

# Tracking Session at CM L

chaired by Peter Wintz (FZ Juelich)


Tuesday, 9 September 2014 from **11:30** to **13:30** (Europe/Berlin)  
at **Laboratori Nazionali di Frascati ( Aula Seminari )**

## Tuesday, 9 September 2014

11:30 - 11:35 Welcome 5'

11:35 - 11:55 STT News & Activities 20'

Speaker: Peter Wintz (Forschungszentrum Jülich)

Material: [Slides](#) 

11:55 - 12:15 FEE-free FADC readout for the STT 20'


Speakers: Krzysztof Pysz (Institute of Nuclear Physics PAN, Krakow, Poland), Dr. Henner Ohm (Forschungszentrum Jülich)

12:15 - 12:35 Beam monitoring in July beam tests at COSY 20'

Speaker: Valeriy Serdyuk (Forschungszentrum Jülich)

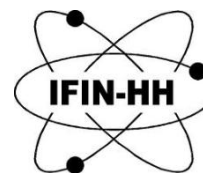
12:35 - 13:00 Beam Test Report 25'

Speaker: Peter Wintz (Forschungszentrum Jülich)

Material: [Slides](#) 



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# STT News & Activities

Peter Wintz (FZJ) for the STT group

L. PANDA CM, TRK session, Sep-9th, 2014

# Outline STT News & Activities

- Straw production
- Central frame structure
- Electronic readout systems
- Beam tests
- Data analysis

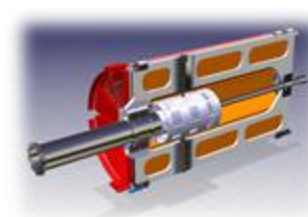
# Straw Production Status

- **Straw series production on track**
  - Next production cycle started last week
- **Straw module** assembly next (quad-layers)
- **Straw layout** final freeze soon
  - Straw pitch defined by (pressurized) straw diameter and glue gap
  - Slight change of pitch from 10.10 mm → 10.14 mm(?)
  - Inner straw diameter (pressurized) ~ 10.07 mm
  - Definition of all 4600 straw positions

# Mechanical Frame Structure

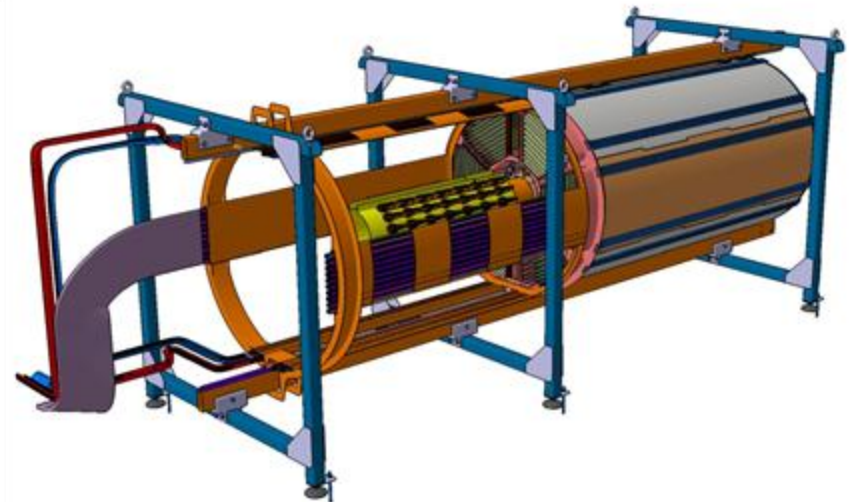
- **STT mechanical frame**

- Include final straw (module) layout
- Gas manifold pipes, FEE-boards, ..



- **Central frame (CF) structure & rail system (prototype)**

- CF for beam pipe + MVD + STT
- Ship from Frascati to Juelich
- System checks, test mountings..
- Workshop tomorrow



# Electronic Readout Systems

- Two readout systems under study (prototypes, ~ 100 channels)
  - ASIC / TRB: time readout, dE from time-over-threshold
  - FEE-free FADC: sampling amplitude readout (pulse shape), dE from ampli. sum
- Optimisations of systems ongoing (both readouts)
  - Shaping parameters (peak time, ion-tail cancellation, baseline restoration, ..)
  - Verify time and dE/dx resolution with data (cosmics, beam), full data analysis ..
  - FADC sampling frequency options (240MHz ↔ 120MHz)
- Buildup of larger systems ongoing (1<sup>st</sup> version systems)

## Readout Systems (contd)

- Time-over-threshold - ASIC / TRB readout
  - ASIC chip design finished (by AGH-Krakov)
    - Re-design (iteration) of ASIC (prototype with some identified mal-functions)
    - PASTTREC = PANDA STT RE<sub>adout</sub> C<sub>hip</sub>
    - CMOS 0.35 $\mu$ m, 8 ch per chip
    - Additional analog signal output for tests
  - Chip production submitted (July)
  - FEE-boards designed and in production (Krakov)
    - New: ASIC control by TRB-FPGA, at prototype by USB
    - Analog output for tests (not in final design / more compact size there)
  - TRB3 boards (10 $\times$ ) ordered (tests & set up in Krakov, Jag. Univ.)
  - (Aim to set up next readout version for Dec-2014 beam time)

## Readout Systems (contd)

- FADC readout (FEE-free)
  - Direct cabling to straws by 12m coax (HV stable,  $\varnothing \sim 1\text{mm}$ )
  - Amplifier back-end
  - 1<sup>st</sup> test in July beam week (32ch) successfull
  - More channels in progress (128ch)
  - Next step: integrating amplifier in/to FADC board

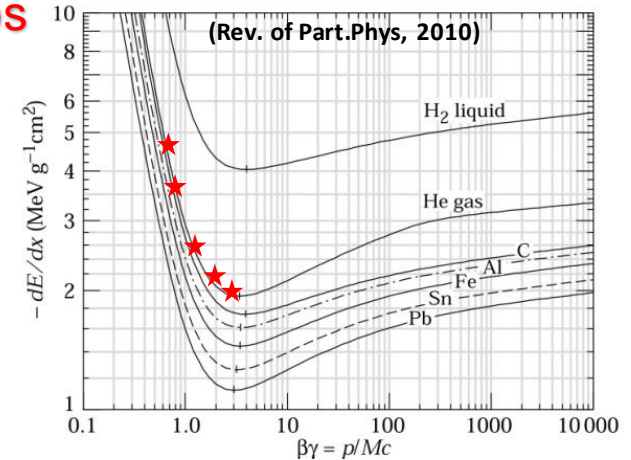
*→ More in Krzysztof's talk ..*



# Beam Test Series in 2014

- Goals

- Pid: proton / deuteron separation** in momentum range 0.6 – 3.0 GeV/c
    - ~ p / K separation task at PANDA < 0.8 GeV/c
    - Cover **full dynam. signal range: ~ 5×mips**
    - dE/dx reconstruction (non-linear fit)
    - By time-over-threshold / amplitude
    - ~ **5× different proton momenta**
    - ~ **3× different deuteron momenta**



- Readout tests & optimisation**

- Determine time resolution & dE/dx resolution with data
    - Verification / optimisation of electronic parameters (shaping, ..)
    - Full data analysis needed: timing, calibration, hit filters, tracking, ..

# Beam Test Series in 2014

- Schedule: **3x1 week** allocated for STT tests
  - July 18<sup>th</sup> - 25<sup>th</sup>, protons: 0.6, 0.8, 2.95 GeV/c (**done!**)
  - **Oct 13<sup>th</sup> – 20<sup>th</sup> (CW42)**, deuterons, 3x diff. momenta (**next!**)
  - Dec 1<sup>st</sup> - 8<sup>th</sup> (cw 49), protons, 3x diff. momenta
- **Two straw setups / two readouts & DAQ systems**

# Data Analysis

- Analysis of cosmics & beam data ongoing
  - FADC-data: Krakov & Pavia
  - ASIC/TRB-data: Krakov & Julich
- Similar straw setups in-beam
  - Exchange observations, analysis methods, results, ..
- Full analysis chain required
  - Hit/event filtering, calibration, tracking
  - Background identification (beam related, ..)
  - Determine time & dE/dx resolution ↔ verify electronic parameters

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  - Hit/event filtering, calibration, tracking
  - **Background identification** (beam related, ..) current, burning issues ..
  - **Determine time & dE/dx resolution ↔ verify electronic parameters**