

STT Status Update

- STT
- PANDA/HADES Phase-0

Nov-6th, 2019 | Peter Wintz for the STT Group

STT Workpackage List



Assigned WPs (in-kind contracts)

1. Straws series & modules, integration, FoS readout (FZ Jülich) →
2. Electronic readout system incl. data concentrator (AGH/JU Krakow) →
3. Detector control & HV system & LV system (IFIN-HH Bucharest) → talk by Stefan G.

Unassigned WPs, no funding (former EoI INFN)

4. STT mech. frame & cable routing cage
5. Gas system

Further WPs

6. SW, real-time: data processing, track & event association, ..
7. SW methods: calibration, tracking, PID
8. In-beam tests & analysis → talk by Gabriela P.
9. System installation

Phase-0

10. Straw station STS1 @ HADES → talk by Pawel K.



Activities Since Last CM



- 28. June: Installation (Interactive) Workshop PANDA-TS
 - Integration of installation procedures for all systems in TS
 - STT: Q3/2023 construction completion, Q1/2024 installation in TS
- 6. Sep: Central Systems Mechanics Meeting
 - Components: Central Systems Frame, Beampipe, MVD, STT
 - Requirements and integration, open points, ..
- 23. Sep: HADES Collaboration meeting
 - Straw stations STS1/2 installation planning
 - Synergies: PASTTREC ASIC for HADES-MDC, ASIC-TRB5 readout board
- 9. Oct: Pre-mounting new STS1 frame in HADES
 - Mech. system approval

Upcoming Activities in 2020

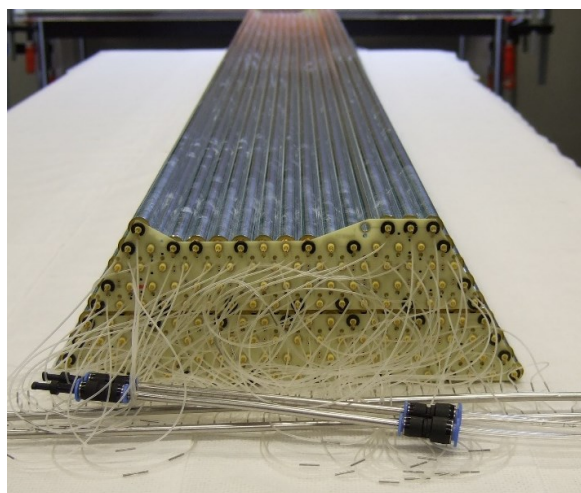


- – Jan '20: STS1 and DAQ set up in Julich, system tests, cosmic data-taking
- Feb '20: Installation of STS1 system in HADES
- May '20: Testbeam for HADES

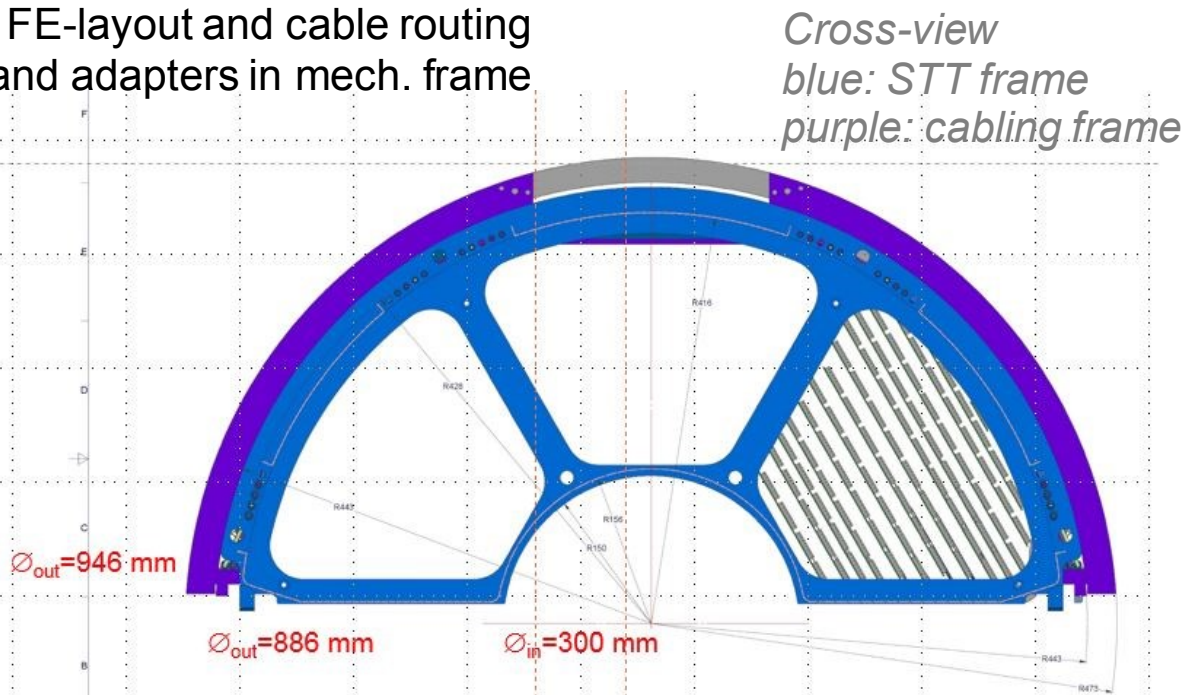
- 2020: Set up one complete STT sector in prototype frame

WP: Straws & Modules

- Straw module production will start soon!
- **Radial STT dimension to be frozen asap:** $\varnothing_{\text{inner}} = 300\text{mm}$, $\varnothing_{\text{outer}} = 886\text{ mm}$
 - Radial geometry defined in steps of closed-packed layer distance (8.78 mm)
- **Binding agreement with MVD, DIRC, CSF responsible required**
 - MVD temperature/fluid shield (?)
- Assembly of one STT straw sector in prototype frame in 2020
 - Completion of layout incl. FE-layout and cable routing
 - Straw module alignment and adapters in mech. frame



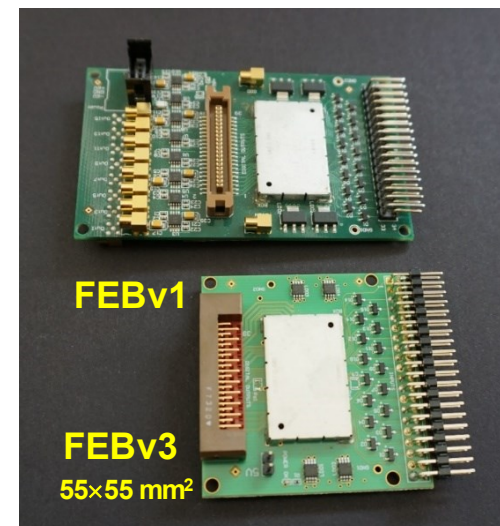
Two innermost STT straw modules



WP: Electronic Readout



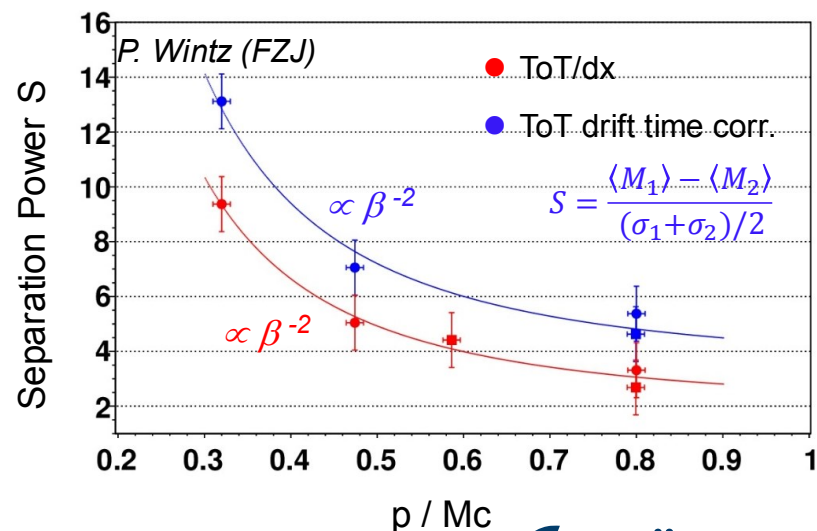
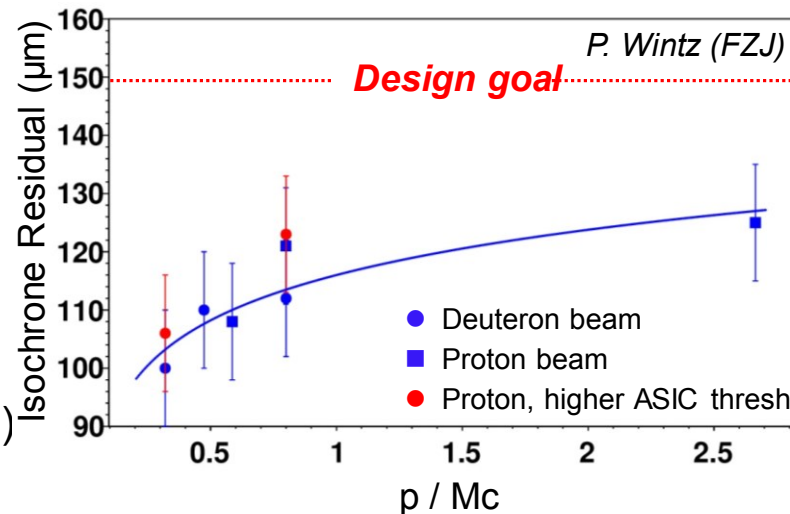
- **In-kind contract** for AGH/JU Krakow sent to FAIR, **waiting for final signment**
 - Remind: WP is STT & FT combined readout, ASIC/TDC incl. Data Concentrator
 - ASIC submission time-critical, **AMS CMOS 350nm technology expiring**
- **Synergies with HADES-MDC**
 - New option: PASTTREC chip housing, FEB production by GSI/Uni Frankfurt
 - TRB5 next generation, integrated ASIC/TDC RO-board for MDC in development
- 56x new PASTTREC ASICs re-ordered (FZJ) from last MPW run in 2017
- Phase-0:
 - PASTTRECv1, FEBv3 & TRB3 available (~ 1800 channels)
 - Identified broken TRB3 HW, repair & replacement (GSI)
 - DAQ system set up ongoing for STS1 in Juelich
 - PASTTREC BL tuning (auto script by Krakow)
 - Channel tests, ..



WP: In-Beam Data Analysis



- STT design resolution & PID demonstrated
 - Isochrone resolution: $\sigma < 130 \mu\text{m}$
 - p/π separation: $p/\text{MIP} \sim 4\sigma$ @ 0.8 GeV/c
- Further analysis ongoing (G. Perez)
 - Global calibrations & tracking (dE/dx unbiased)
 - PID observable/method
- Inputs to simulation (hit digitization)
 - Drift time & ToT, smearing
 - Isochrone resolution, $r(t)$ parametrisation
 - Tracking methods (hit filter, δe -tracks, ..)
 - ToT observable for PID ..

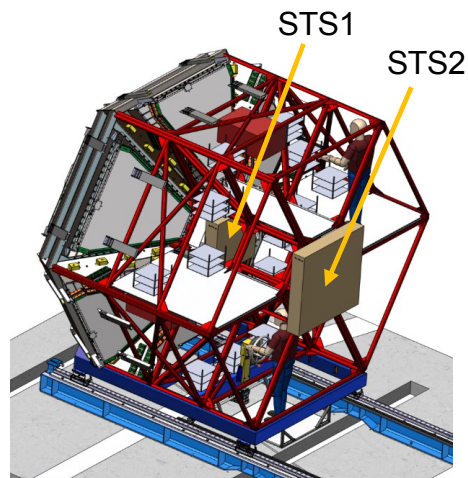
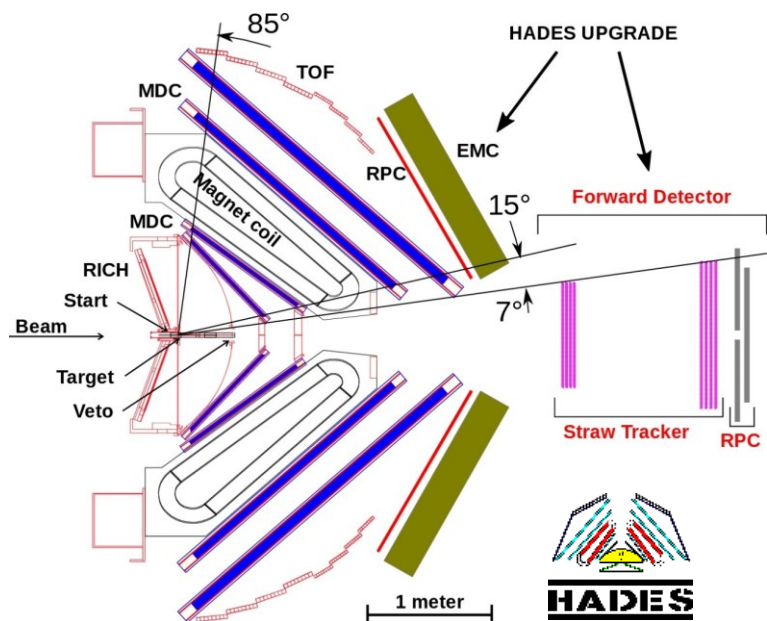


→ simulation contact person required

Reminder: Phase-0 STS@HADES



- Experiment program: hyperon radiative and Dalitz decays with HADES at SIS18
- Upgrade by two forward straw tracker stations (STS1/2) for small polar angles $\theta < 7^\circ$
 - STS1 by Julich STT group
 - STS2 by Krakow FT group
- Later use of STS1/2 modules in PANDA – FTS 3/4 and 5



HADES upgrade by two forward straw tracker stations (STS1/2), RPC and DAQ..

STS1 @ HADES Timelines



Task	2019							2020		Remarks
	J	J	A	S	O	N	D	J		
Mech. system	■	■		■	■					
Mech. frame re-design & production	■	■	■							
Straw module QA			■	■						Leakage & HV (shorts)
Module assembly in mech. frame				■	■					Final positioning w/ data
Mech. frame pre-mounting at HADES					8.					Positioning w/ laser
Cables and electr. distribution boxes					■					Manufacturing
STS1 system assembly					■					
DAQ & electronics			■	■	■	■				
TRB3 firmware and control SW			■	■	■					5x TRB3 (4+1)
TRB3 inspection and repair verification			■	■	■					Spares from HADES
Channel tests, PASTTREC tuning					■	■				BL / thresh., ⁵⁵ Fe
System pre-tests w/ data-taking						■	■	■		
Cosmic data-taking						■	■	■		
Calibration w/ data & analysis						■	■	■		Reco tracks
Straw positioning & alignment							■			Reco tracks, ⁹⁰ Sr
Transport & installation at HADES								■		Gas system required

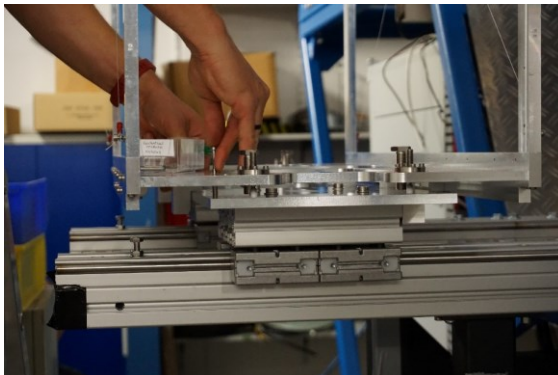
STS1 Frame



- STS1 mech. frame re-design was necessary (now by Artur D., IKP)
 - Carrier-plate on bottom rails, rails installed by Orsay group
 - Bottom base-plate, horizontally/vertically adjustable
 - Two rectangular (window-type) thin frames, each for mounting 2 double-layers
- Production of components done during summer



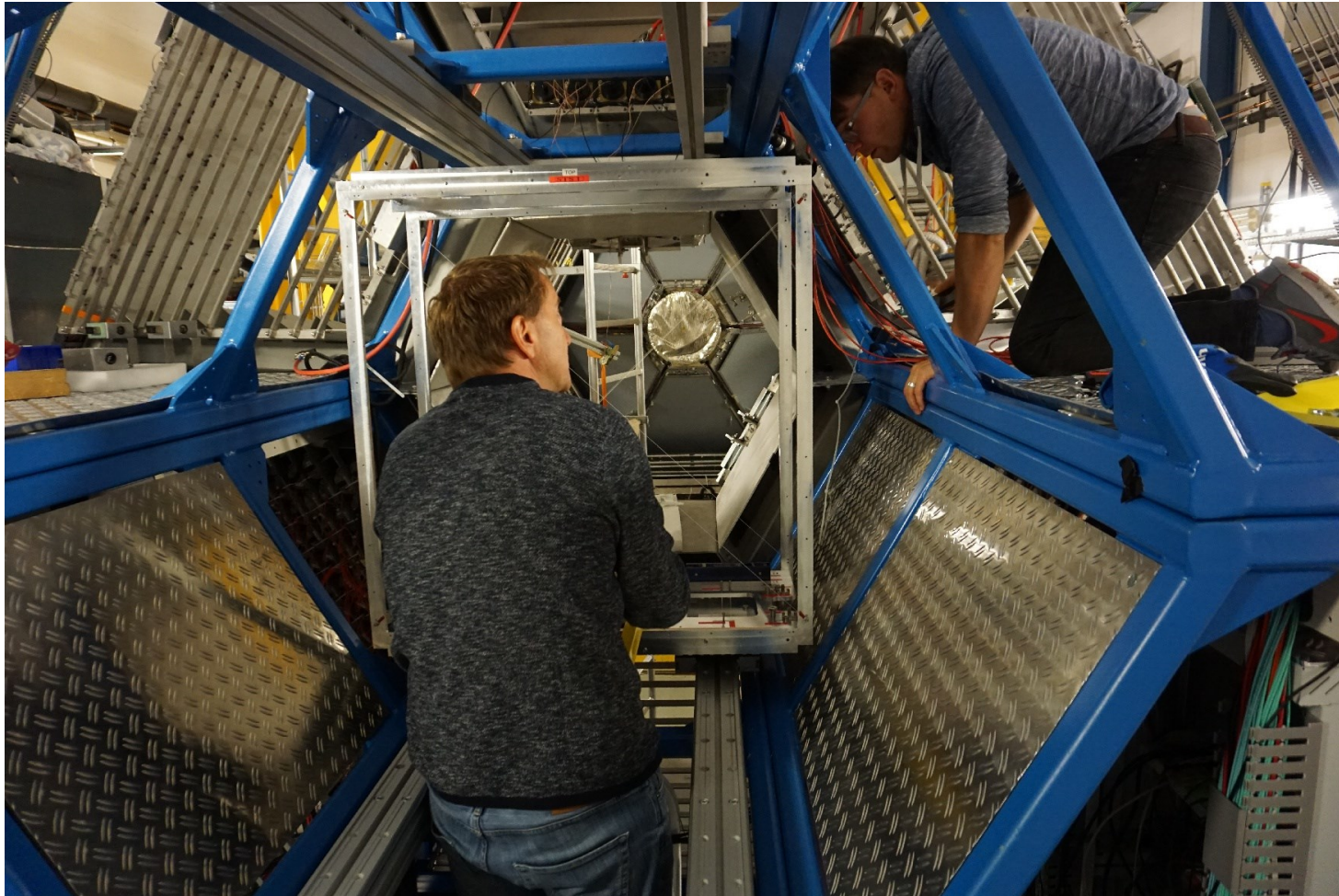
Pre-mounting of STS1 mech. frame in HADES ECAL frame (blue profiles)



STS1 Frame Mounting



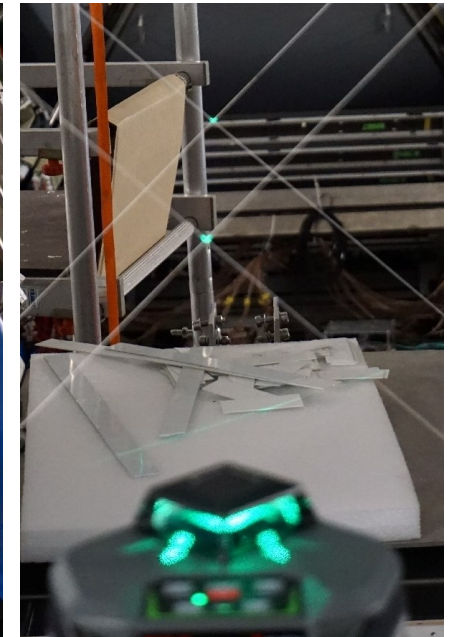
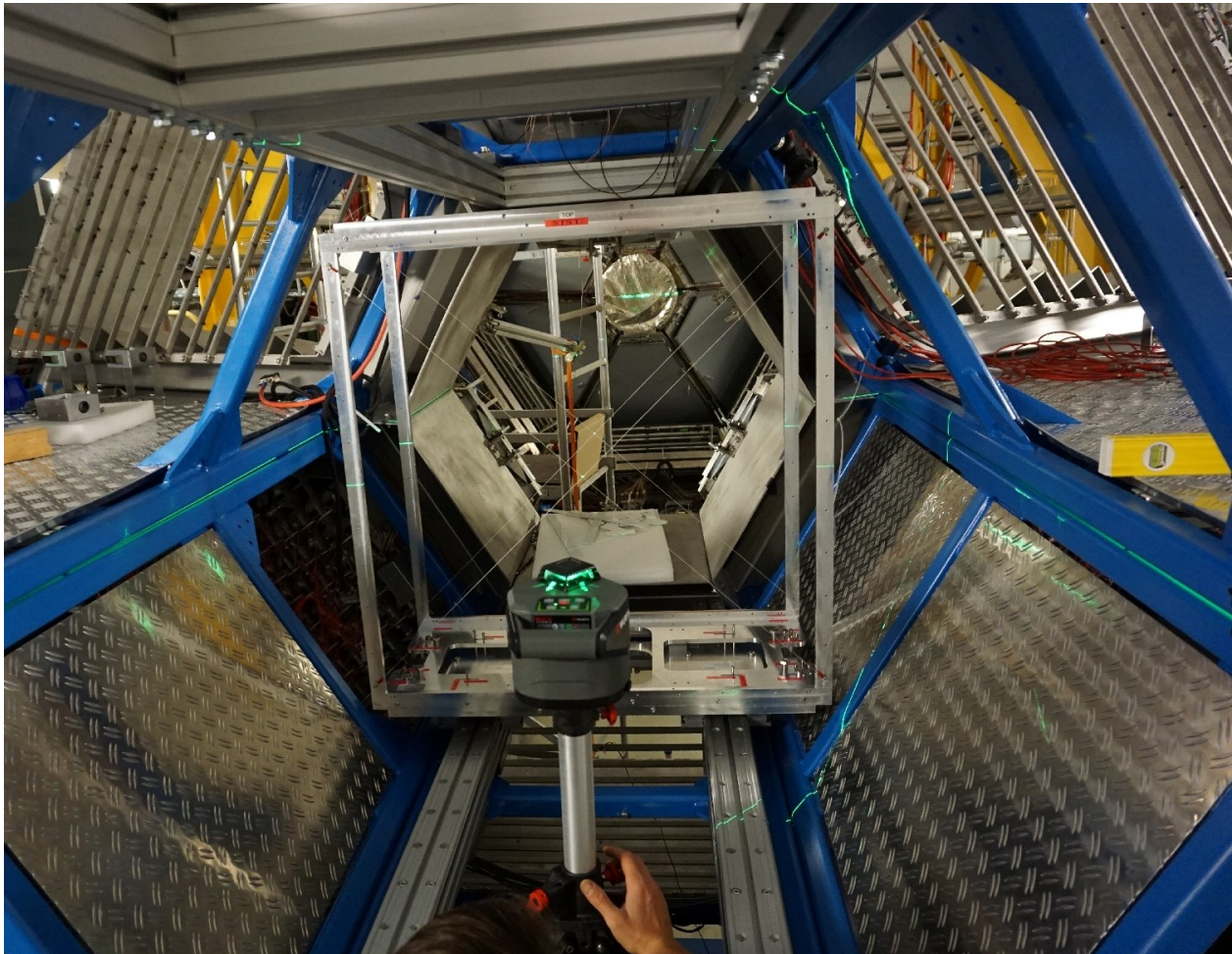
- 1-2 cm distance between STS1 corners and ECAL frame
- Cable-routing at detector front-end challenging



STS1 Frame Alignment



- Laser alignment of front/back STS1 frames (crosslines)
- STS1 mech. system approved



STS1 System Assembly Status



- Completion of all cabling soon
- Next: detector tests with running DAQ
 - Cosmic data-taking (Nov-Jan)
 - PASTTREC BL tuning (auto script by JU)
 - Module alignment



Vladimir K. watching you

STS1 side-view (left) and from front (above)

Thank you

for

your attention