STT Outlook (Discussion)

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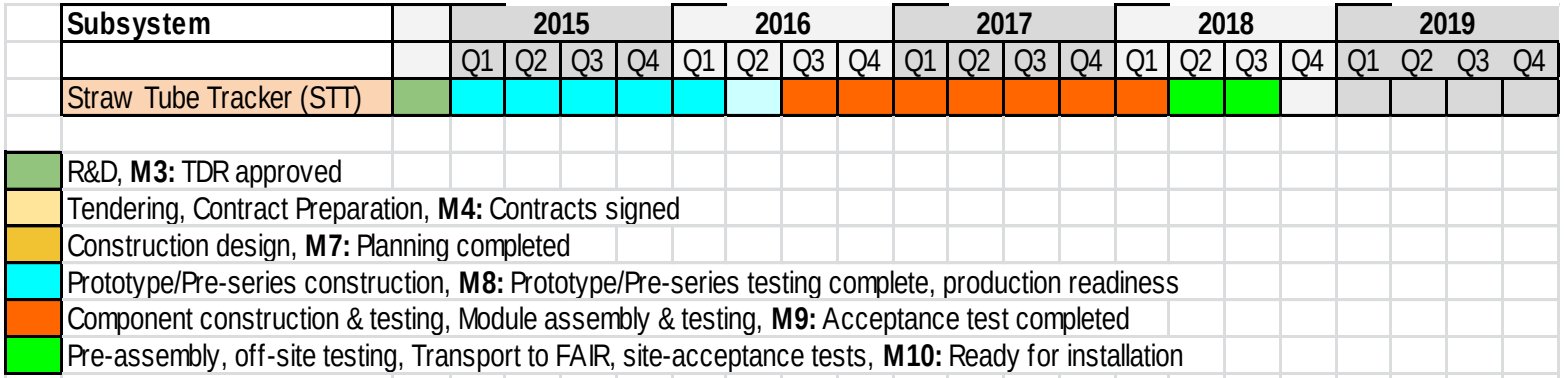
STT Outlook

- Project status
- Pre-series test (M8)
- Electronic readout decision
- Group interests

STT Project Status

- Funding partly established (to-date)
- General project funding depends on FAIR council decision (late summer) and PANDA future
- Pre-series test (M8) of STT is still planned and prepared under the current (to-date) funding situation for Q2/2016
- WPs with funding: straw & module production, electronic readout system
- WPs w/o funding: CF and STT frame system, gas system, (slow-control)
- ToDo: definition of test system(s), measurements & criteria (group & TC)
- Beam time requests to be submitted in Dec-2015 (beam times after Feb`16)



STT Status for Pre-Series Test

- Straw mass production and straw module assembly ongoing (in-line)
- Straw modules can be mounted in existing STT prototype frame (l=1500mm)
- Adjustment by frame adapters to new straw module dimensions (1400mm length, new radial positions)

- ASIC/TRB - readout
  - ~35 ASICs existing, next PASTTRECv1(2) production run in July (~ >100 ASICs)
  - Spare FE-boards for ASIC bonding existing, option: new FE-boards (analog out)
  - ToDo: verify PASTTREC design parameters (gain, peak time range, TC)
- FADC - readout
  - Amplifier circuitry (backend) & signal coax lines (12m) verified
  - ToDo: integration of amplifier & HV distribution in FADC board layout (space)
  - ToDo: decision on FADC chip (240MHz or 125MHz already sufficient)

STT Pre-Series Test

- Test systems & measurements & criteria to be defined (1st ideas, to be iterated)
  - Full system test: one STT sector (~700 straws)
    - Mount straw modules in existing prototype frame (adapt. to new geo.)
    - Front-end electronics & readout system & cable routing
    - Moderate beam intensity (avoid uncontrolled aging)
    - Cosmic tests (3D-tracking)
    - Straw modules can be used later in final system
  - High-rate readout beam tests: ~ 1-2 MHz / cm wire
    - 2 setups for FADC and ASIC/TRB readout, each min. ~192 straws
    - Same straw modules as in STT, quad-layer modules (24 straws/lay)
    - Mechanical precision tests of modules with beam
    - Straws can be not used later, due to rates up to ~100x PANDA-STT
- Simple gas supply system sufficient (premixed gas, constant flow)
- PANDA-DAQ not expected available, no high-rate readout (real-time tracking)

STT Electronic Readout Decision

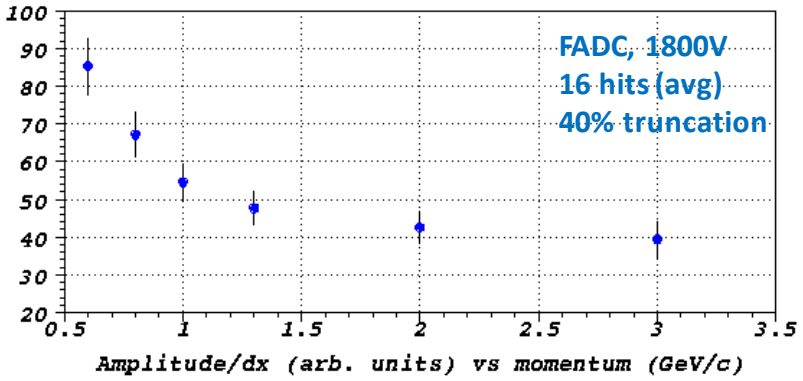
- Decision between both readout options for PANDA-STT required
- Criteria: performance results, system complexity, robustness, economics
- "Pre-series" beam tests as data basis (proton/deuteron beams)

- Group interest beyond this PANDA specific decision:
- Our readouts define new state-of-the-art straw readout: high time resolution, PID by dE/dx, high particle rates, broad signal dynam. range, triggerless, ..
- Finish both readout developments with publications
- Work out and finish the full readout system design
- Beam tests to produce final performance results
- Main investments done, readout & test systems available

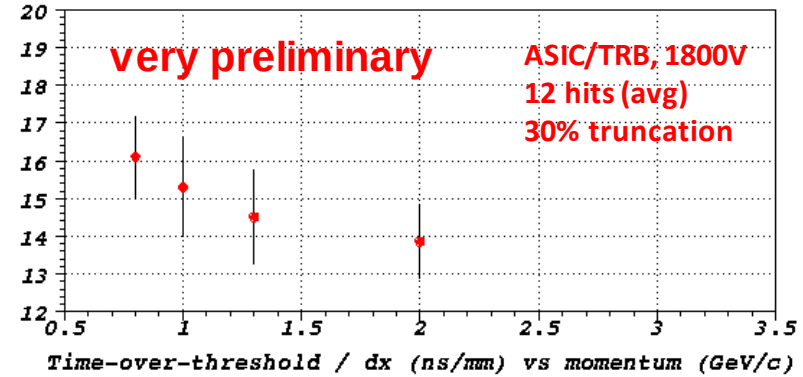
- Interest from other experiments
- Straw technology: µP-scattering (PSI), NuStar (vacuum straws), g-2@FNAL
- Expect serious future interest for our straw readout systems

STT Readout: dE/dx - Results (Pre-lim)

- dE/dx measurement by
  - signal amplitude (FADC)
  - signal width (time-over-threshold)
- dE/dx sensitivity demonstrated for both with beam



- First ToT/dx results, only preliminary
- Prototype ASIC: BL/gain dispersion (σ)
- Only ~12 hits per track (truncation lim.)
- First data analysis, optimization ongoing



- New PASTTRECv1-ASIC optimized:
  higher gain, broader peaktime range, global BL, ..→ ToT higher, less spread

Open Discussion