

STT Status & Plans

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55. PANDA CM, Vienna, Dec-4th, 2015

Outline

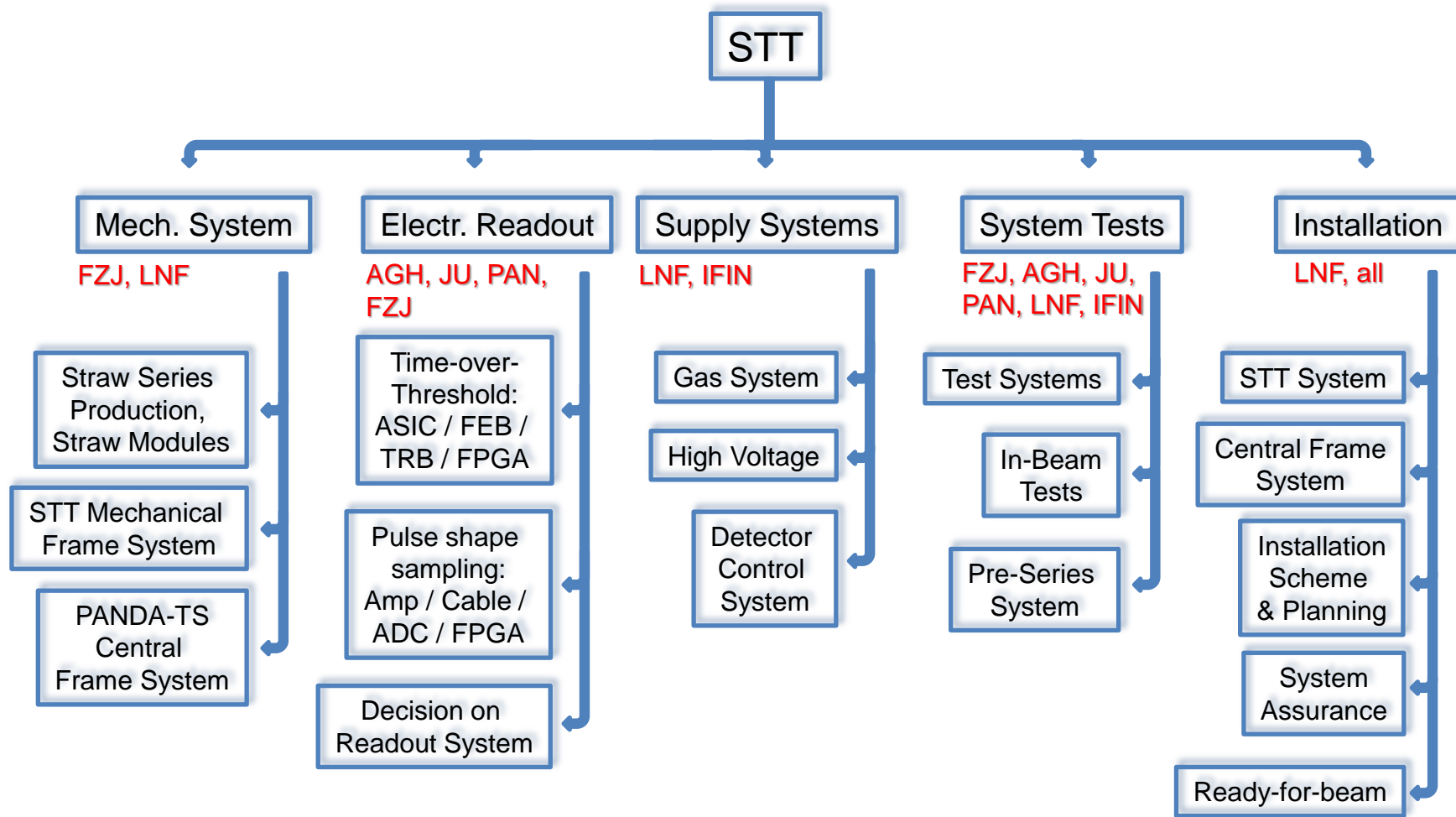
- Status of WPs
- STT timelines
- Beam tests
- Milestone loaded schedule
- STT Status

Organisation of WPs

- Mechanical system (straws + frame system): FZJ, LNF
- Electronic readout system: AGH, JU, PAN, FZJ
- Supply systems & detector control system: IFIN, LNF

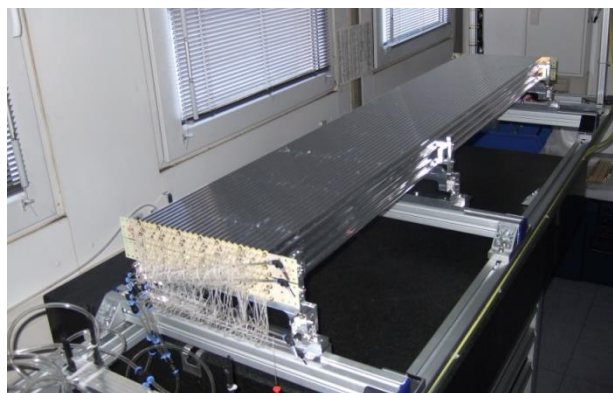
- System tests
- Installation processes

WP Organisation

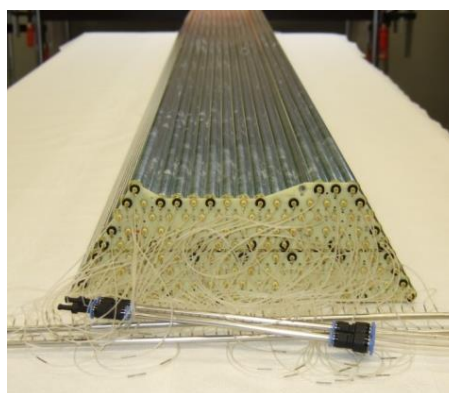


WPs: Straw Series & Module Assembly

- Institute: FZJ
- Straw series production ongoing as scheduled, no delays
- Aim to finishing series production in 2017, incl. spares, test system straws
- Straw modules (quad-layers, final pitch) assembled, ready for next beam tests
- All sector modules for STT pre-series test to be assembled till end 2016
- Mounting of STT sector modules in Prototype Mechanical Frame (LNF)



New straw setup (two quad-layer modules) for in-beam tests



Two inner quad-layer modules of the STT.



STT prototype mech. frame (LNF) shipped to Juelich

WPs: STT Mechanical Systems

- Institute: LNF (FZJ)
- STT frame and system design, STT gas system, Central Frame System
- Resources pending (~ 32% of STT budget)
- Man power stalled, engineering stopped in 2015
- Aim for official resume of activities and funding avail. in 2017, but connected to general PANDA / INFN situation

- STT Mechanical System & Central Frame System design frozen (Mar '15)
- Reminder: system integration with target pipe, **MVD**, backw EMC, ..

- FE-electronics and all cablings will be finally fixed after STT readout decision, aimed for Q2/2017
- Final STT mech. frame design incl. cable routing in 2017
- Cope with current frame design freeze and resume LNF activities in 2017

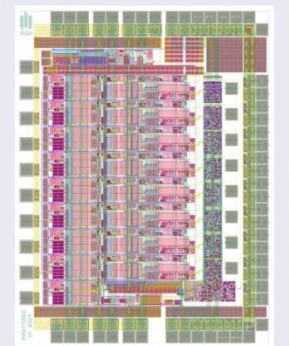
WPs: ASIC/TRB Readout

- Institutes: AGH, JU, FZJ
- Time and time-over-threshold readout
- STT specific ASIC (PASTTRECv1), FE-boards & TRB3 readout system avail.
- Tests in next beam time (Feb 2016), verification/tuning of ASIC parameters
- Option: 2nd ASIC version (PASTTRECv2) with 2-comparator stage, new FEBs may be available by end 2016

ASIC design by AGH

PASTTREC: A new 8 channels ASIC for STT & FT

Layout – 1.95 × 2.6 mm²



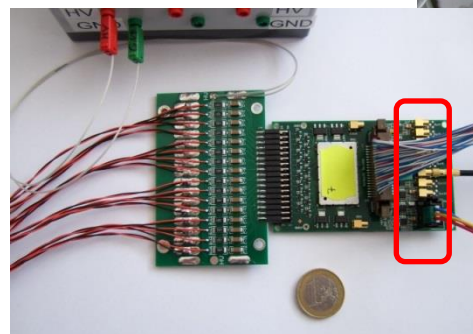
Improvements

- New faster amplifiers
- Redesigned BLH circuit: Baseline dispersion below 35 mV_{p-p}
- 5 bit DACs added to trimm baseline (2 mV accuracy)

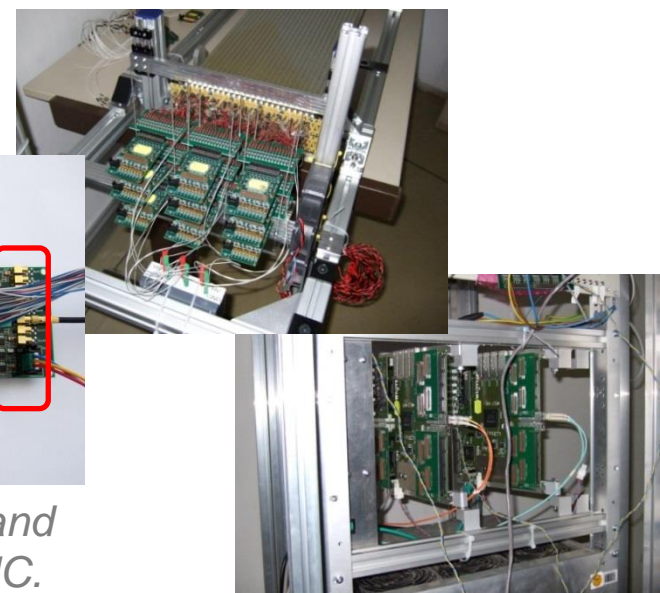
Performance

- Total power 34.2 mW/ch
- Gain in range of 1 to 7 mV/fC
- T_{peak} of ~17, ~23, ~39 and ~64 ns
- ENC below 3000 e⁻ for highest gain and 25 pF of C_{in}.

Dominik Przyborowski PASTTREC: A New 8-channel ASIC for STT & FT



HV coupling board and FE-board with 2 ASIC.

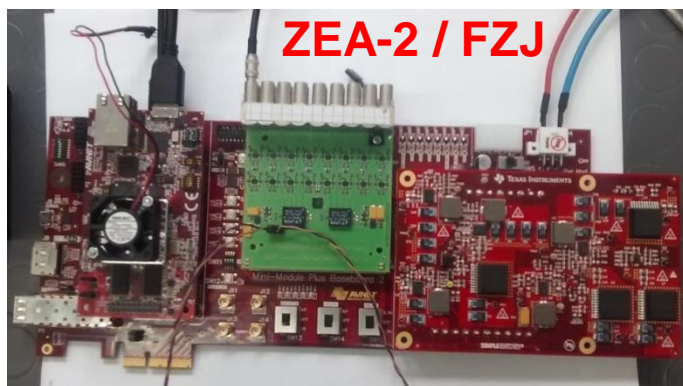


FEBs at test system (top) and TRB3 readout (lower)

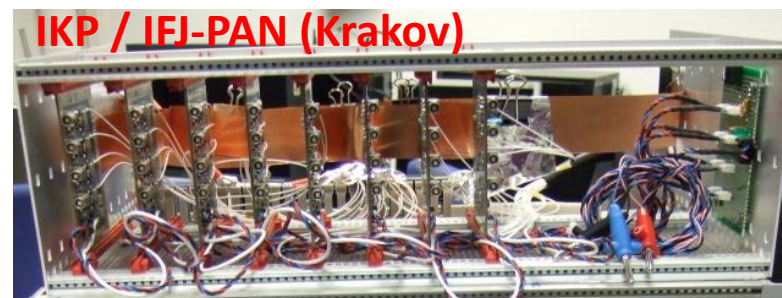
PASTTRECv1 parameters

WPs: ADC-based Readout

- Institutes: ZEA2-FZJ, PAN, IKP-FZJ
- Time and pulse integration by pulse shape readout
- Front-end electronics free readout, amplifier & HV distribution backend
- Activities stalled during summer, re-started now
- Delay for pre-series ADC-based readout system of ~ 1 year
- ADC type (LTM9011-14) determined in 2015 (in-beam tests)
- Next: amplifier / ADC integration, HV distribution, all backend



Testboard (green) with two ADCs and FPGA readout board (red)..



Prototype setup of backend amplifiers.

WPs: Slow Control and DCS

- Institutes: IFIN Bucharest, LNF
- HV-System, (Gas system) Slow Control, Detector Control System
- Activities stalled during summer, resume now
- Connected to gas system, components prepared by LNF

WPs: Pre-Series Tests

Proposed test systems & tasks:

- **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
 - Cosmic tests (3D-tracking)
 - Only moderate beam intensity (no uncontrolled aging)
 - Straw modules can be used later in final system
- **High-rate readout in-beam tests:** ~ 1-2 MHz / cm wire
 - 2× setups for ADC and ASIC/TRB readout, each min. ~192 straws
 - Similar straw modules as in STT
 - Quad-layer modules (16-24 straws per layer)
 - Mechanical precision tests of modules with beam
 - Straws can be not used later due to rates up to ~100x PANDA-STT

Upcoming STT Timelines

- 2016: Construction of Pre-series STT system (one sector)
Straw test systems for high-rate in-beam tests
Pre-series electronic readout systems, both ROs
- Feb. 2016: Beam test, 1 week, deuteron beam, high-rate readout
- April 2016: **Readout workshop in Krakau**, readout status reports,
definition of criteria for STT readout decision
- End 2016: 1st pre-series tests planned, in-beam, both readouts
- Early 2017: **Completion of pre-series in-beam tests**,
data basis for readout decision
- Q2-2017: **Decision on STT electronic readout system**

Upcoming Beam Tests

- Feb-2016 (allocated):
 - 1 week deuteron beam, 3× diff. momenta, high-rates
 - 2x straw setups, 1× new setup with final straw pitch and STT straws
 - ASIC/TRB3 readout (PASTTRECv1), ADC readout
 - New experimental area & setups
- Nov-2016 (requested):
 - 2 weeks proton beam, 6× diff. momenta, high rates
 - 1st pre-series STT in-beam tests
- Q1/2-2017 (propose):
 - 2 weeks proton/deuteron beam
 - dedicated pre-series STT readout tests, high-rates
 - data basis for readout decision

STT Milestone Loaded Schedule

	'13	'14	2015				2016				2017				2018				2019				2020			
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Straw Tube Tracker			○							M8	○											M9			M10	

- R&D, **M3**: TDR approved
- Tendering, Contract Preparation, **M4**: Contracts signed
- Construction design, **M7**: Planning completed
- Prototype/Pre-series construction, **M8**: Prototype/Pre-series testing complete, production readiness
- Component construction & testing, Module assembly & testing, **M9**: Acceptance test completed
- Pre-assembly, off-site testing, Transport to FAIR, site-acceptance tests, **M10**: Ready for installation
- Funding Milestone

- 2nd Funding milestone needed for INFN contrib. (~ 32 %), aim for Q2/2017
- Design of Mech. Frame Systems currently frozen, extension of constr. period
- Delay of ~ 1 year to our original schedule
- STT ready for installation in Q3/2020

STT Status

- STT financing: 68% secured financing and 32% pending (Italy)
- MP discontinuity in 2015:
 - LNF (mech. systems), aim to resume funding & activities in 2016/2017
 - Pavia (simu & analysis, tracking), situation unclear
 - ZEA2-Juelich (ADC readout), will be resumed in Jan 2016
- Temporary staff / students leaving to be replaced
- Two new PhD students from KVI Groningen (data analysis, pre-series test)

Thank you
for
your attention