



COMPASS polarized target for Drell-Yan program

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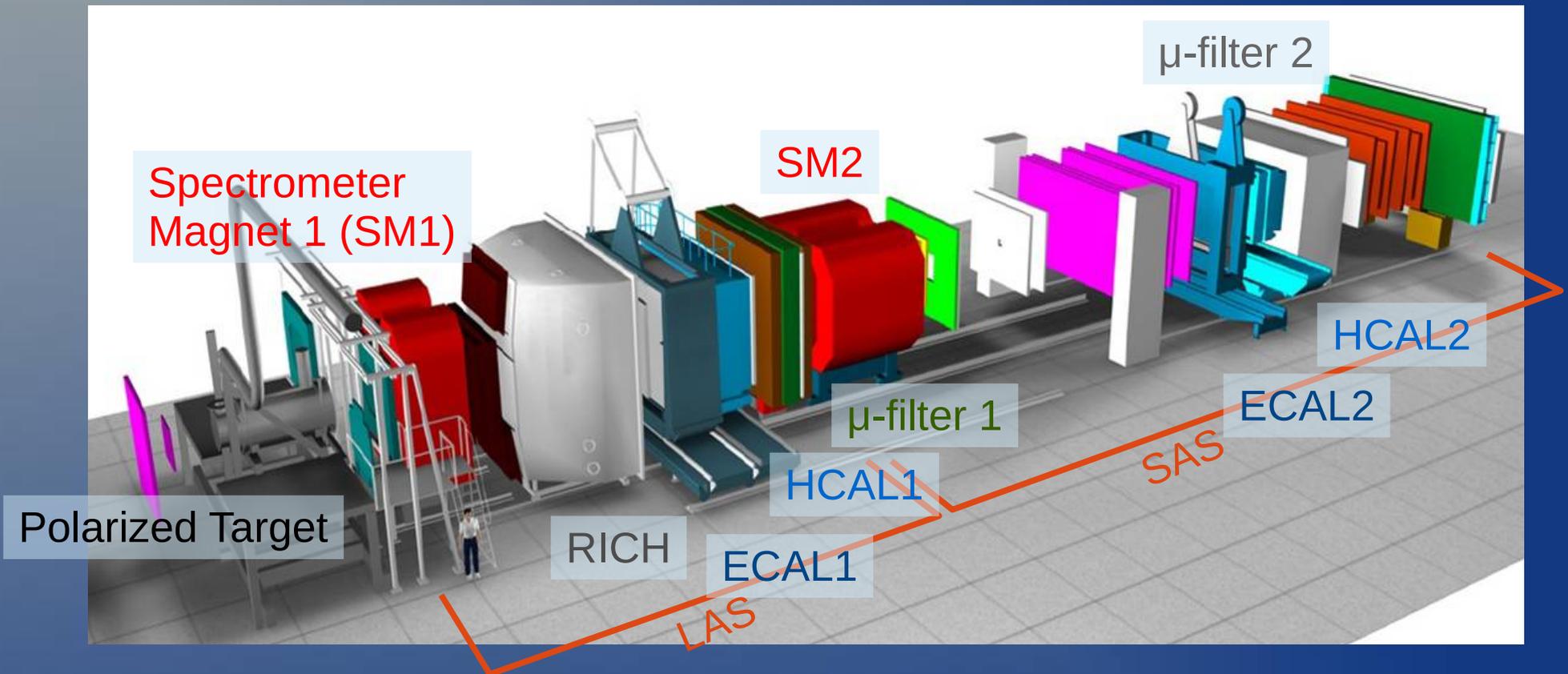


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- PT during the 2010 & 2011 Runs
- Drell–Yan program at COMPASS
- PT for the COMPASS Drell–Yan program
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COMPASS Experiment at CERN

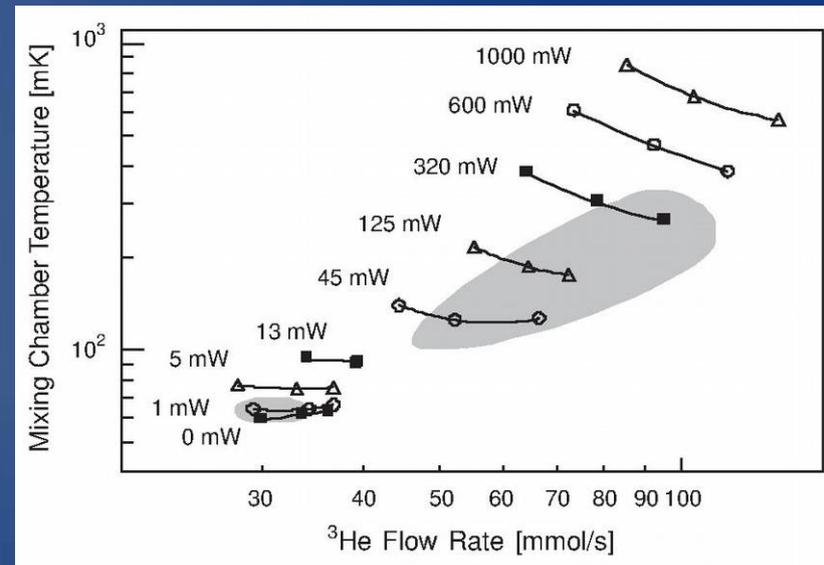
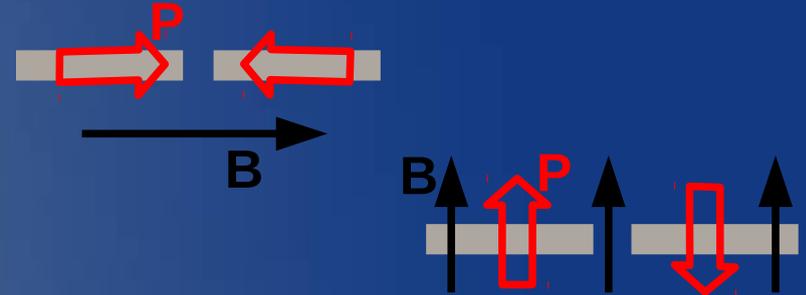


- Fixed target exp. on M2 beam-line at CERN North area, at SPS
- Both muon and hadron beams (up to 280 GeV), various targets
- Physics program: nucleon spin structure & hadron spectroscopy
- 2-staged spectrometer (LAS, SAS), good PID (tracking, calorimetry, RICH, muon detection)



COMPASS Polarized target

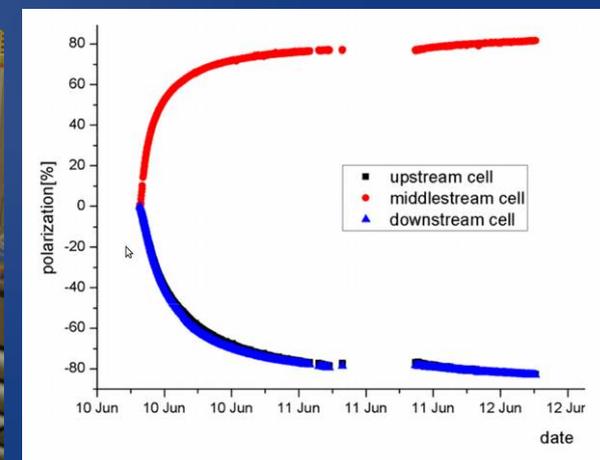
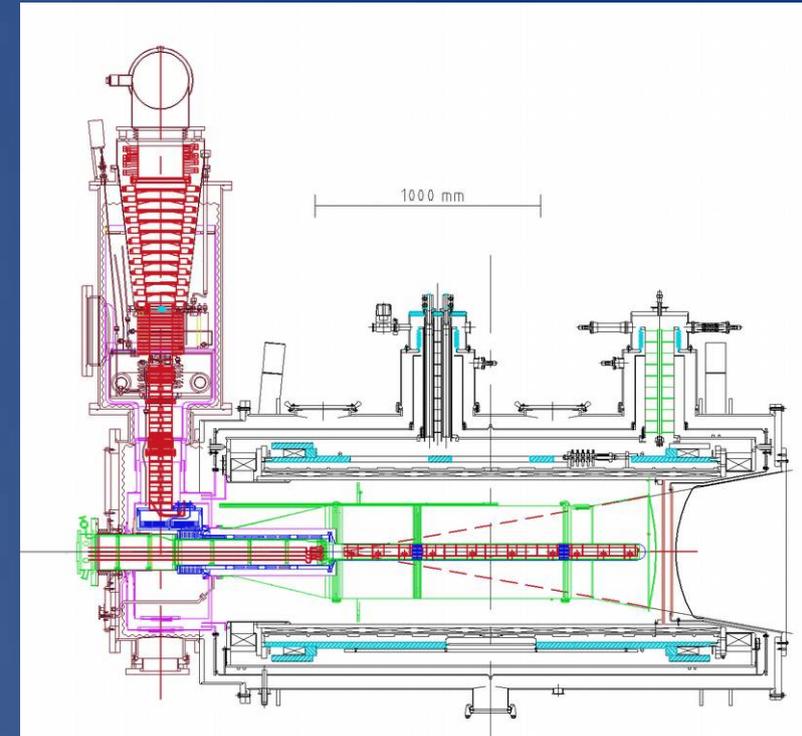
- SC 2.5 T solenoid & 0.65 T dipole magnets
 - Both long. & transv. Polarizations
 - Polarization rotation to reduce systematics
- One of the most powerful dilution refrigerators (DR) in the world (5 mW @ 75 mK)
- Polarized by DNP at ≈ 0.5 K
- „Frozen spin mode“ at ≈ 50 mK
- Polarization measurement: continuous-wave NMR (multiple coils & Q-meters)





PT during 2010 & 2011

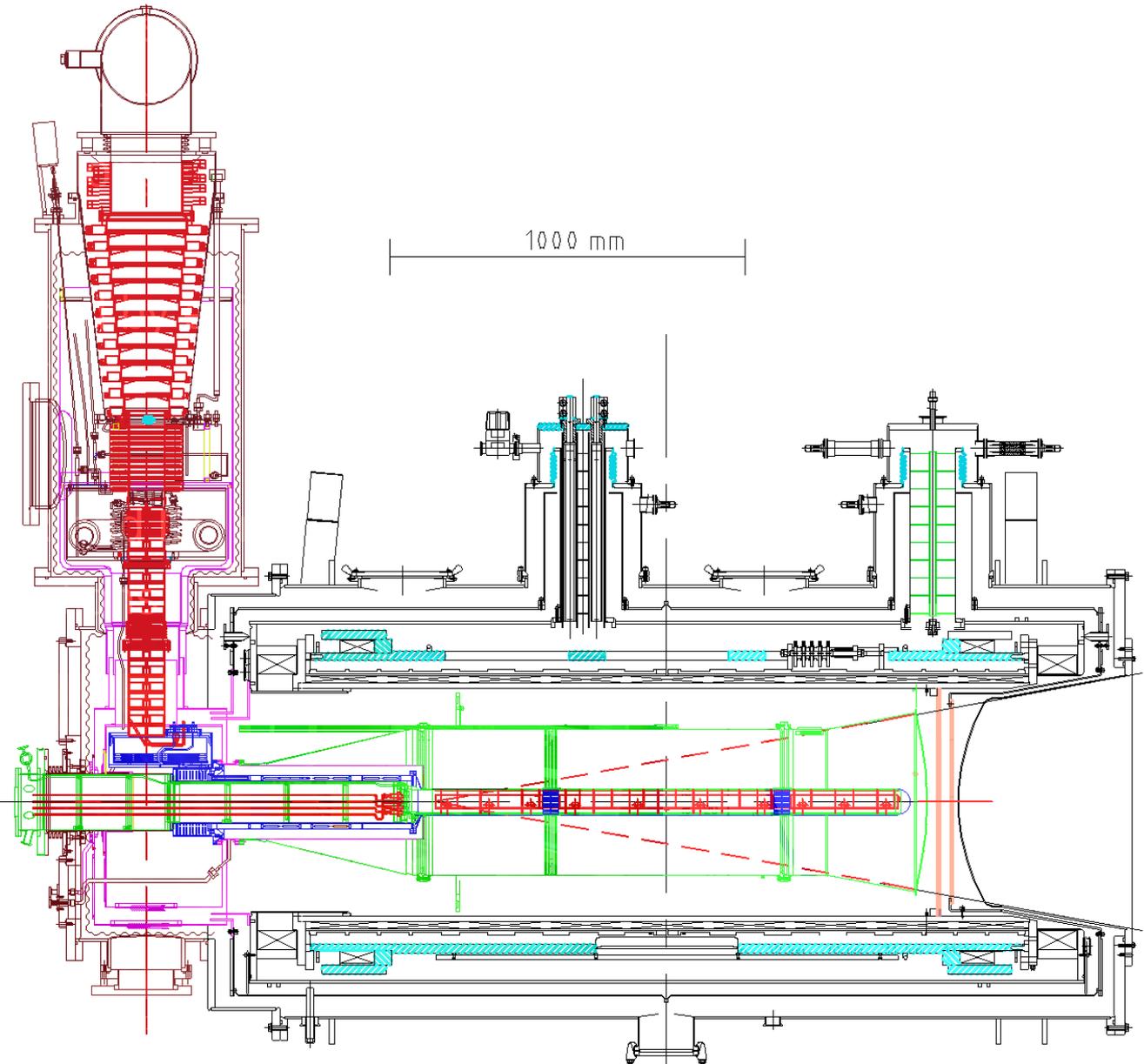
- Running with muon beam (intensity 10^8 s^{-1})
- 3-cell design (30-60-30 cm), 4 cm in diameter
- 2 microwave stoppers, 5 cm long
- Target material: solid NH_3
(NH_2 radicals for DNP induced by e^- irradiation at Ruhr University, Bochum)
- 10 NMR coils
- LabVIEW software for NMR and DR monitoring
- Both long. & transv. polarizations
- Average maximum polarization $\approx 83\%$





PT during 2010 & 2011

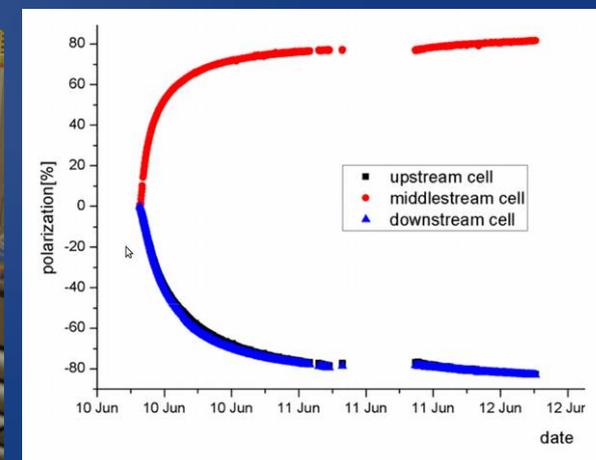
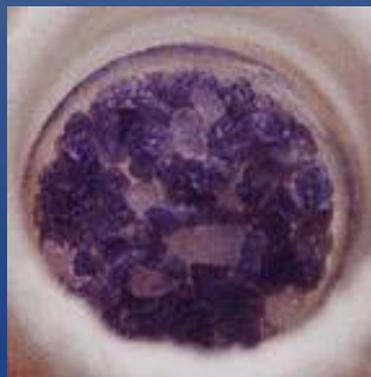
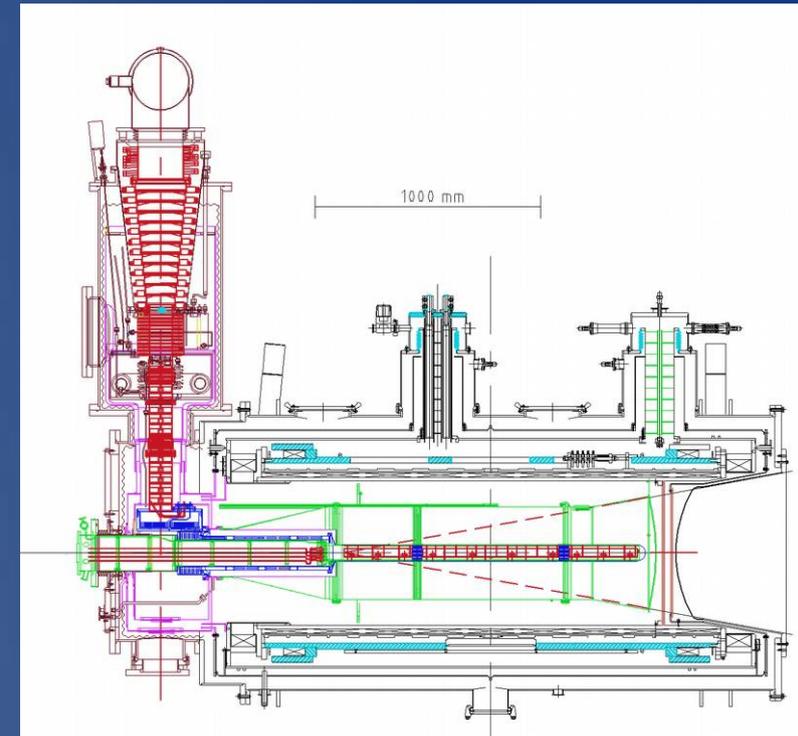
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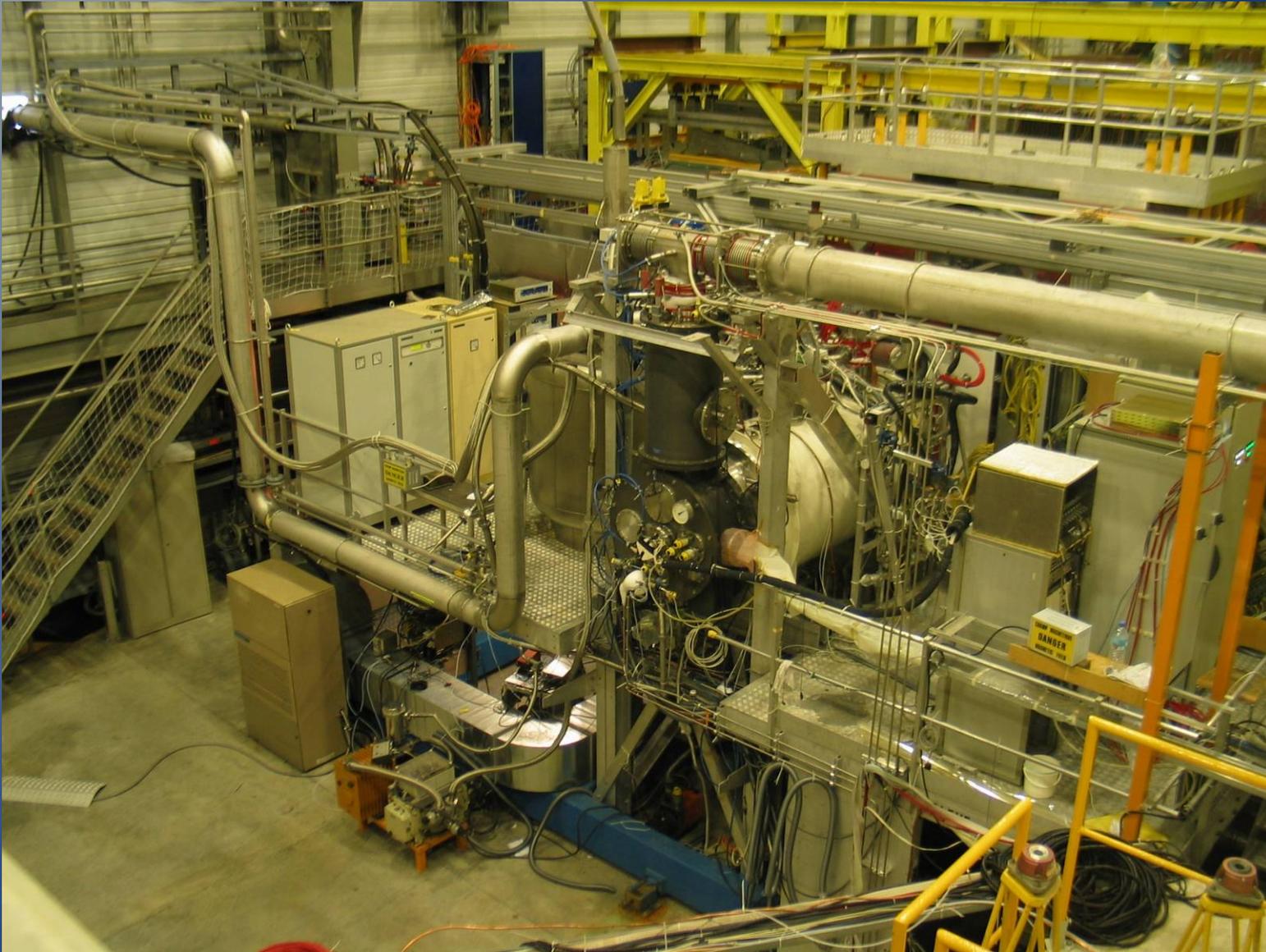
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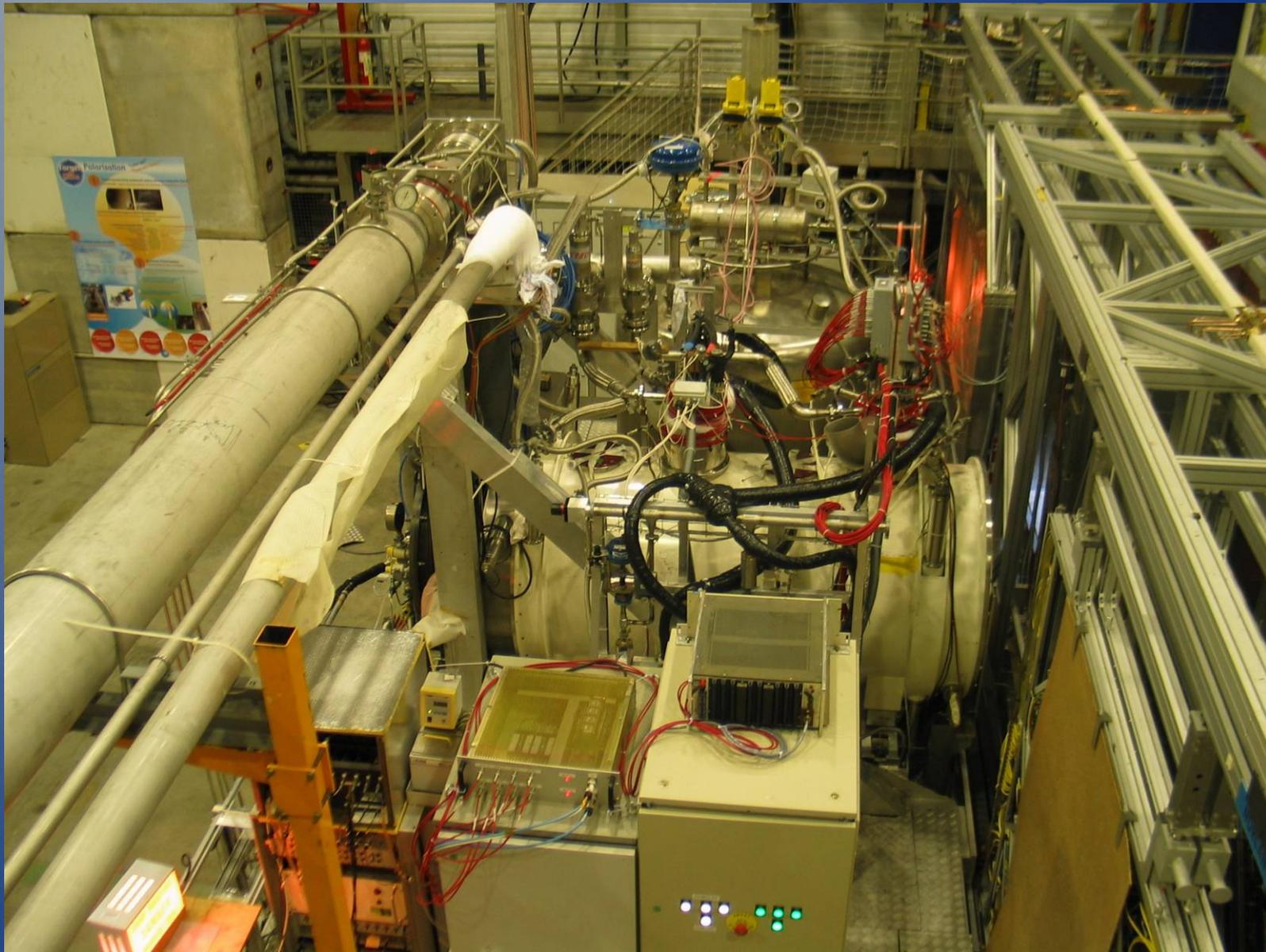


PT – some photos





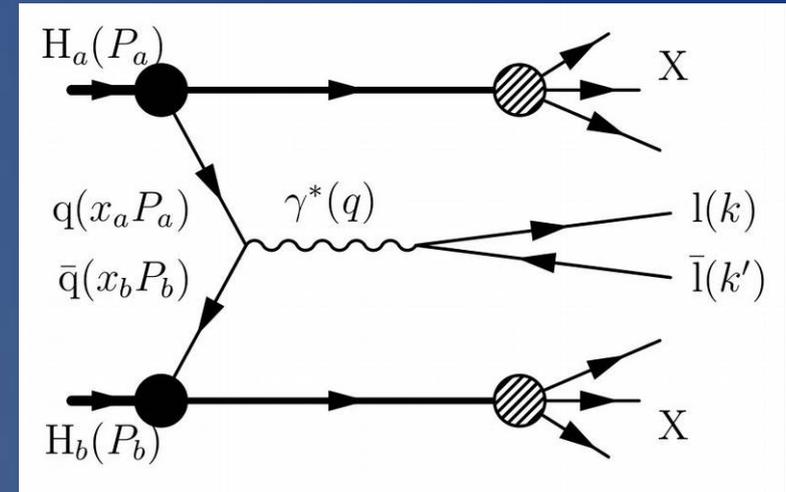
PT – some photos





Drell–Yan program at COMPASS

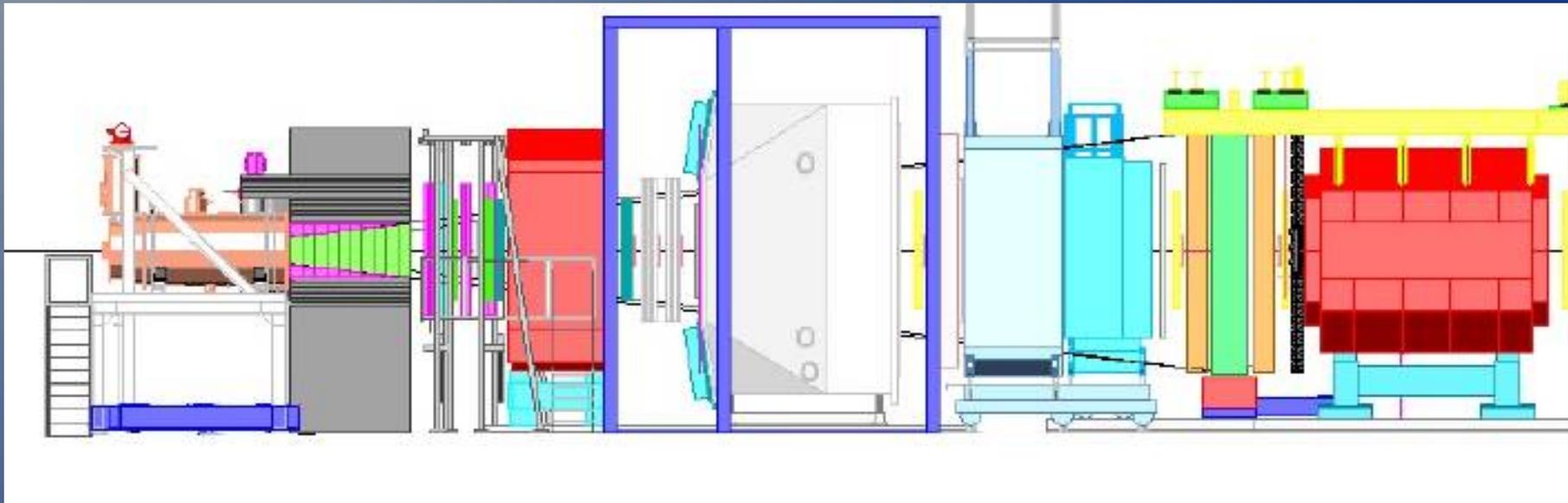
- Drell–Yan process: quark and antiquark from 2 hadrons annihilate, two leptons are produced.
- In case of COMPASS:
 - π^- beam (190 GeV), polarized p target,
 - looking for μ^+ & μ^-
- Main goal: Measurement of transversity and TMD PDFs of proton
- Complementary to SIDIS processes studied on COMPASS before
- Radiation dose in the hall would probably slightly exceed CERN limit (3 $\mu\text{Sv/h}$ for permanent working area) \rightarrow Control room will be moved to office building
- Physics run planned on fall 2014 (after accelerator shutdown) and on 2015





Drell–Yan program at COMPASS

COMPASS Drell–Yan setup



- Low cross section \rightarrow larger hadron flux required (10^8 s^{-1}) \rightarrow secondary hadrons flux has to be stopped to avoid the spectrometer flooding up \rightarrow hadron absorber



PT for Drell–Yan program

New target cell design

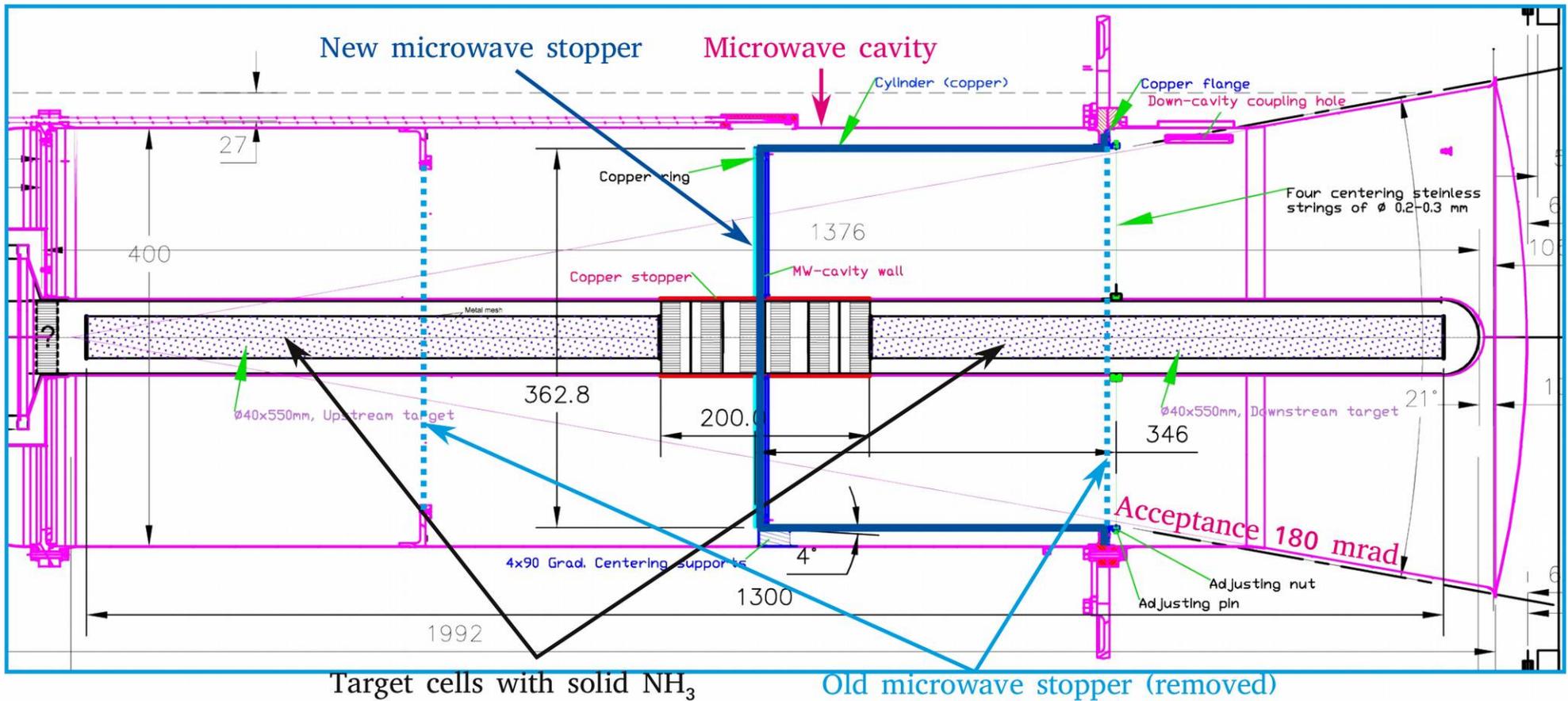
- High intensity hadron beam
- Defocused beam (larger beam spot) to avoid local overheating
- 2 cells (55-55 cm), 4 cm in diameter
- Hadron absorber → 20 cm gap between cells to ensure proper vertex resolution
- 10 NMR coils with new design (not decided yet)
- Kevlar tube with polyamide/torlon mesh (will be tested in Bochum)
- 2–cell design → microwave cavity has to be modified





PT for Drell-Yan program

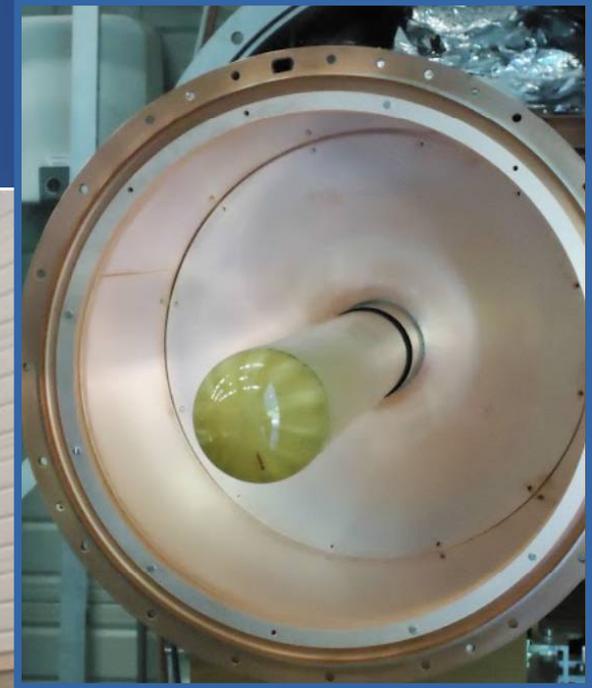
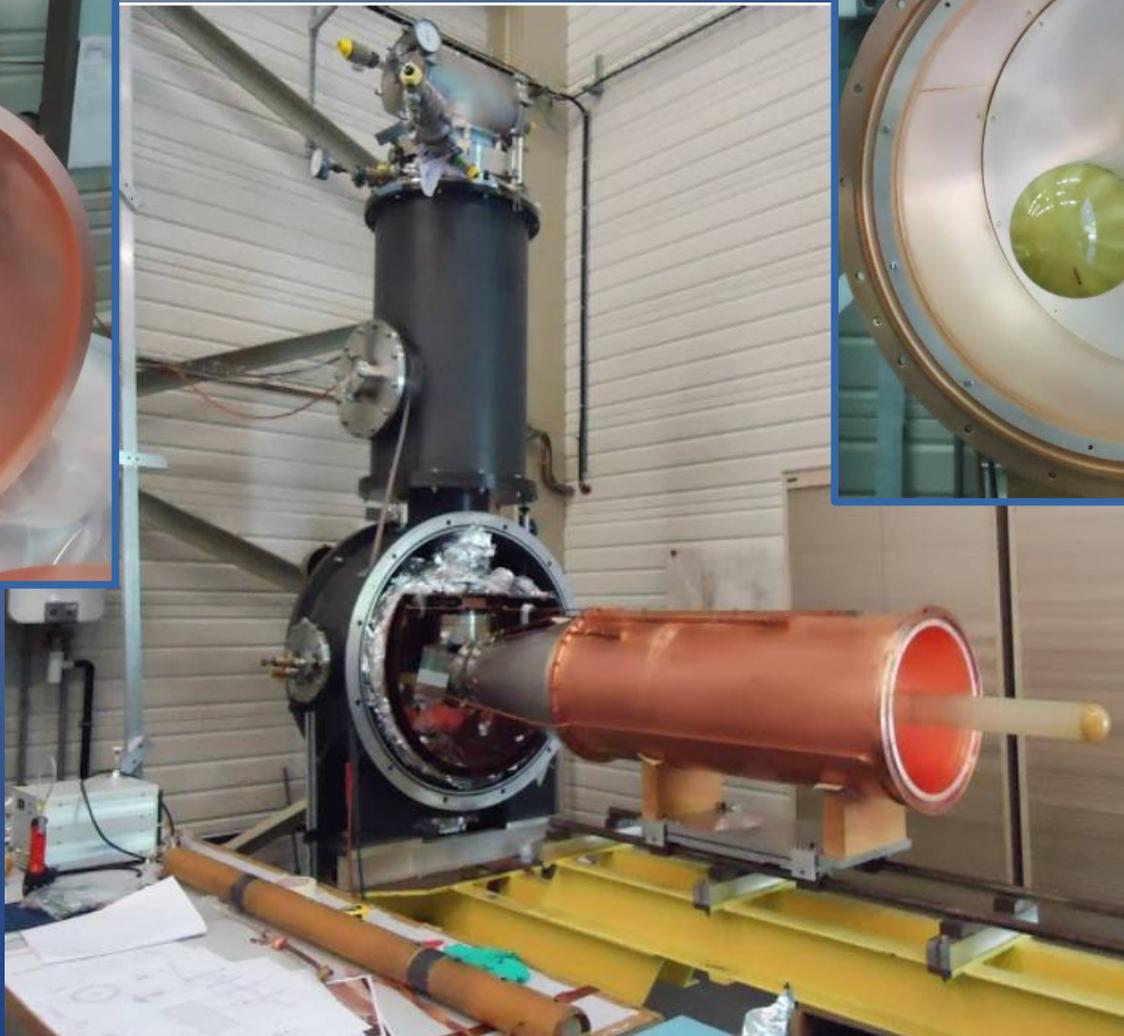
Modified microwave cavity





PT for Drell-Yan program

Modified microwave cavity





PT for Drell–Yan program

New remote control system

- Control room will be moved to office building → remote control system is necessary
- Decision to:
 - Abandon LabVIEW system for DR monitoring
 - include it under standard COMPASS DCS
(centralized, PVSS–based detector control system)

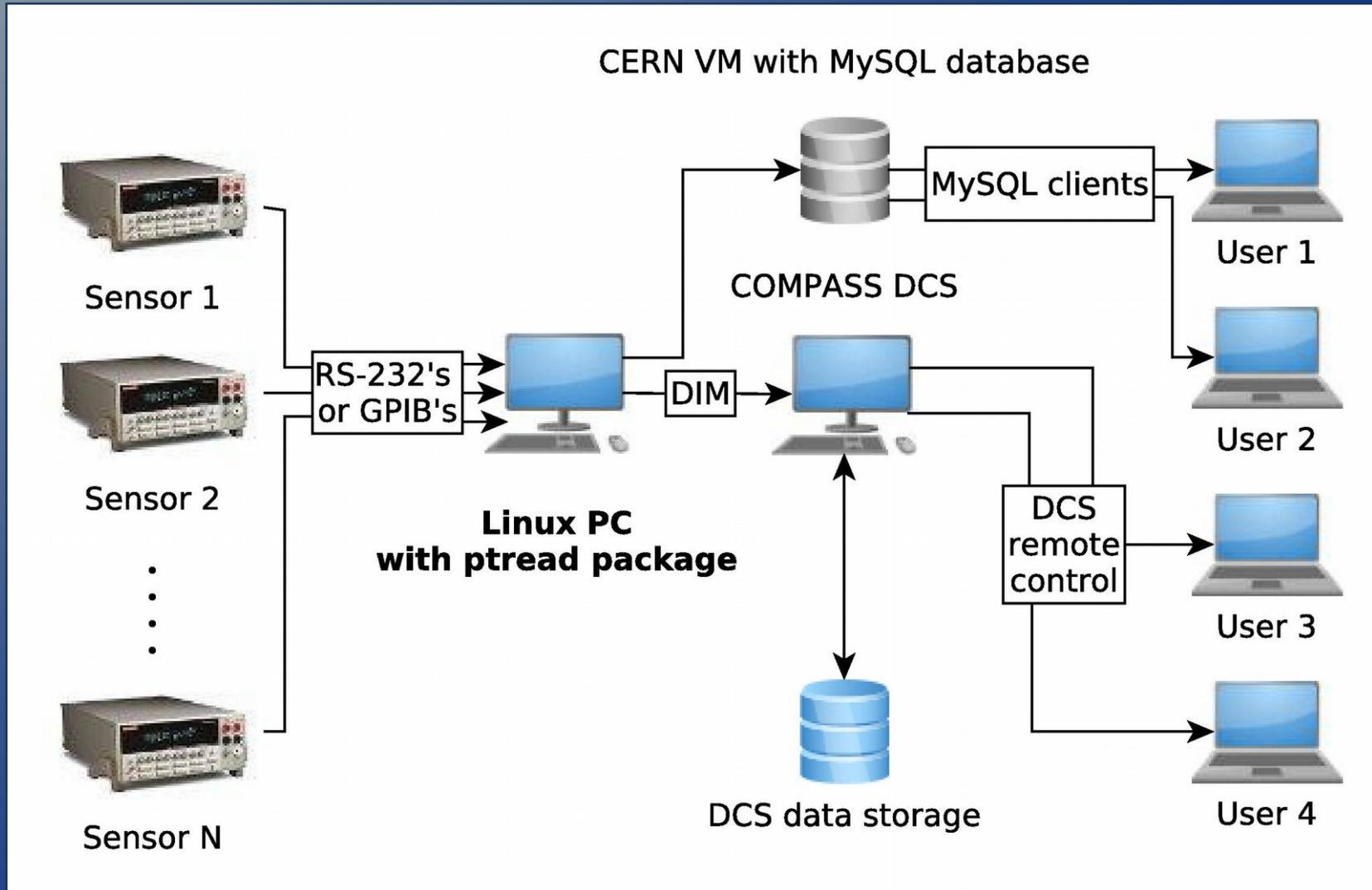
ptread package

- Monitors DR (pressure gauges, flowmeters, > 30 thermometers...)
- Linux platform, open–source, modular, Perl & C++
- Output possibilities:
- DIM service (Distributed information management system) for communication with DCS (ideal for „mixed“ environment)
- Alternatively: MySQL or SQLite databases



PT for Drell-Yan program

pthread package

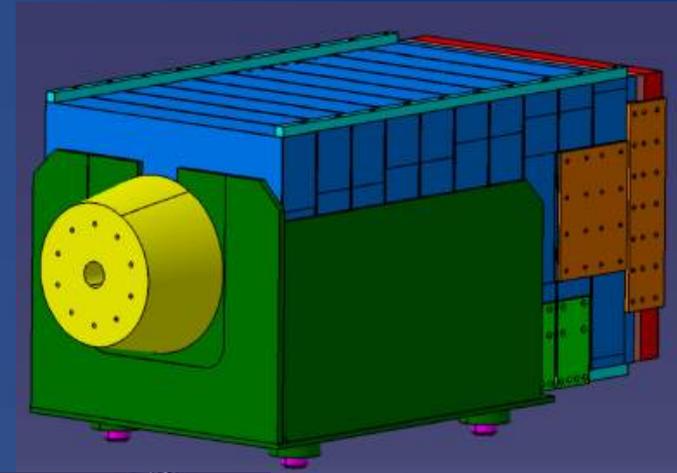




PT for Drell–Yan program

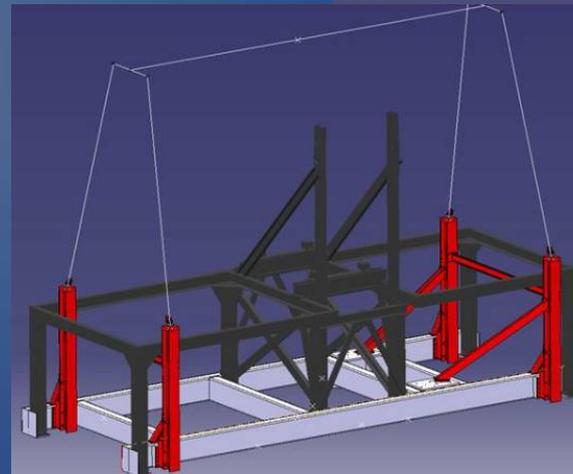
Hadron absorber

- Dimension 160 x 160 x 230 cm
- Made of stainless steel and alumina, with tungsten beam plug in the center
- Weight 22.5 t (supplemented by additional 140 t of concrete shielding)



PT platform movement

- PT platform has to be moved by 230 cm upstream from the standard (SIDIS) position
- Shorter loading platform is required
- New holes drilled in the floor
- Special device for crane is being prepared
- Movement of the microwave system

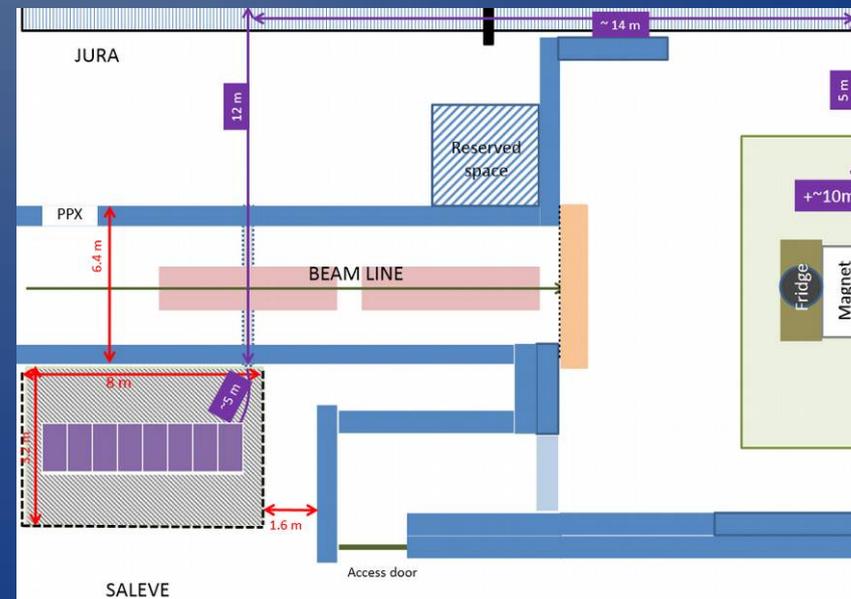




PT for Drell-Yan program

Target magnet

- Target magnet is being refurbished by CERN magnet group (almost finished)
- Vacuum tested, cooling tests coming soon
- The new control and safety system will be provided





Conclusion

Current status and plans

- Cavity: New MW stopper installed, cavity tested
- He leak test of the DR (at room temp.), no leaks found
- Target holder & cells are being prepared
- New magnet control system and magnet refurbishment should be finished in December
- PT platform movement probably during November

Conclusion

- COMPASS PT preparation for Drell–Yan is progressing well
- PT will be fully operational for the 2014-2015 physics run



Thank you for your attention!

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