

Progress of the Cluster-Jet Target

Gas System Studies, Beam Adjustments and its Electronics, and Gas Supply Connections

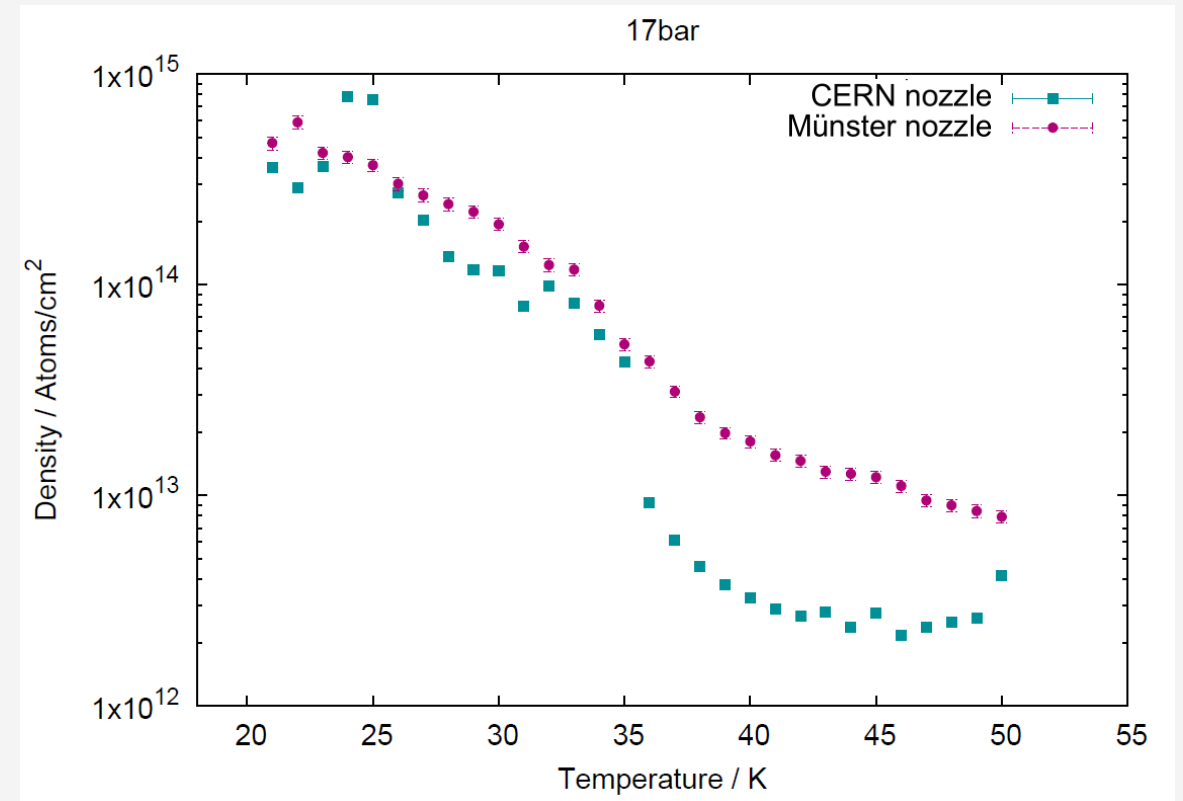
PANDA Collaboration Meeting 2017/3
Novosibirsk, Russia

Benjamin Hetz
WWU Münster



Gas System Studies

- Ongoing investigation of CERN nozzle clogging:
 - Using a self produced nozzle (A21) no clogging appears
 - No severe problem because both nozzles show similar thickness profiles



PANDA Prototyp by Silke Grieser

Gas System Studies

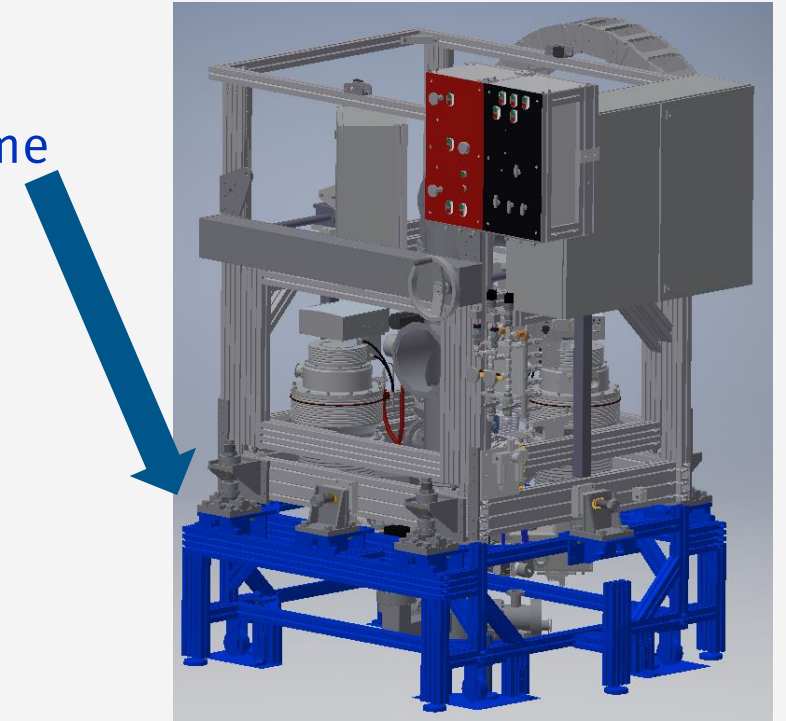
- Severe problem for our current target studies at Münster:
 - PANDA Target purifier was already broken (see talk PANDA Meeting 2017/2)
 - Recent black out killed the prototype purifier, too
 - Maximal gas pressure of ~15 bar available/wanted ~20 bar
- **No hydrogen purifier for highest thicknesses available at Münster**
- **Final purifier (SMI Vienna) will become available only in some years**

Progress of the Cluster-Jet Target Beam Adjustments

- Status at last meeting
 - Auxiliary support frame (not needed at PANDA) too soft
 - Beamline got misadjusted during alignment work
 - Due to this no signal inside the scattering chamber observed
 - No significant pressure increase by cluster beam in the beam dump

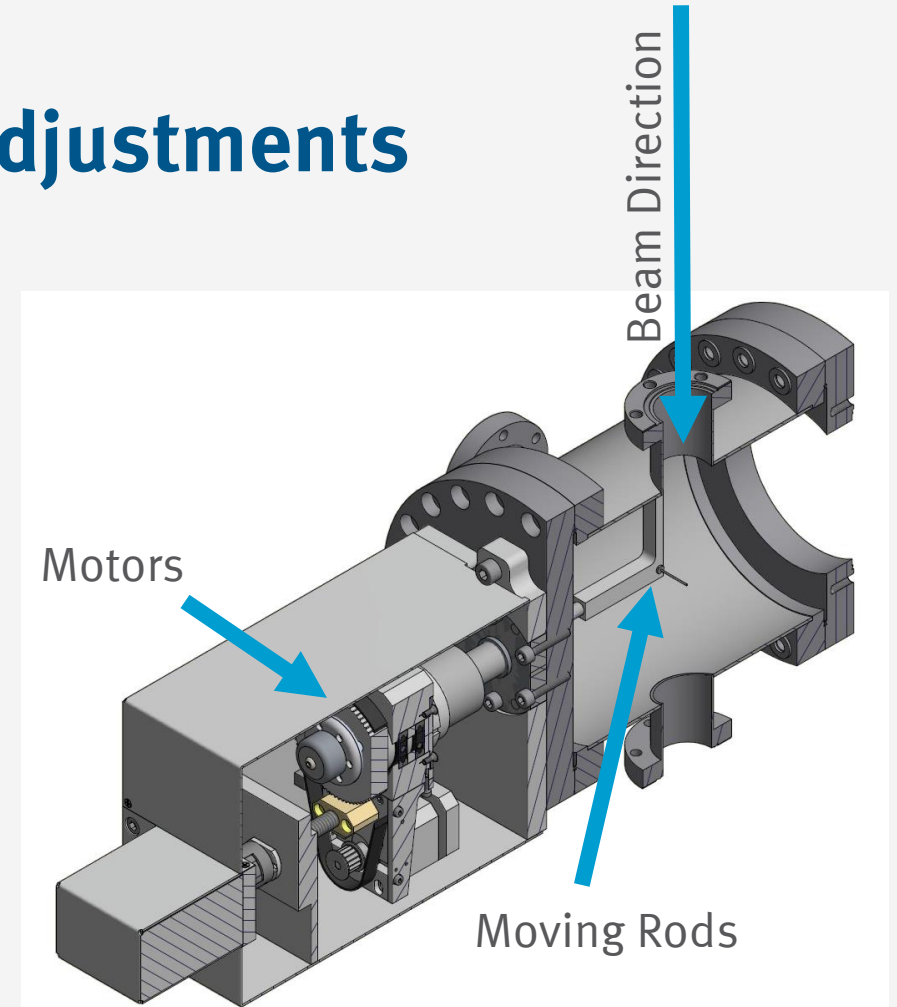
Progress of the Cluster-Jet Target Beam Adjustments

- Status now:
 - Beamline is (coarse) adjusted thanks to an **advanced support frame**
 - Fine adjustment is done by using:
 - Optical thickness monitor system in transition vacuum chamber
 - Scattering chamber thickness monitor signal
 - Beam dump gas input/pressure increases in each stage
 - Iterative process for each nozzle



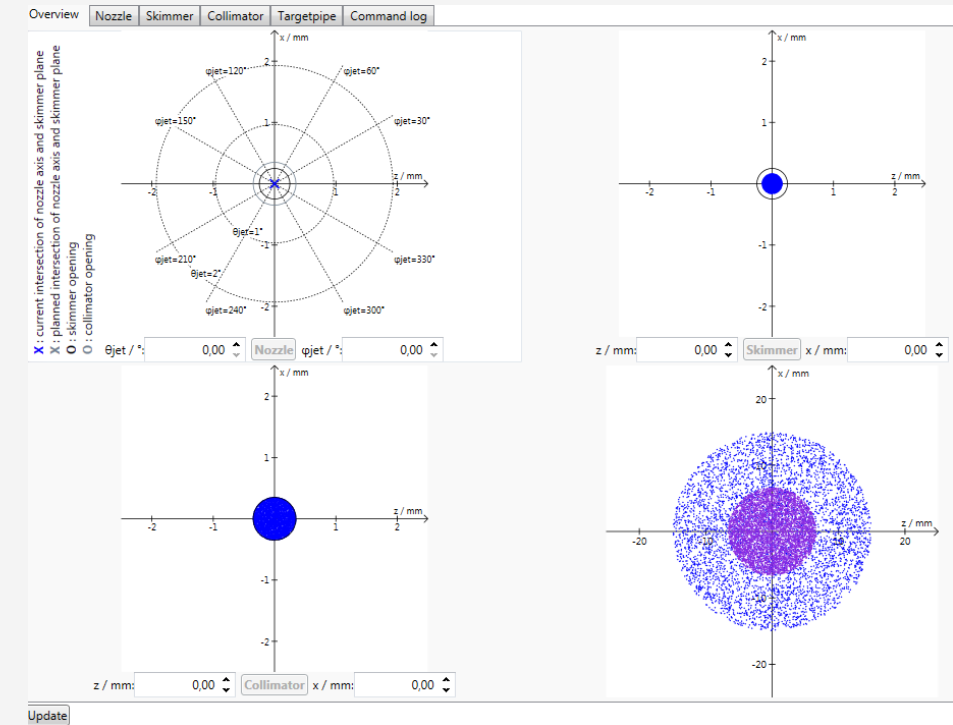
Progress of the Cluster-Jet Target Beam Adjustments

- During beam adjustment studies scattering chamber monitor was optimized
 - It takes less time to measure a profile
 - More measure points possible
 - Advanced operator interface
- Overall speed up for beam alignment work/beam studies



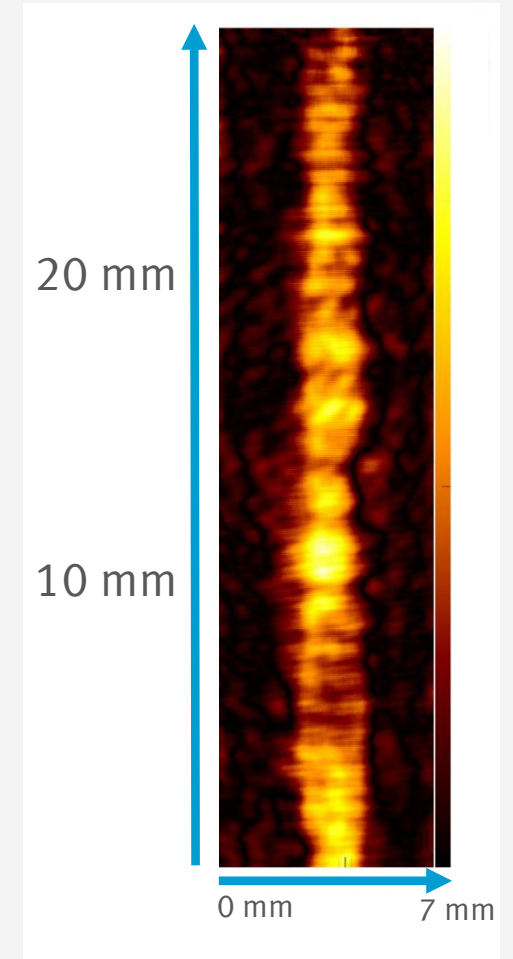
Progress of the Cluster-Jet Target Beam Adjustments

- Graphical Operator Interface for skimmer, collimator, and nozzle manipulation is under development
 - Showing/manipulate skimmer, collimator position
 - Showing/manipulate nozzle tilting angle
 - Calculate beam position, etc. at interaction point
- Will ease beam line adjustments for target operator a lot



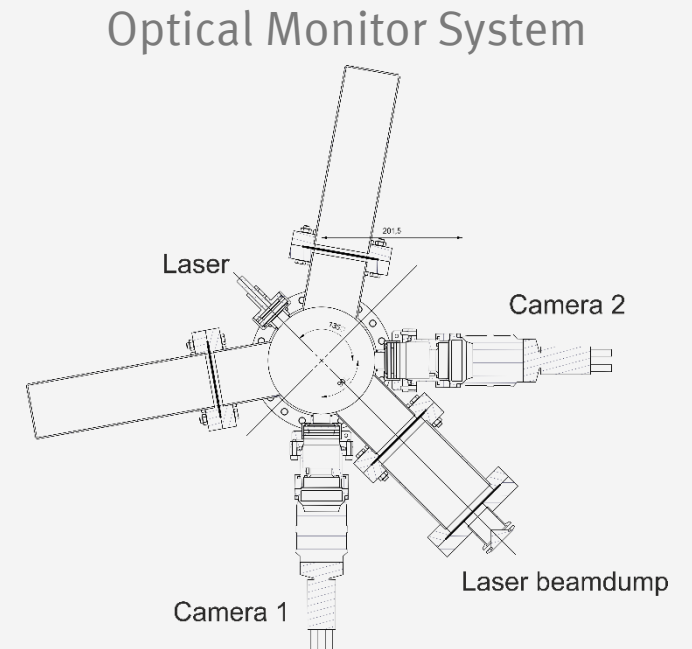
Interferometer Studies (by S. Grieser)

- Observation of jet-beam up to 30 mm behind nozzle
 - Data show directed beam of highest thickness
 - Different nozzles, gases and stagnation conditions were measured
- Analysis of thickness, time development, jet beam range, etc. are currently running



Next and Ongoing Steps

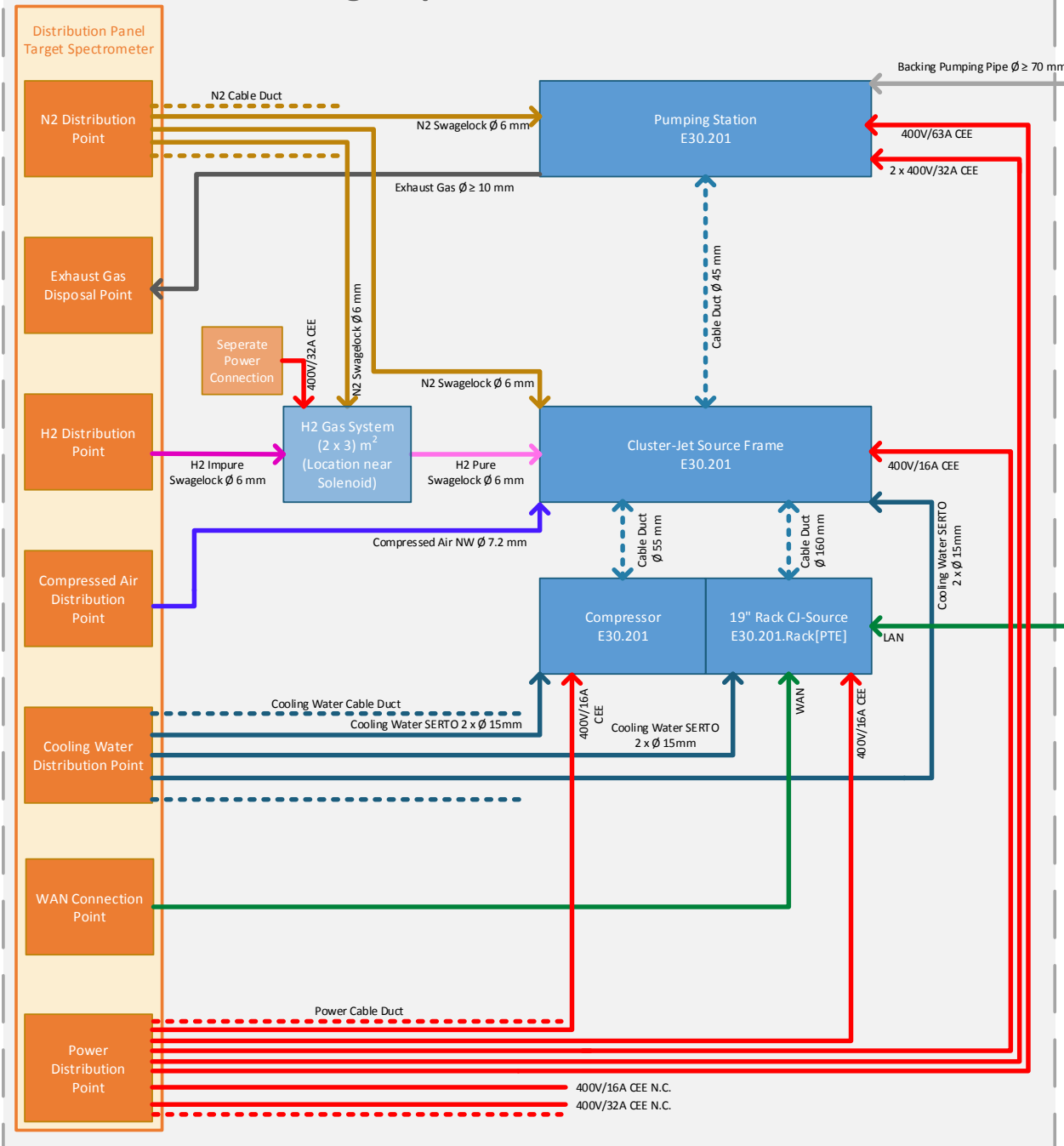
- Investigation of CERN nozzle clogging problems
- Fine adjustment of beamline and target position
- Studies of pressures and flows into each chamber
- Investigation of beam dump gas backflow rate
 - Data will be very preliminary because of no highest beam thickness available
- Studies/calibration of the optical monitor system at the transition vacuum chamber (talk PANDA 2017/2)
- Interferometer studies of the jet-beam



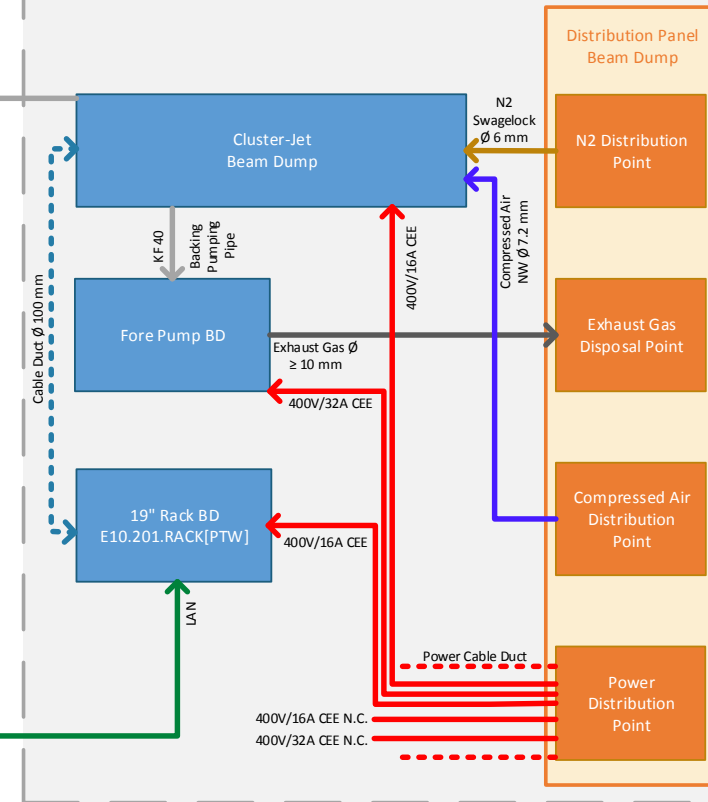
Electronics and Gas Supply Connections of the $\bar{\text{P}}\text{ANDA}$ Cluster-Jet Target

(also in reference to Tasso's *Service Tables* mail from July)

Target Spectrometer Platform

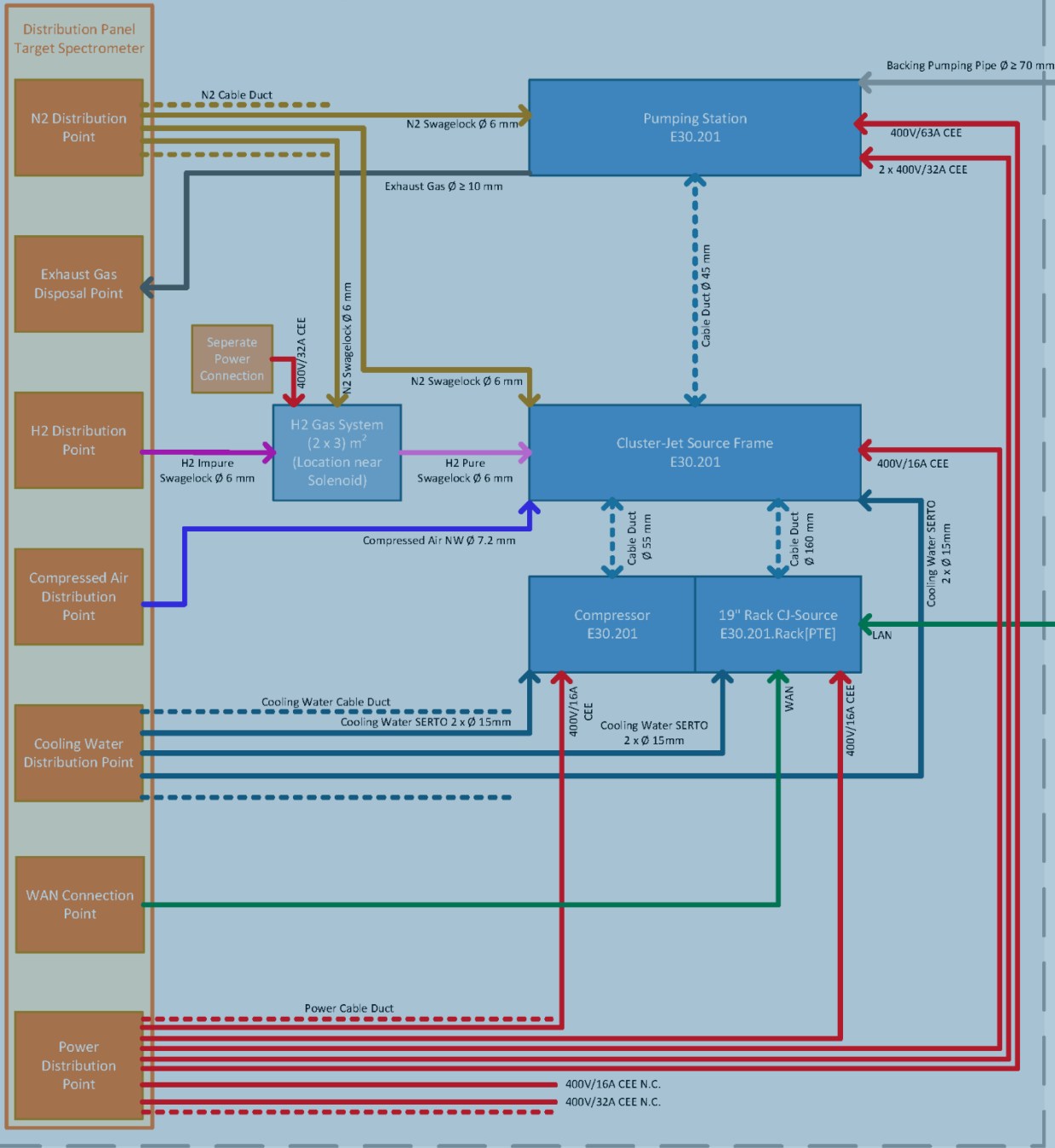


Beam Dump Platform

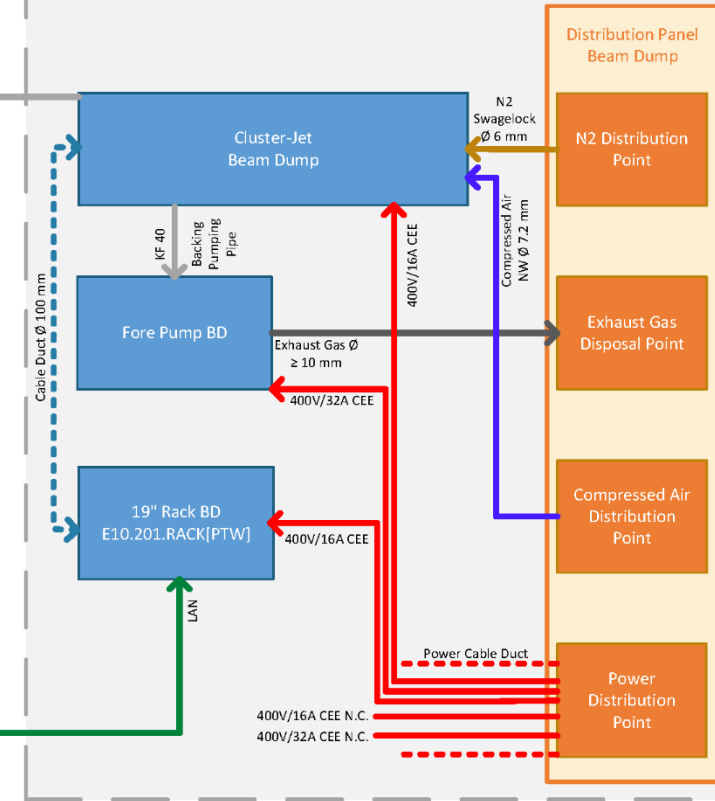


Sketch of the needed electrical, gas supply, coolant, etc. of the PANDA cluster-jet target.

Target Spectrometer Platform

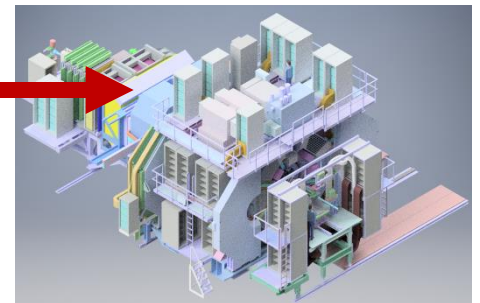


Beam Dump Platform



Antiprotons

Components placed upon the target spectrometer platform

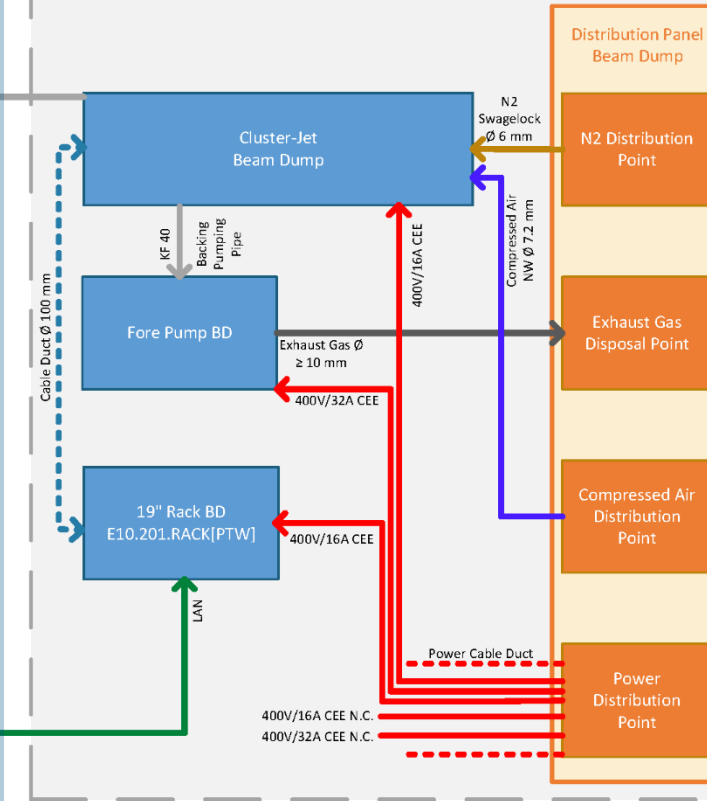
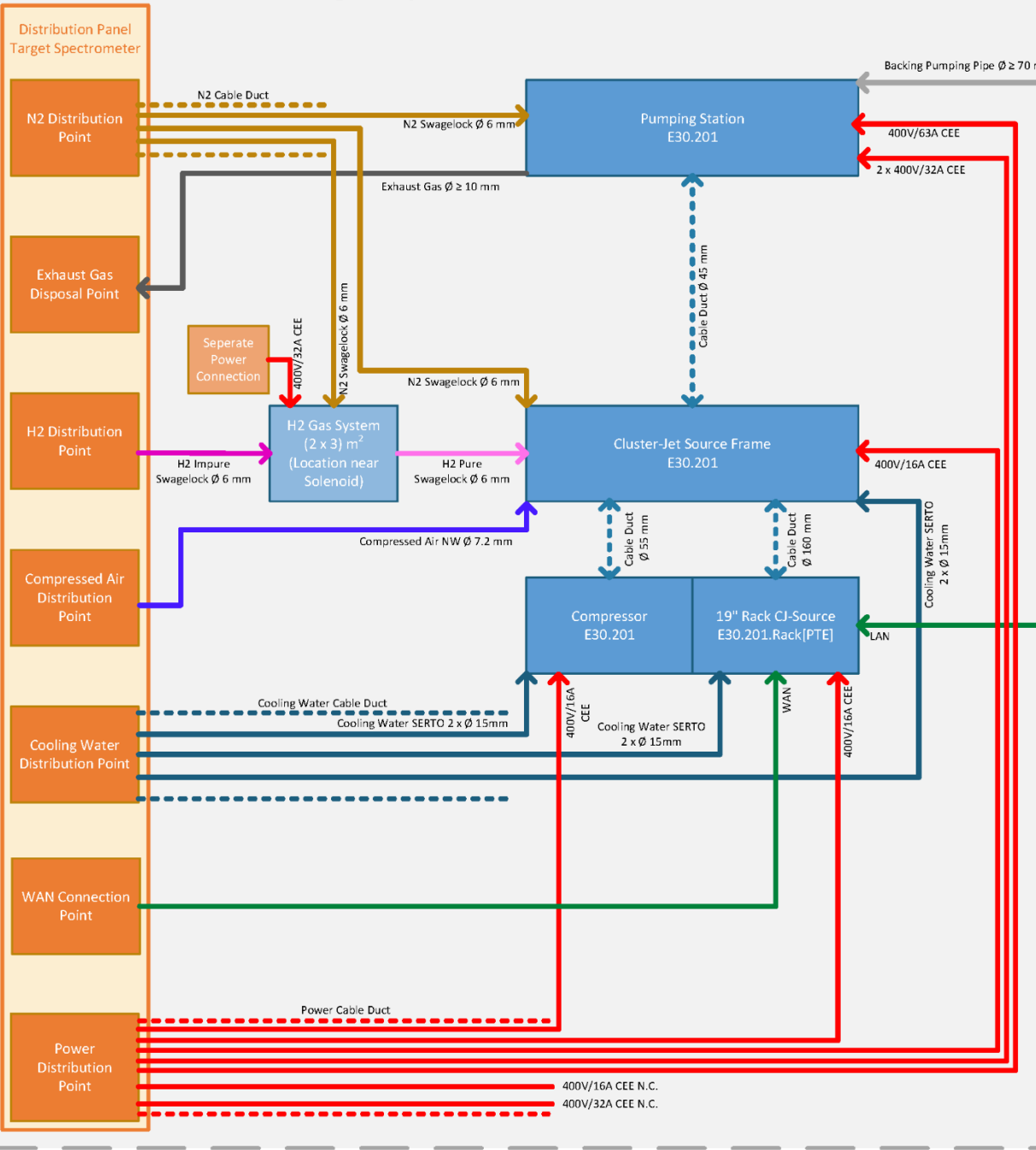


Target Spectrometer Platform

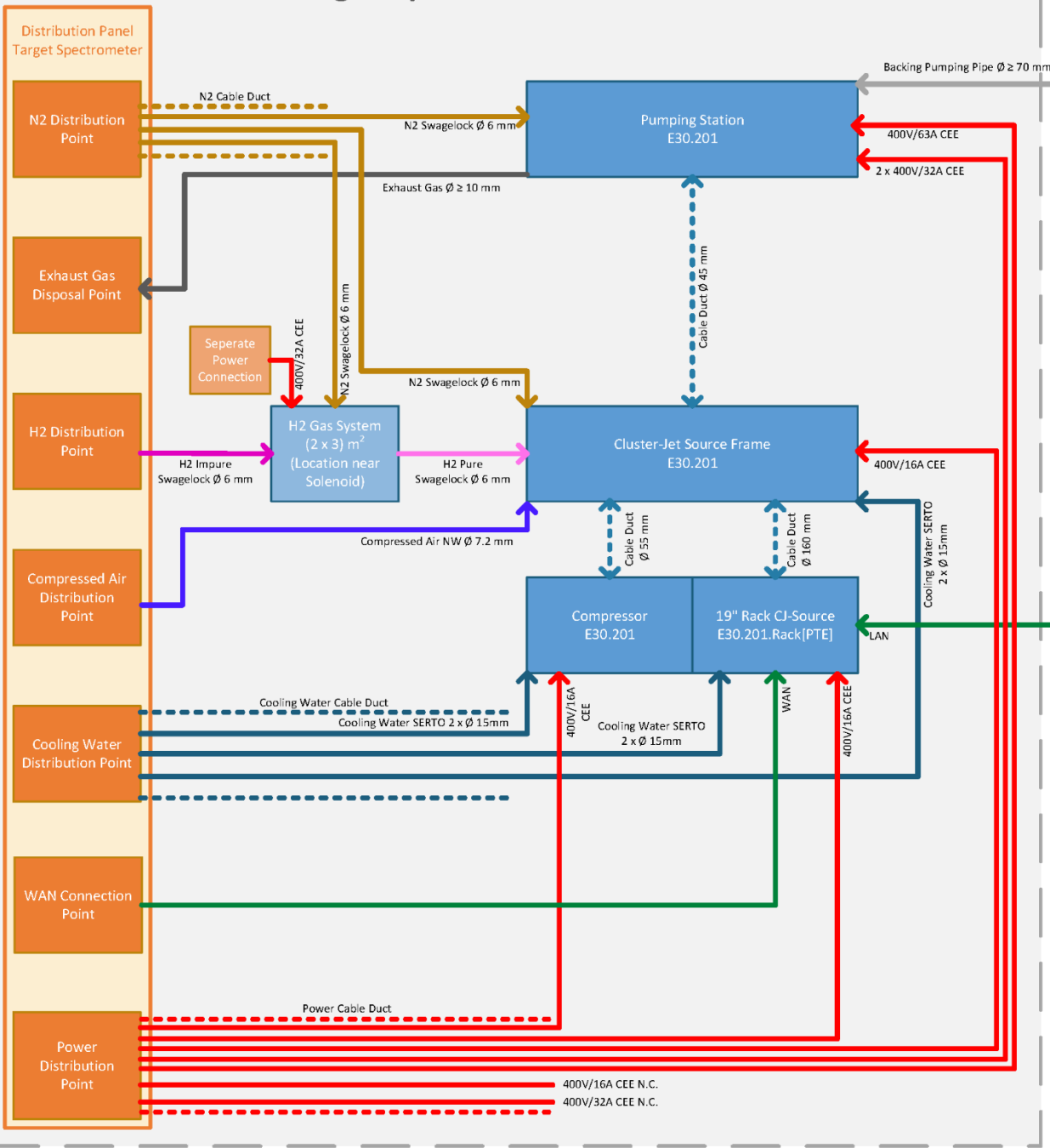
Beam Dump Platform

Antiprotons

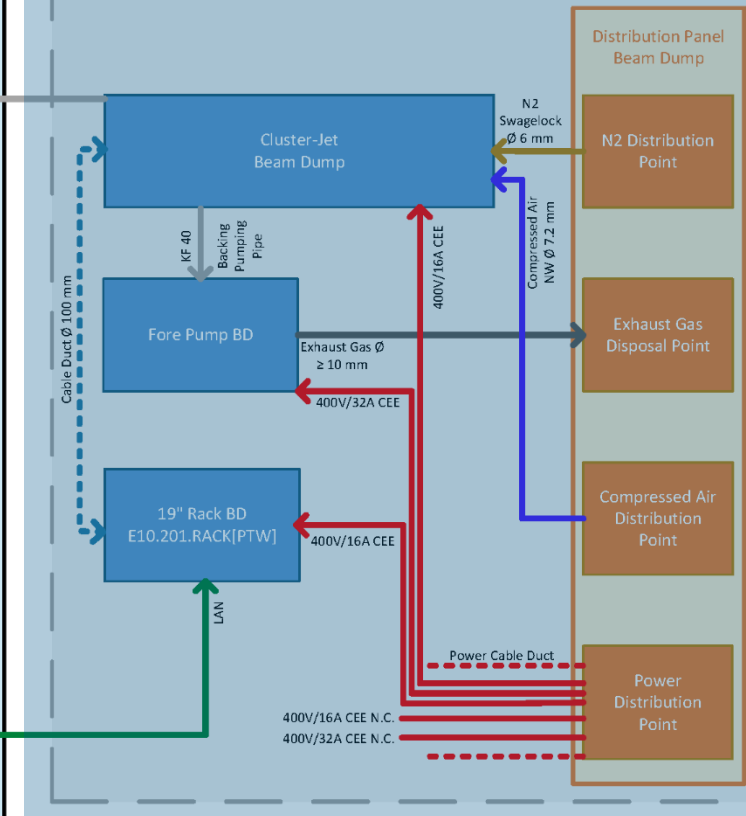
Antiproton Beamline



Target Spectrometer Platform

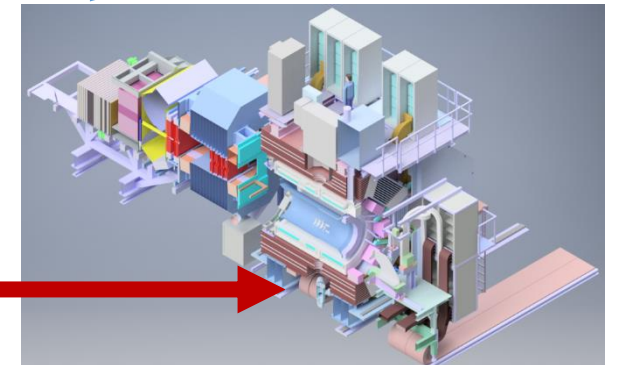


Beam Dump Platform

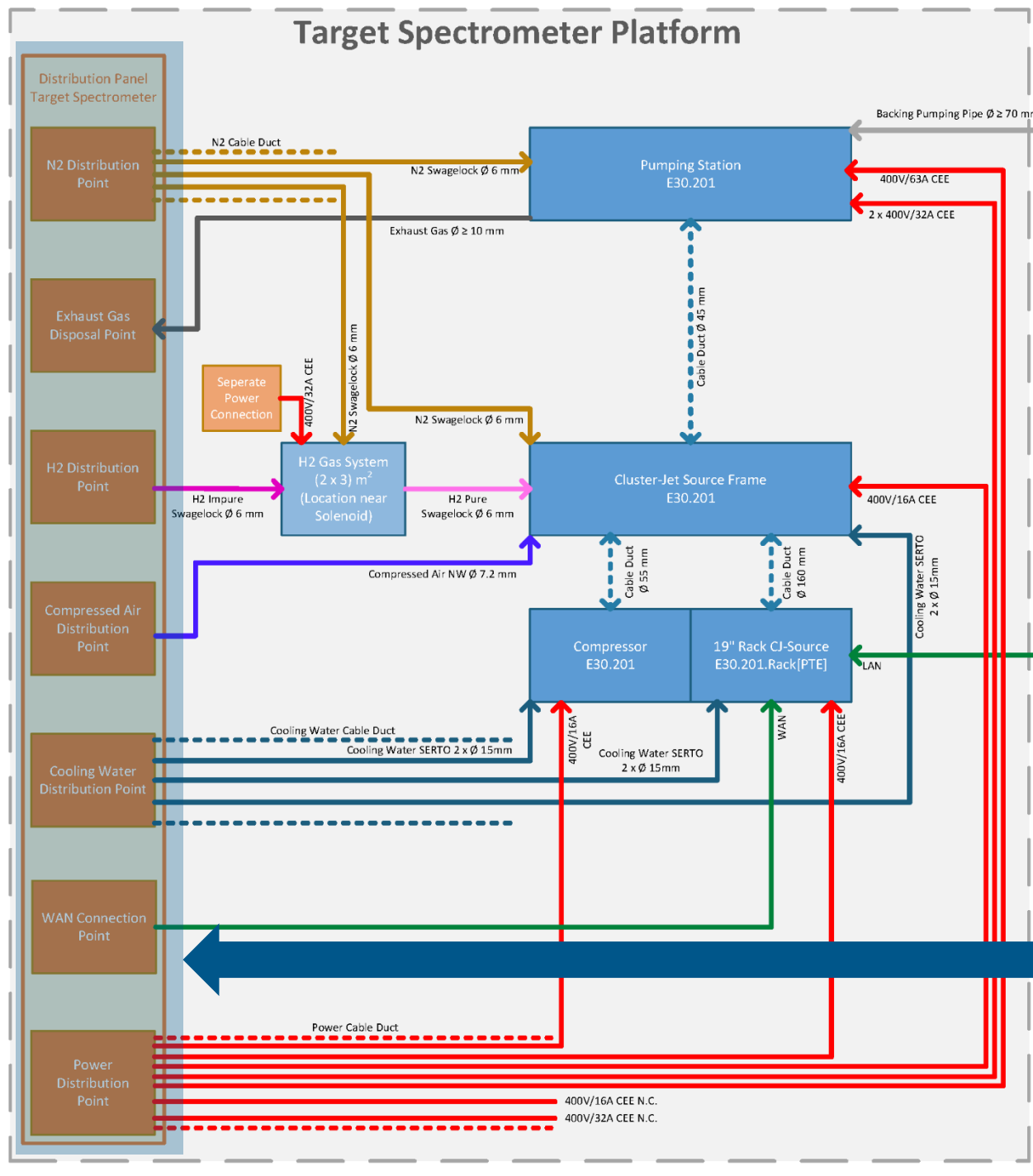


Antiprotons

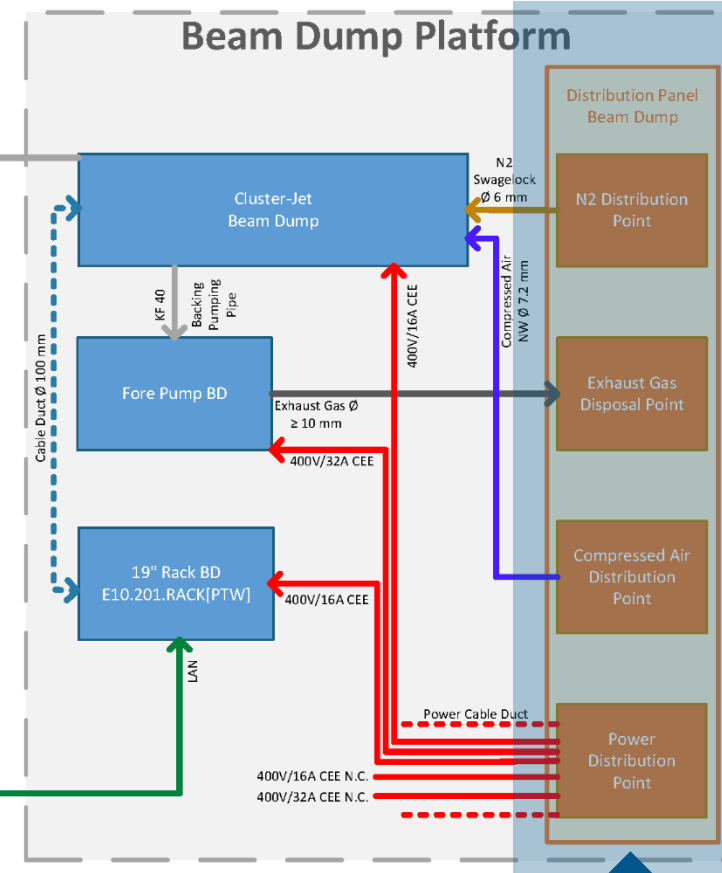
Components placed upon the beam dump platform



Target Spectrometer Platform

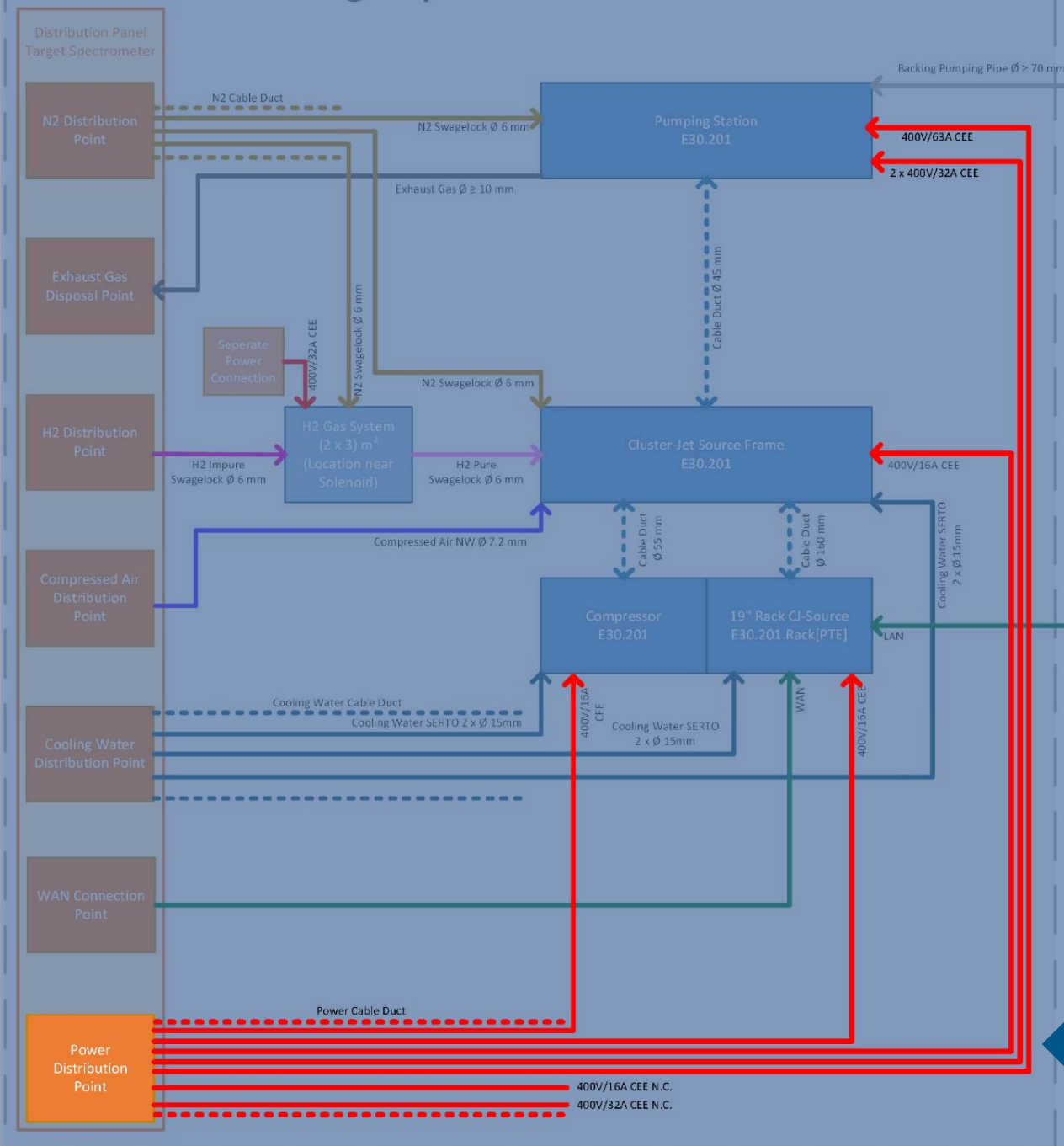


Beam Dump Platform

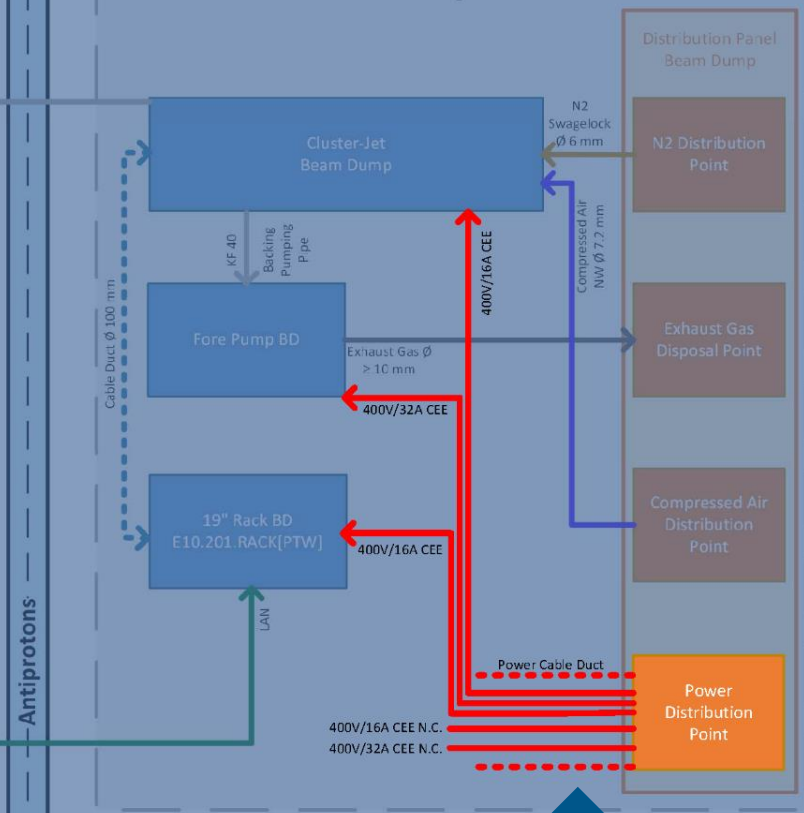


Our idea is to have two separate located **distribution patch panels (provided by FAIR)** offering us power, gas, coolant etc. with the desired connectors at each platform.

Target Spectrometer Platform



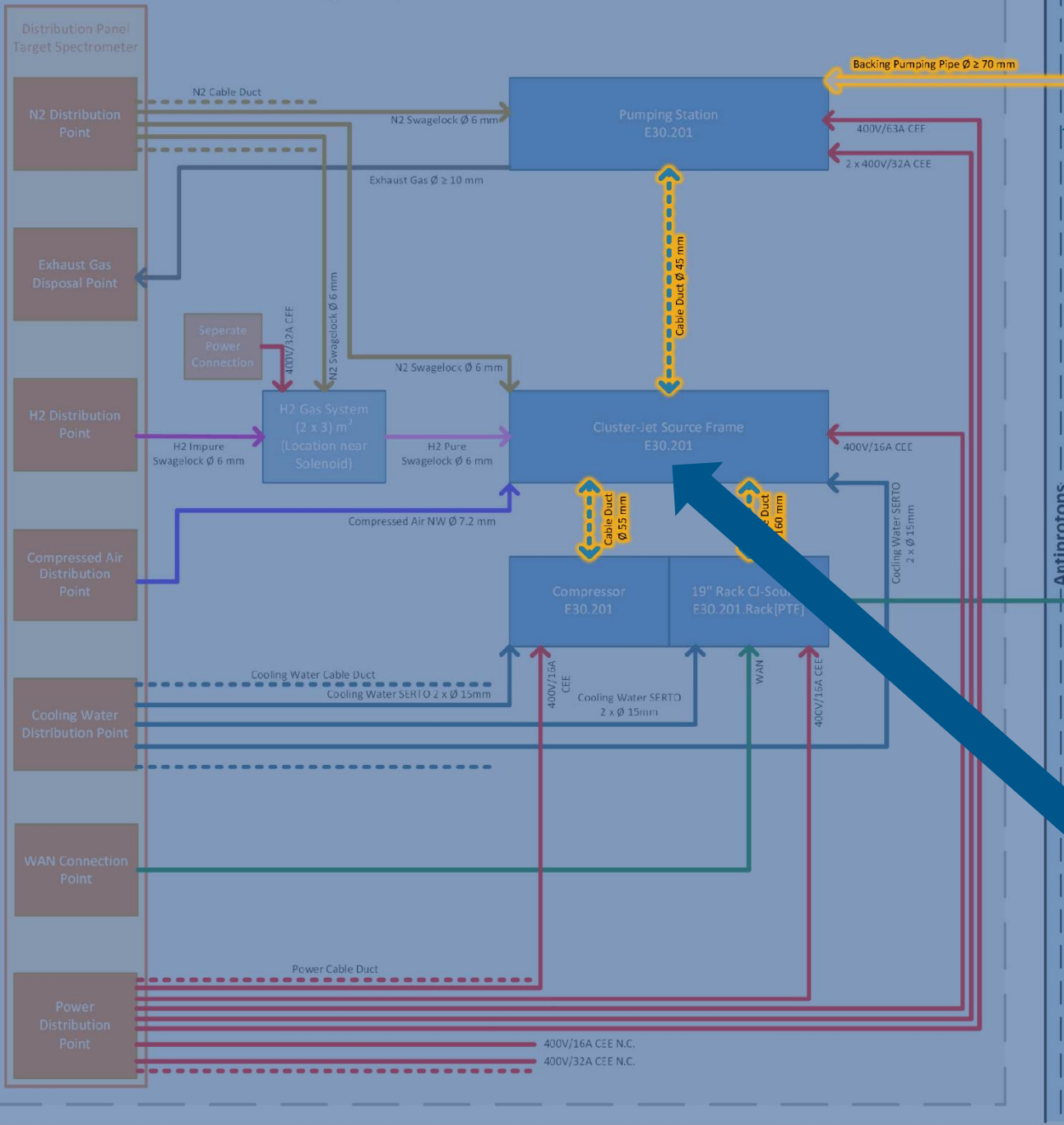
Beam Dump Platform



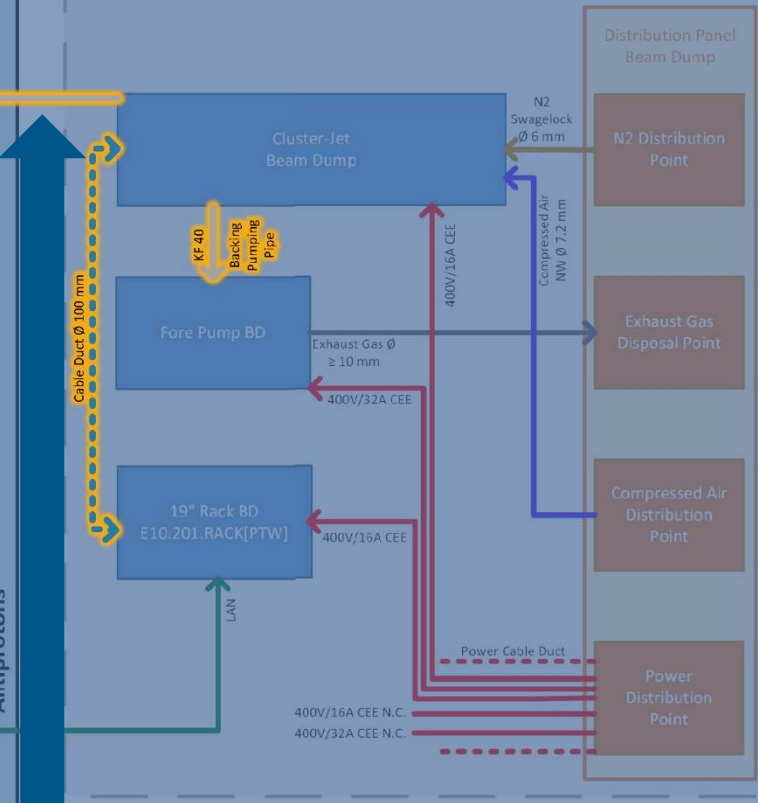
Antiprotons

From the **distribution patch panels** the connection is made to the target devices, e.g. the CEE power connectors.

Target Spectrometer Platform

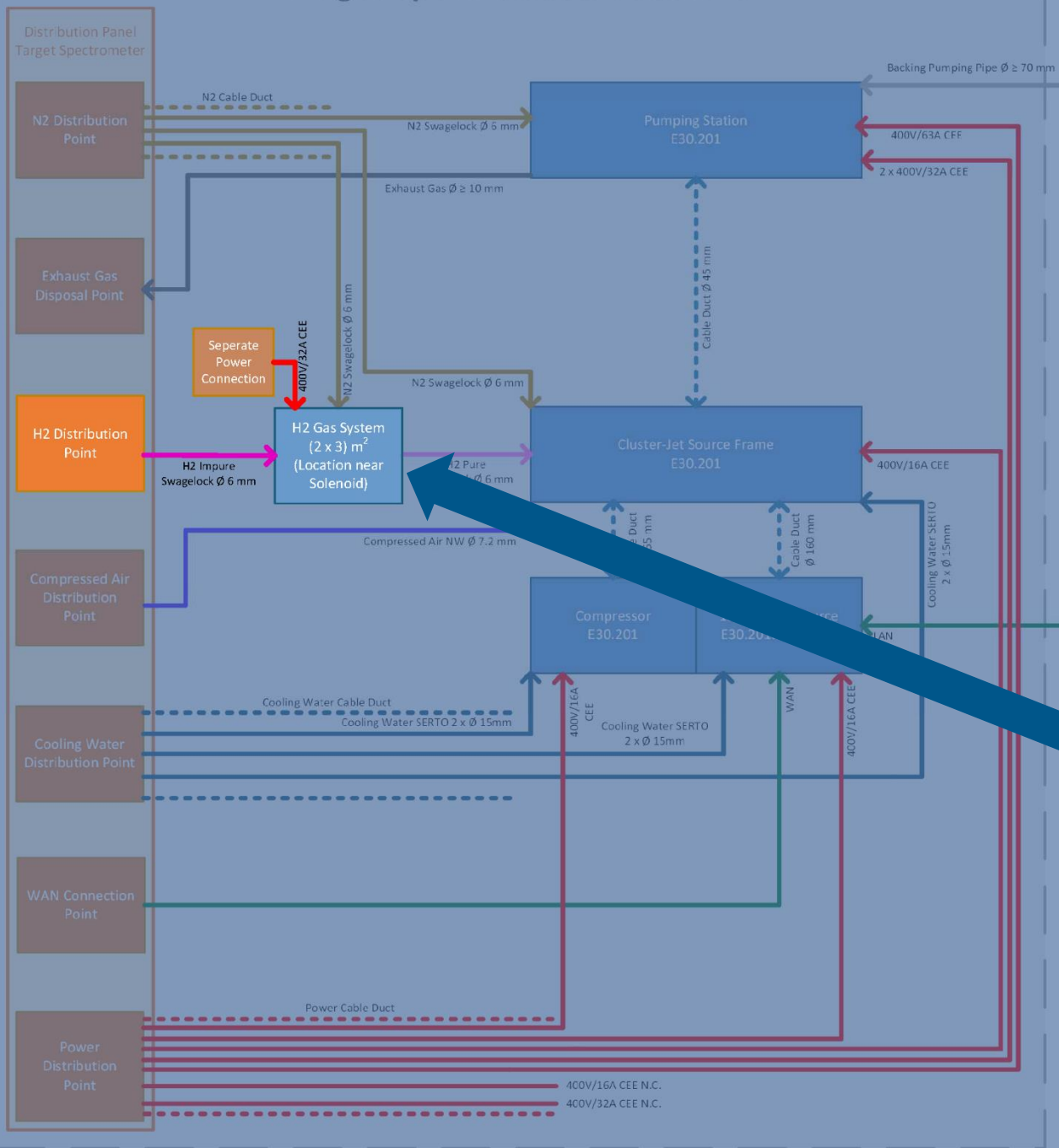


Beam Dump Platform

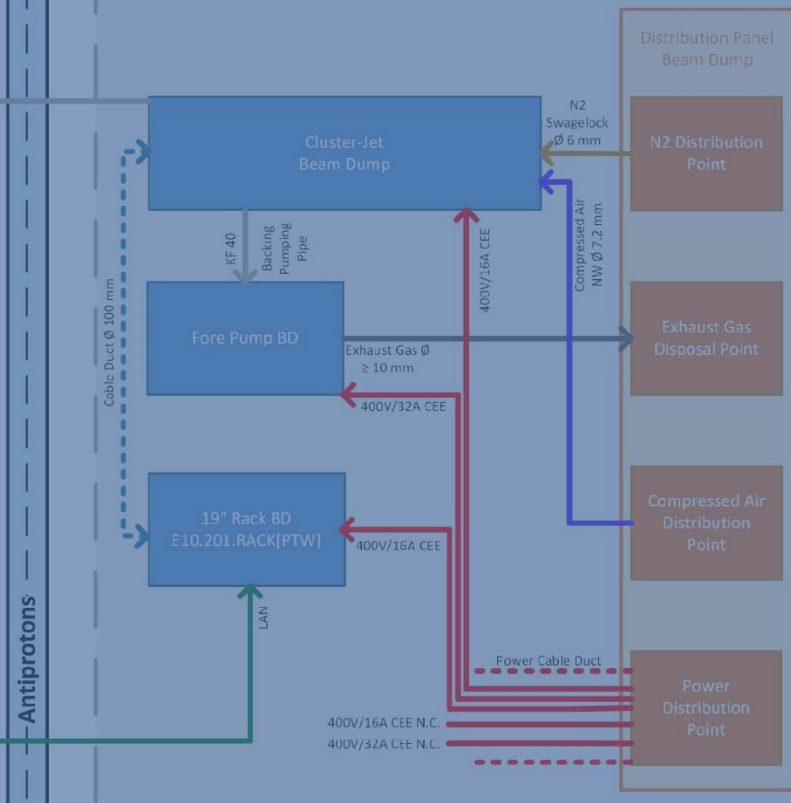


Target modules connected internally
(cables and pipes bundled in cable ducts).

Target Spectrometer Platform



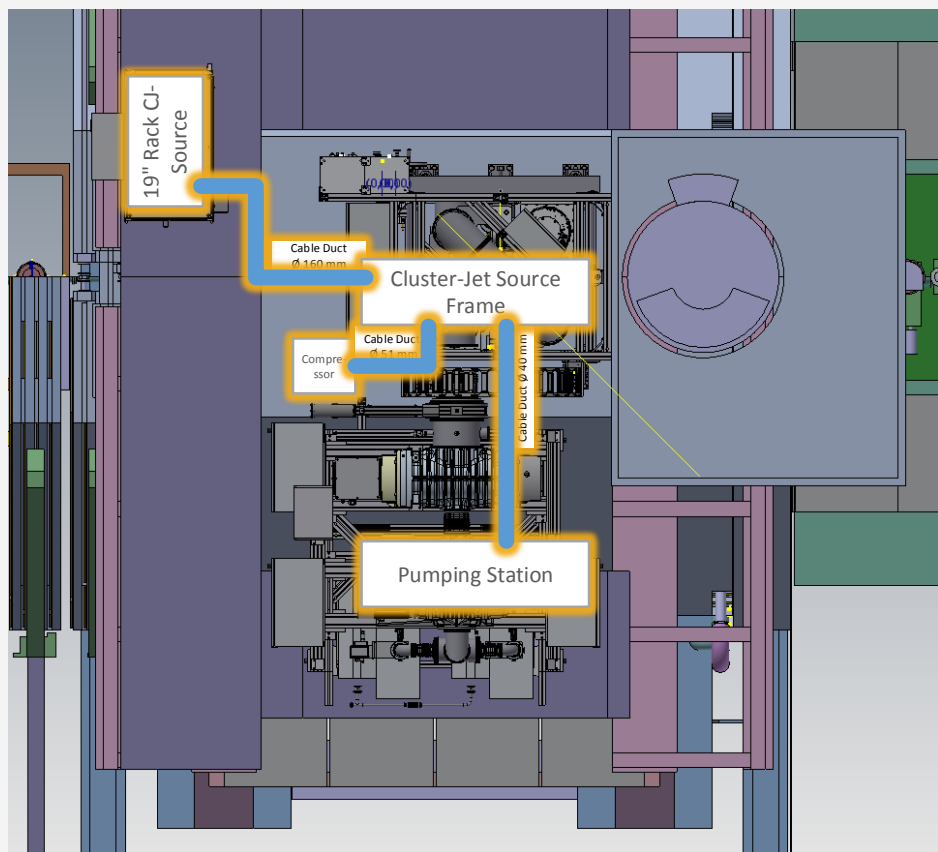
Beam Dump Platform



Antiprotons

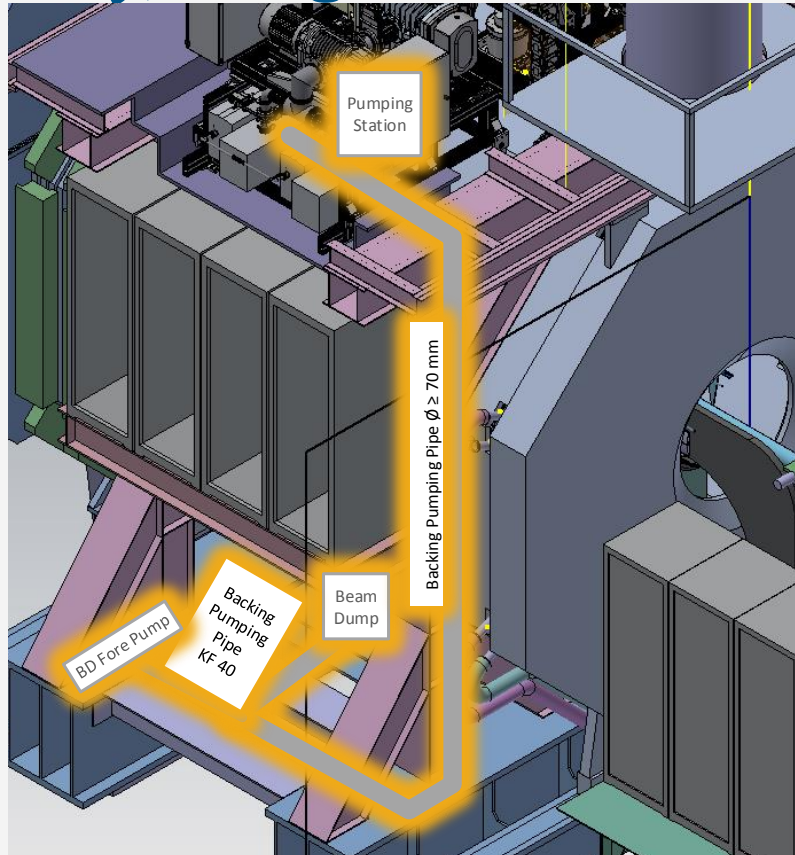
PANDA Hydrogen Gas/Purifier System can be located „anywhere“ but somewhere near the solenoid. More details will come from the responsible Vienna group about sizes connections etc.

A (very) rough sketch of the target/pumping station location



- View onto the target spectrometer platform
- Indicated is the routing of our **cable ducts** for internal target communication only, these wires do not need communication with something else but our slow control system
- More or less to treat as one big cable
- External communication given by WAN connection point from the 19" rack (see prev. slides)

A (very) rough sketch of the needed beam dump backing pump line



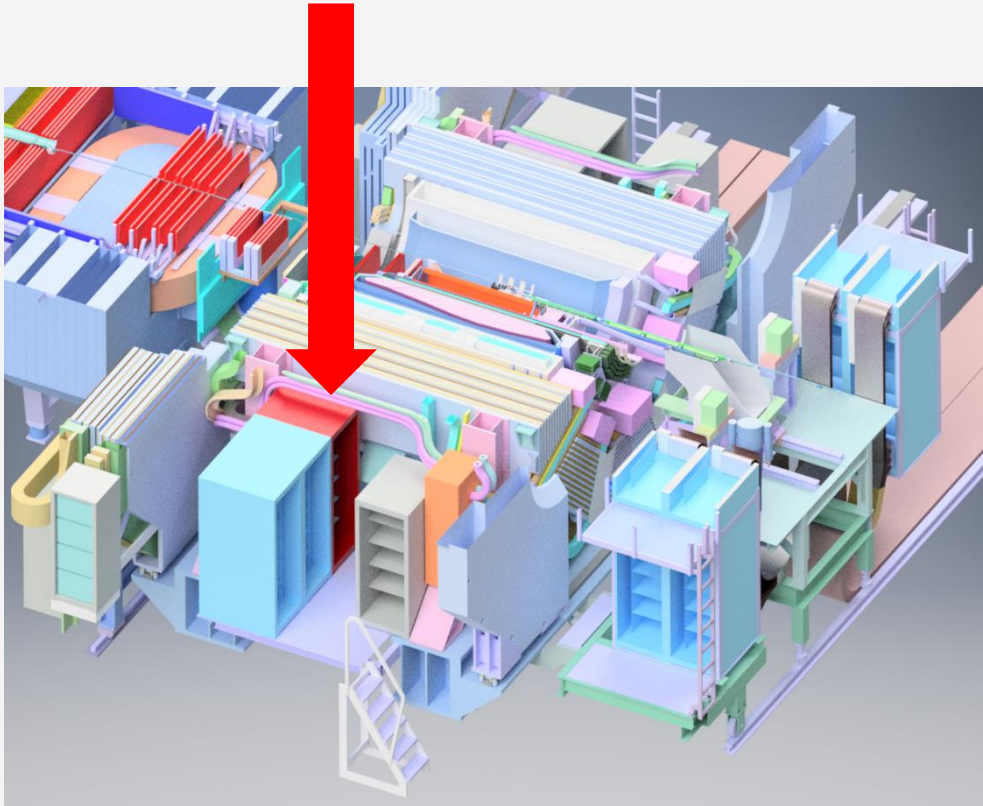
- Beam dump located beneath the detector
- Beam dump needs a backing pumping pipe to the pumping station at the target spectrometer platform
- Additionally a backup backing pump near the beam dump would be worthwhile
- No concrete plans do exist about pumping line routing, yet
- Possible locations and realization of these lines/pumping solutions are open for discussion

Location of the Cluster-Jet Target Rack



- We bring our own **rack** for the cluster-jet source
- Already completely filled and set into operation at Münster
- Concrete location and size already shown in the latest PANDA step files
- Connections, power lines, etc. shown in the previous slides

Location of the Beam Dump Rack



- As being told the **rack 42U-T1009** on platform TW East is still completely unclaimed
- So we claim the whole rack for the beam dump electronics
- About 1/2 is filled with the turbopump supply units
- The other half can be used for the final slow control system by the **Warsaw group**
 - Which supply lines etc. are needed here?
 - Other wishes?

Summary and Outlook

- Ongoing beam studies and adjustments to determine gas loads and flows
- Currently no possibility to do measurements with highest thickness in Münster (and COSY) due to broken hydrogen purifiers
- Continuous development of local target controls
- Electrical, coolant, gas installations at PANDA shown
 - Additional input from gas system and slow control subgroups is welcome
- Beam dump vacuum pipe/pump connection plans have to be concreted

