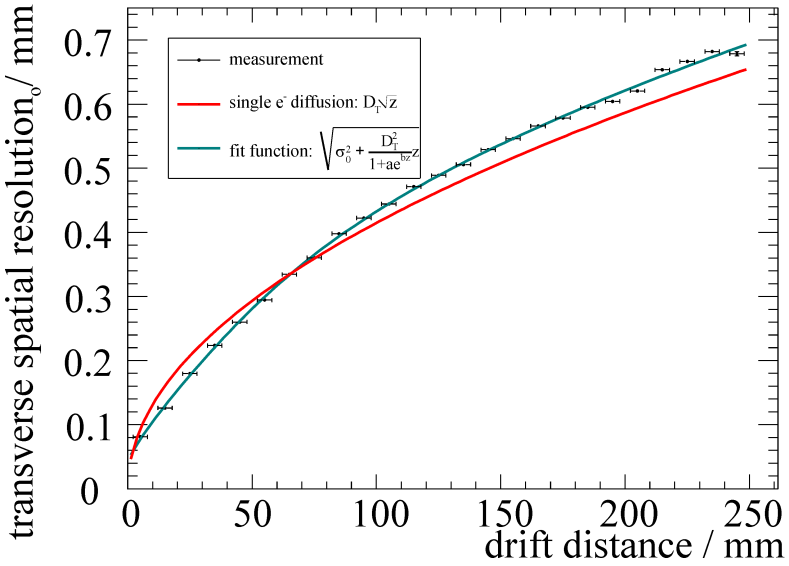
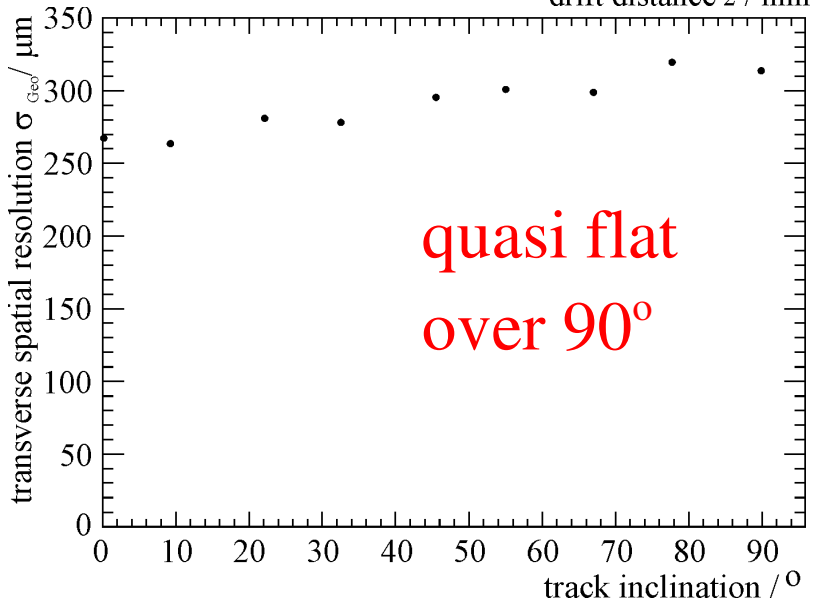
Bonn: Observation of Declustering



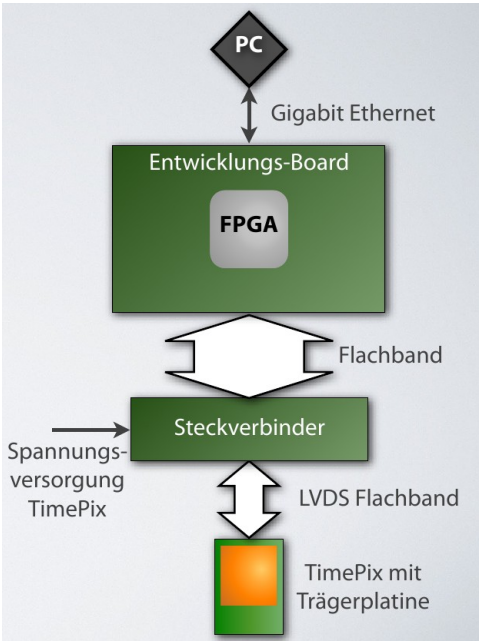




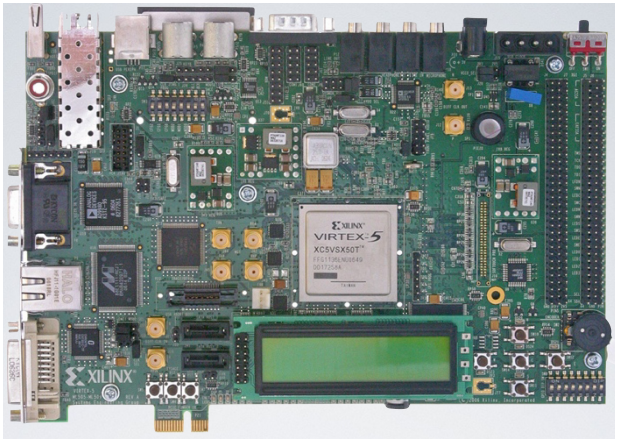


Mainz

Mainz is designing and building a new FPGA-based readout for Timepix chips.

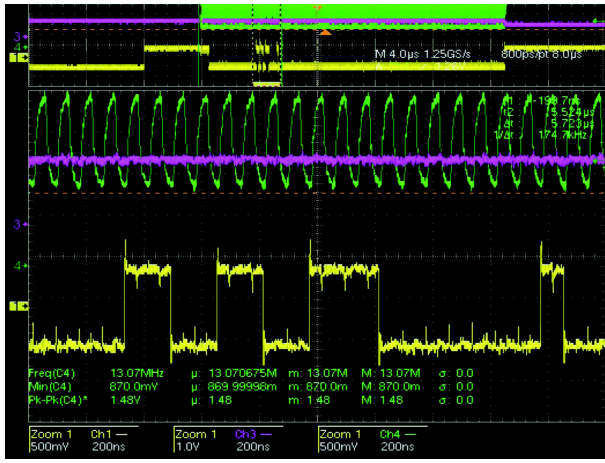


- Readout with maximum speed (100MHz)
- Connection to PC with Gigabit Ethernet
- FPGA:
  - De-/serialization of data streams
  - Conversion CMOS – LVDS
  - Firmware in VHDL



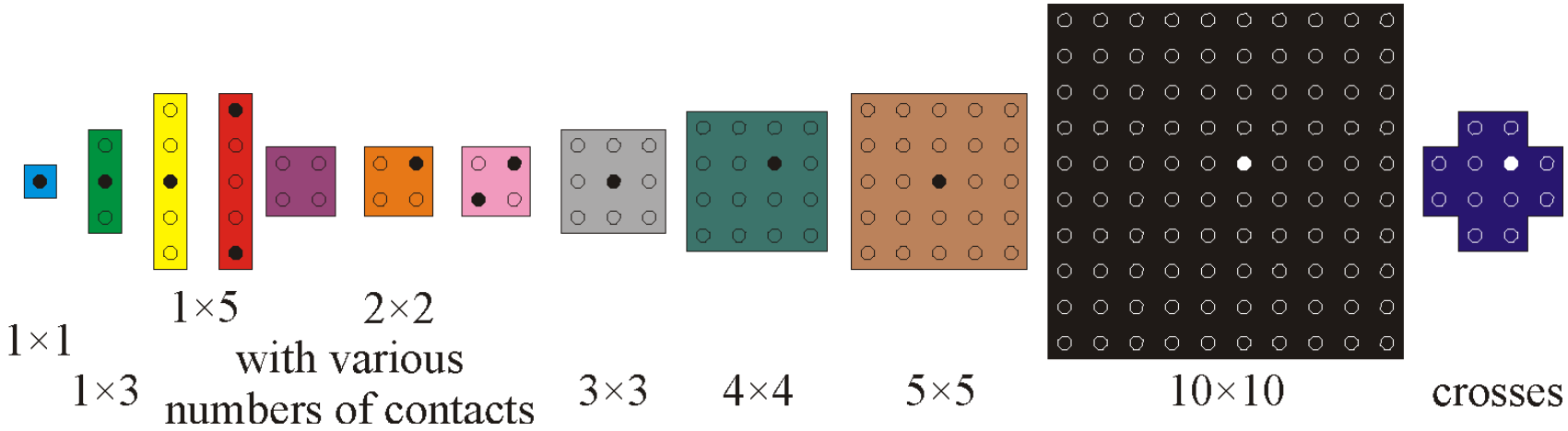
FPGA – development board

- Software and firmware are in good shape but some missing functionality until now
- Serialization and ethernet communication are correct
- Not at full speed yet (needs matching of clock to delayed data stream in Timepix)
- Problems with understanding Timepix docu. correctly



A vague plan for the test beam

Study pad enlargement: pixel size of 55µm*55µm seems too small to be operated with GEMs
Various pad sizes can be generated by combining pixels (Fraunofer Institut IZM, Berlin)



Study of track inclinations => detector should be rotatable

Possibly second small detector (30*30*10 cm³) for tests of industrially
Produced InGrids (Timepix + Micromegas)

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Requirements

Minimum requirements: Detector + Gas (which ??? don't know yet)
7 HV- channels up to 2.5kV (including cables)
1 HV-Channel up to ~20kV (including cable)
Trigger signal (usually from scintillator coincidence)
Readout electronics (several cable: LEMO + custom made)
High energetic particles (no multiple scattering moderate rate)

Nice to have: B-Field

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