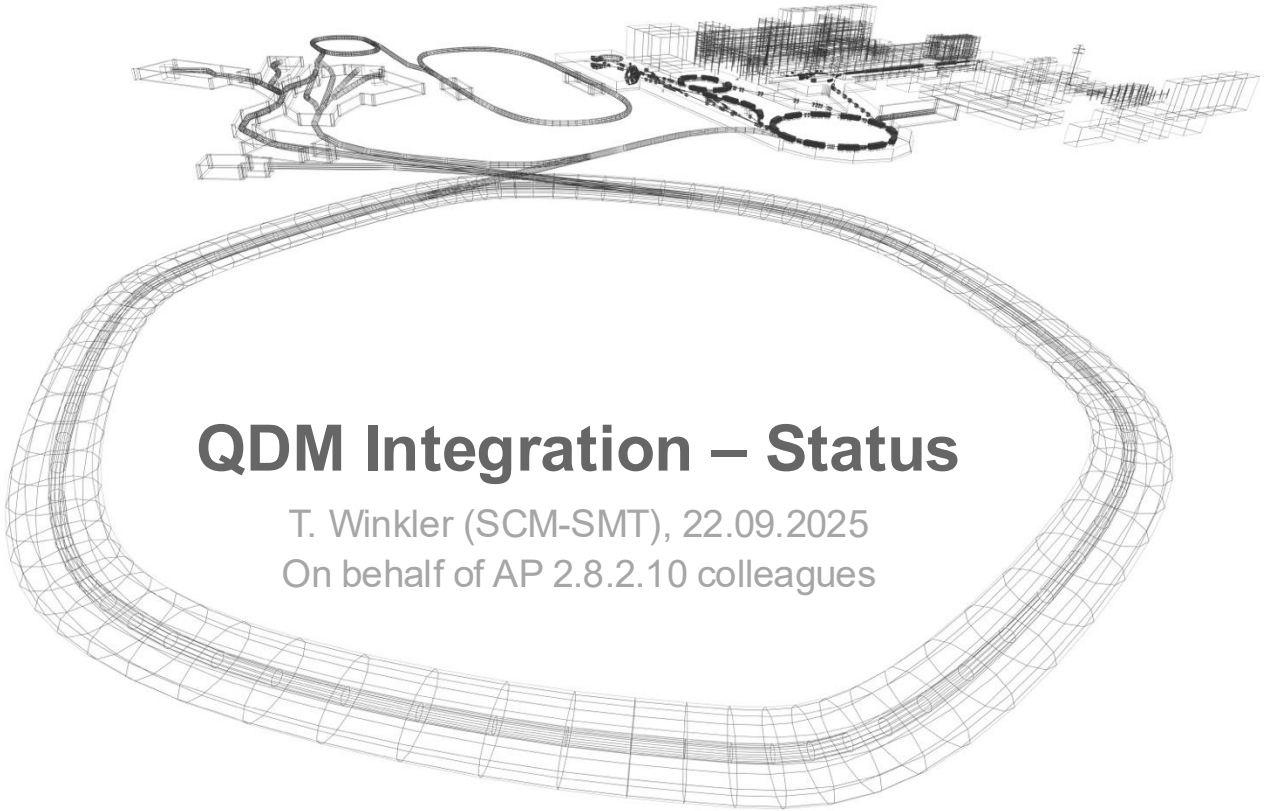


QDM Integration – Status

T. Winkler (SCM-SMT), 22.09.2025
On behalf of AP 2.8.2.10 colleagues

Current Status

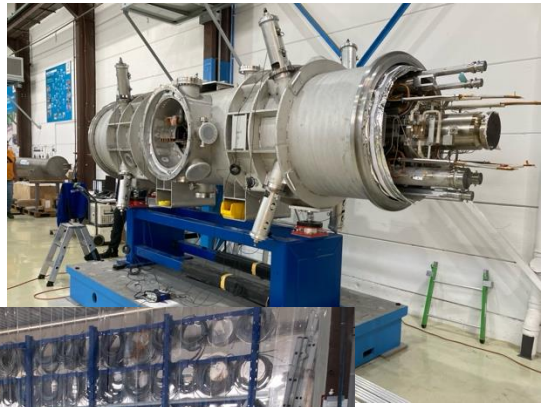
Before integration stop we had:

- 5 QDM type 2.5 (6 are needed)
- 8 QDM type 1.7B (12 are needed)

These all have a FAT and a SAT approved.

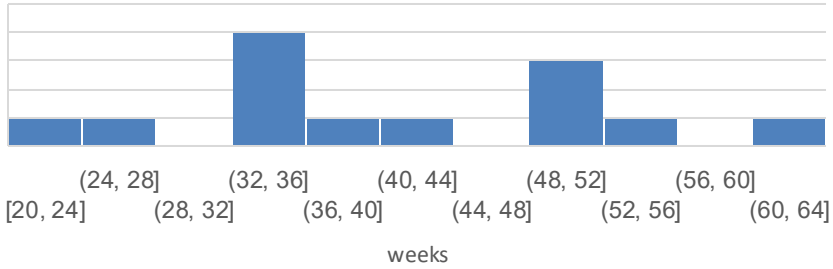
Series integration has restarted in 08/24:

- 5 more unit deliveries were received:
  - 4 QDM type 1.7B (2 deliveries)
  - 11 QDM type 1.6A (3 deliveries)
- 5 modules with FAT acceptance
- 3 modules with FAT declaration

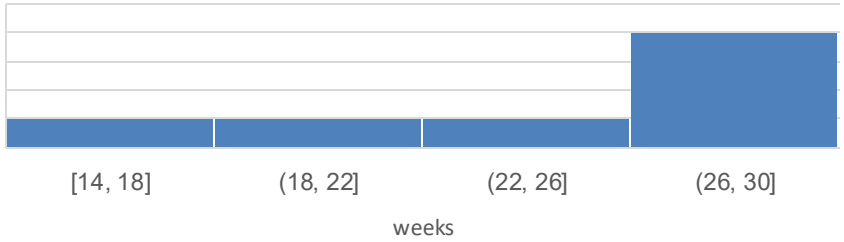


Integration duration

- Pre Integration stop (~40 weeks)



- Post Integration stop (~ 24 weeks)



Integrations speed has picked up

Planning is for **12 weeks** per module, the speed has to increase even more

Coordination between GSI and BNG due to technical issues takes a lot of time.

Problem: Integration **can't run without GSI interference**, we need holding points during integration

Technical issues so far:
leaks in UHV system (4 in total, not solved)

Plan vs. Reality

- Integration needs much more interference from GSI
  - SAT Aa takes 3-4 weeks compared to 1-4 day
    - SAT Aa
    - Bandage, Removal of rust
    - Backfitting of changed design
    - Electrical Tests
    - Always small changes
  - Trouble shooting takes time
    - Identify problem, Discuss, Procure pieces, Solve (UHV-Leak, Alignment)
- JINR
  - QPU deliveries are delayed
  - Customs take time
- BNG
  - People are on vacation
  - Dependent on GSI for trouble-shooting
  - Very linear integration process (little flexibility when changing order)
  - Leak tests take very long

All together 4-5 months delay

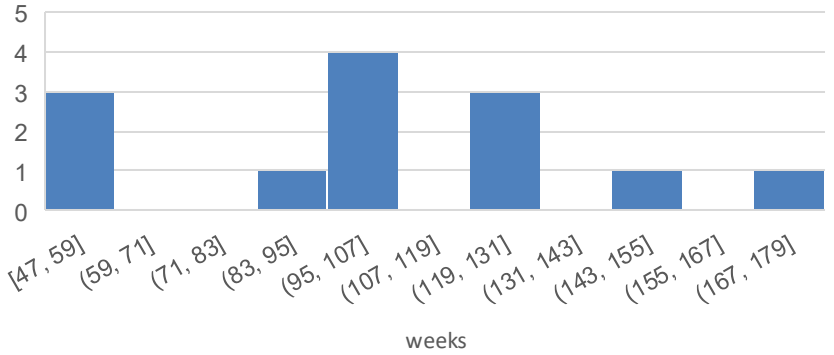
Lieferplan QDM 26.03.2024

Basis: Unit Plan vom 21.02.2024

Jahr	2024		2025		2026		2027		
Monat	Units	QDM	Units	QDM	Units	QDM	Units	QDM	
Januar				1	8	2	8	2	
Februar				2		2		2	
März			8	1	8	2	8		
April	4			2		2		2	
Mai			8	2	8	2	8	2	
Juni				2		2		2	
Juli	Go!		8	2	8	2	8	2	
August	2	2.5		2		2		2	
September	4		8	2	8	2	2	2	
Oktober				2		2		2	Ende VA30
November			8	2	4	2		2	
Dezember	8	1		2		2		1	
Summe	**18**	**0**	**40**	**21**	**44**	**24**	**34**	**21**	**136** Units
									66 QDM

SAT duration

- Two test facilities: STF (1 bench for QDM) and THOR (1 bench)
- Typical SAT duration Pre-Stop (> 1 year), 1st cold cycle finished 15 weeks after FAT acceptance)



- Typical SAT duration Post-Stop:
  - No SAT acceptance Post-Stop.
  - First module came 11.12.24 to GSI

Technical Issues:

- First QPUs since restart of production in JINR
- Thorough testing necessary:
  - #50-4 has ”suspicious” steerer
  - #51-1 has “suspicious” steerer
- THOR is upgrading facility to 2 benches

Crystal ball

- Current delay is not caught up, further delays not accounted for
- time from QPU release to FAT acceptance: ~18 weeks, speed up by 25%
- time from FAT acceptance to SAT acceptance: ~ 20 weeks, speed up by 75% (to keep up with integration)

Assuming: speed up as above, no additional delays (on top of 4 months), no counter measures, only series QDM difficulty

- Last delivery of QPU in 12/27
- Rough estimation: delivery of last QDM in **12/28**, then installation follows

Challenges

Technical:

- UHV leak problem
- Steerer performance

Organizational:

- Increase throughput
- Find solution for straight module testing.
- Design of injection and extraction modules is not finished.

Installation: SAT approved modules are not the end

- installation is tricky
- then work in the tunnel begins:
- positioning
- welding
- **leak testing** (UHV, process pipes and insulation vacuum)
- commissioning can begin

- Questions?