

Alignment and Survey in PANDA Cave

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- Presentations concerning Alignment and Surveying
- Optical Devices for Alignment and Surveying
- Target seat at Cave Walls
- Visibility of Fiducial Targets for 3 Exemplary Tripod Positions
- Questions

Presentations concerning Alignment and Surveying

Roman Klasen (HIM Mainz) had shown a presentation for the Luminosity Detector at the MEC session in Giessen, March 2015. It contains a fine introduction to alignment and surveying in general.

<https://indico.gsi.de/conferenceDisplay.py?confId=3480>

Optical Devices for Alignment and Surveying

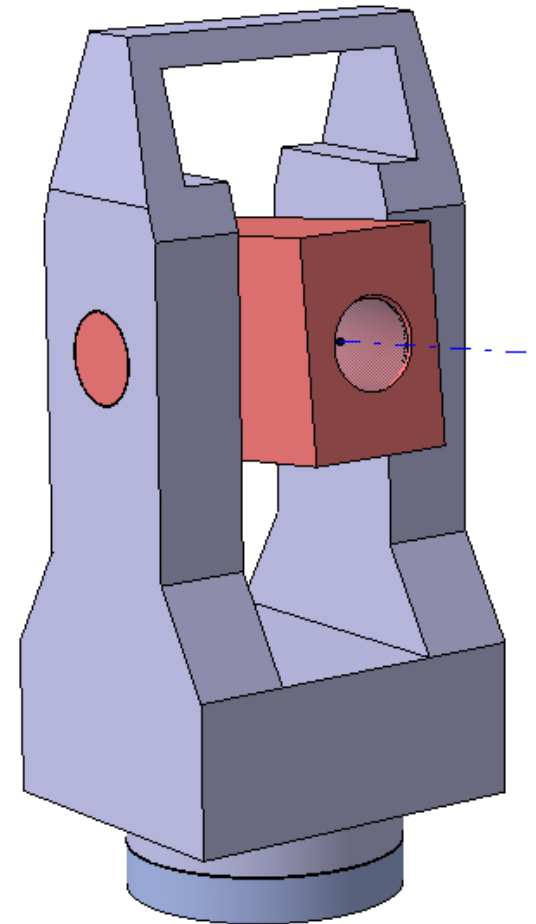
Laser-Tracker:

- high precision (<0.05 mm)
- relatively easy to use (laser beam follows automatically an SMR which is carried by the operator from a defined conical seat at the tracker to a conical seat at the target)
- 3D coordinates in Real Time
- high price ($> 80\text{k€}$),
- path between tracker and target has to be walkable

Theodolite:

- inexpensive (with compensator and digital display $< 2\text{k€}$)
- path between theodolite and target does not have to be walkable
- application more complicated than for laser-tracker
- only angles can be measured*
- precision down to $40 \mu\text{rad}$ ($0.4\text{mm}/10\text{meter}$, or $10''$)

* there are theodolites with laser distance measurement (Tachymeter) but the accuracy is not better than 2mm



SMR (Spherically Mounted Reflector, or "Corner Cube")

Target seat at Cave Walls

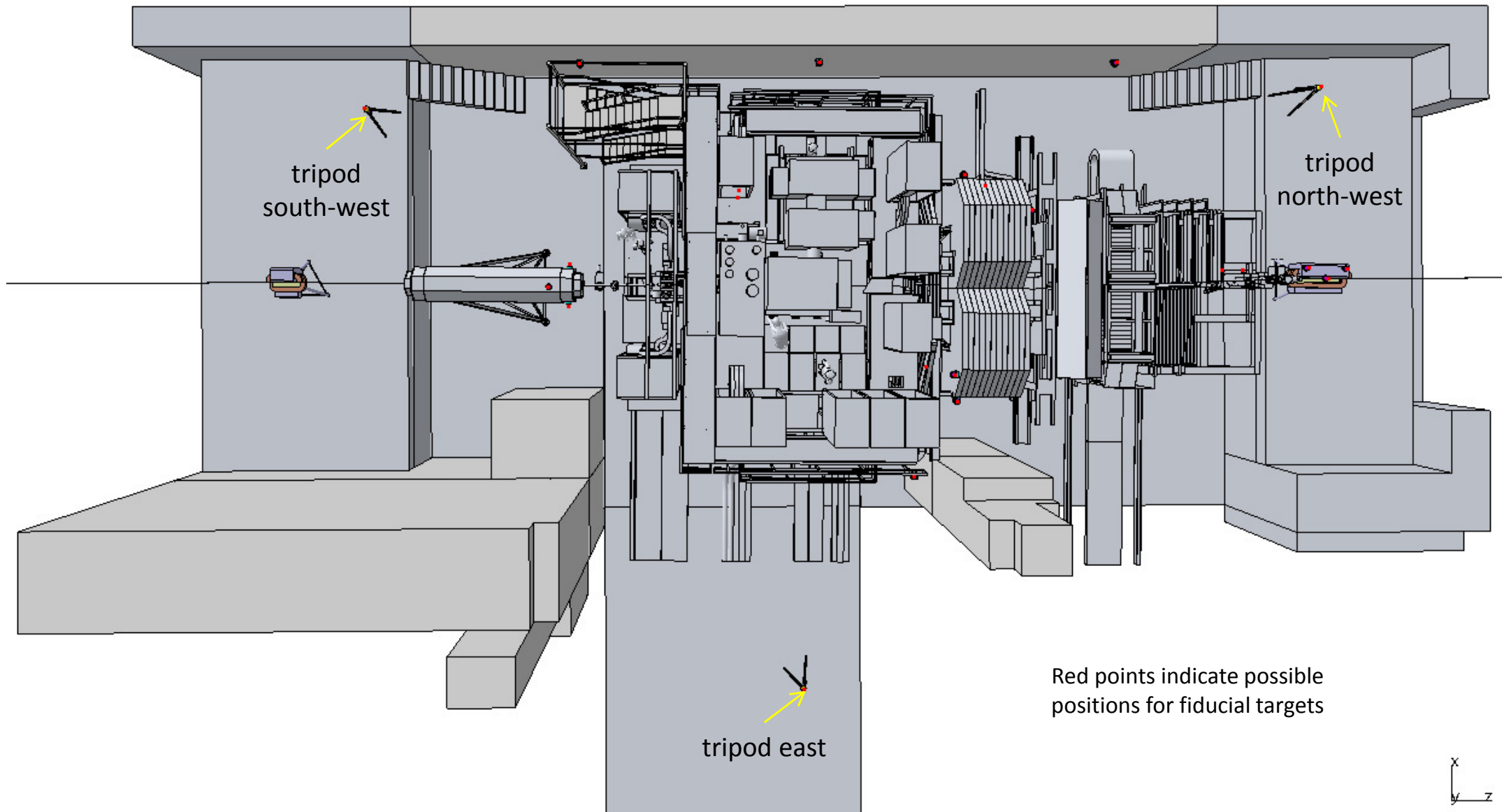
Several target seats will be distributed in the cave. They define fixed points for surveying.

FAIR has defined technical guidelines for surveying:

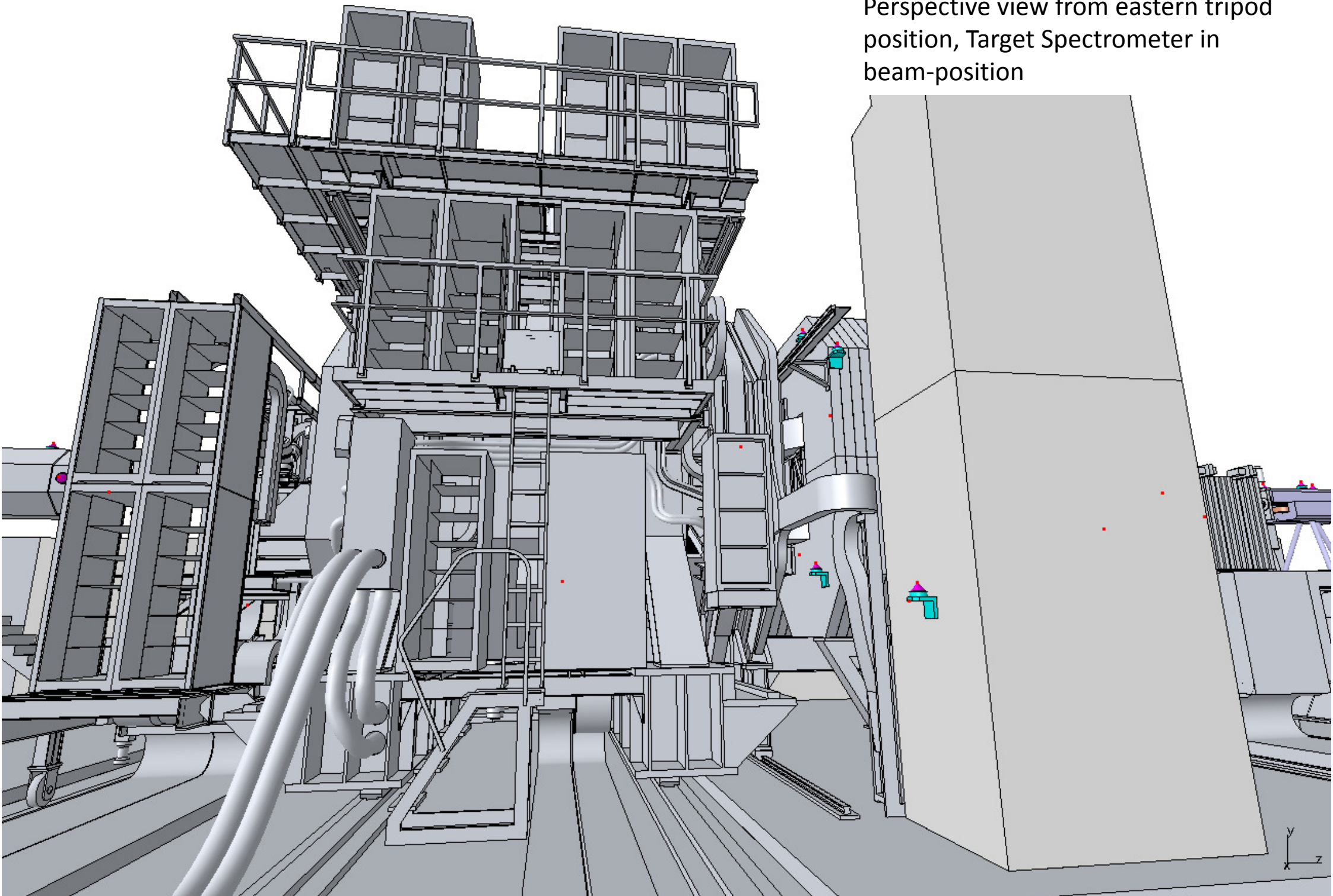
<https://edms.cern.ch/project/FAIR-000001289>



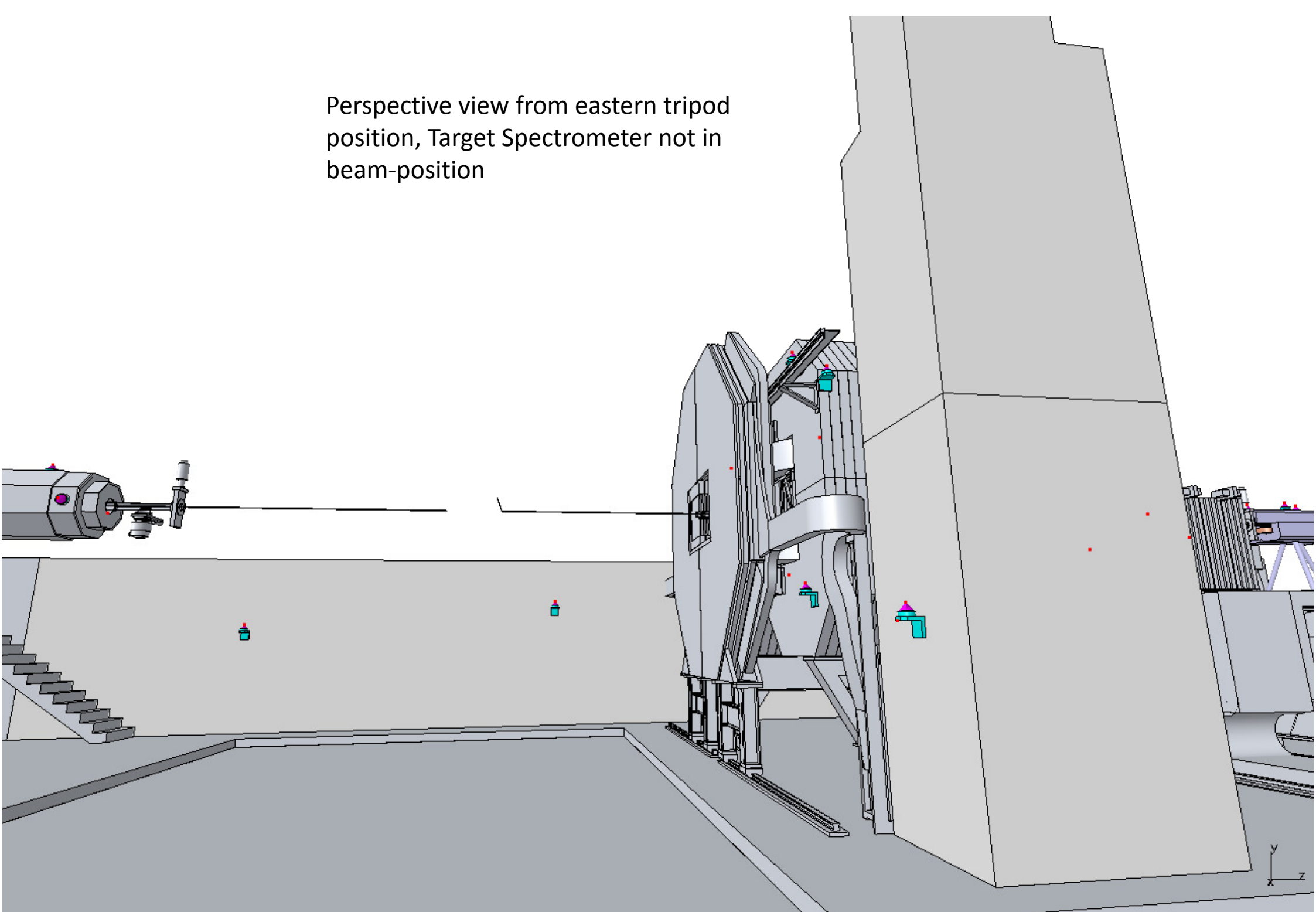
Visibility of Fiducial Targets for 3 Exemplary Tripod Positions



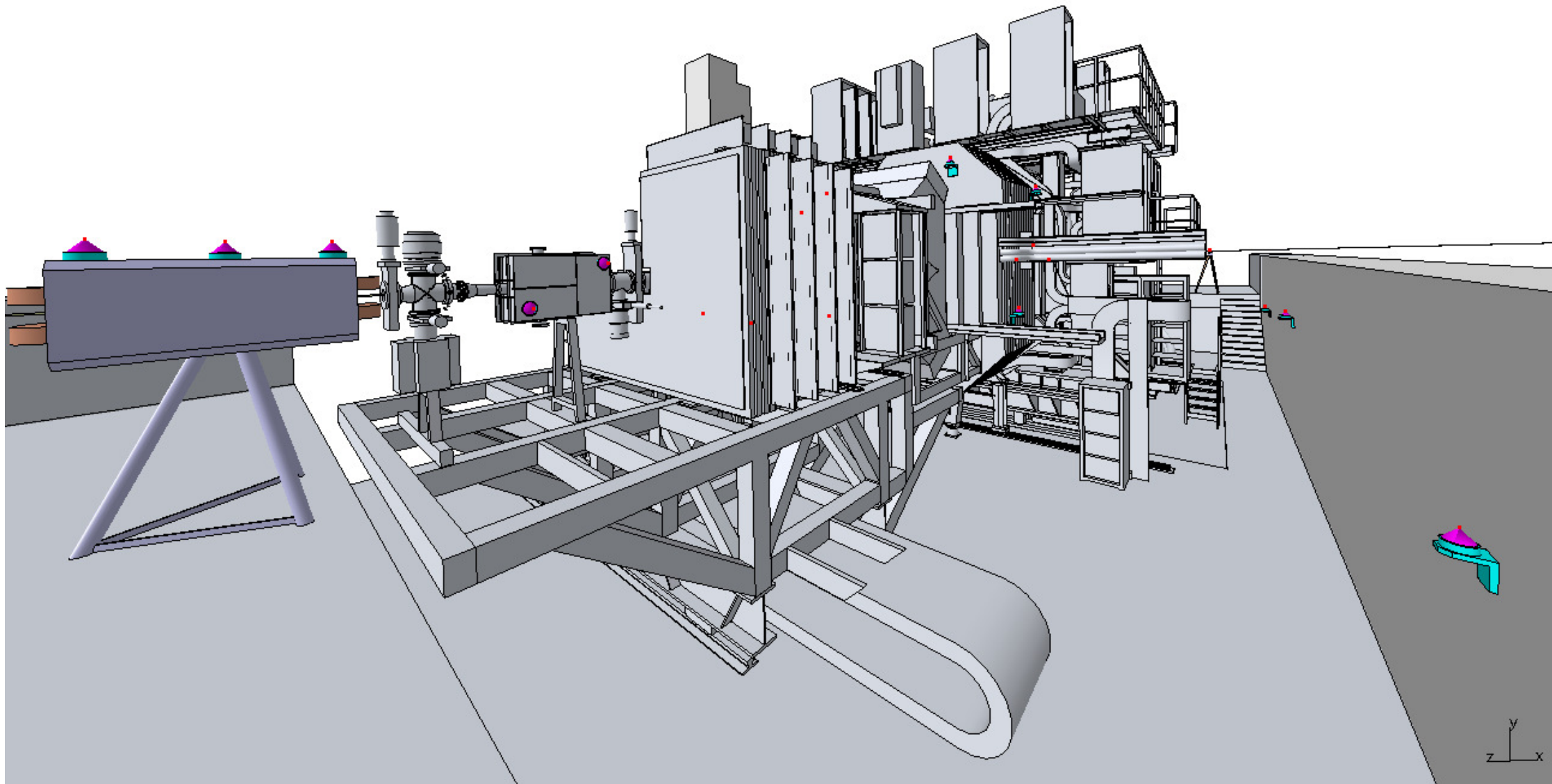
Perspective view from eastern tripod position, Target Spectrometer in beam-position



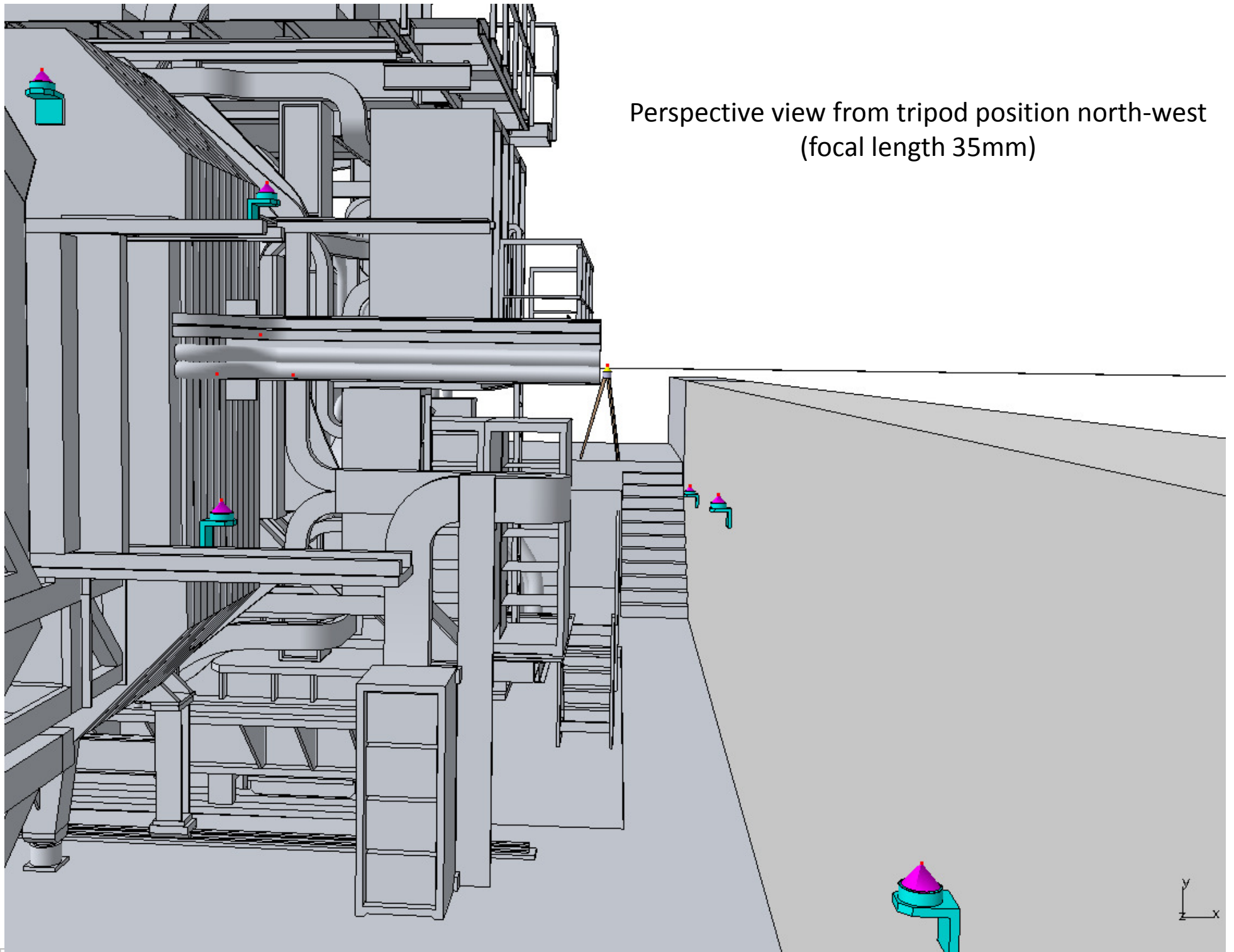
Perspective view from eastern tripod position, Target Spectrometer not in beam-position



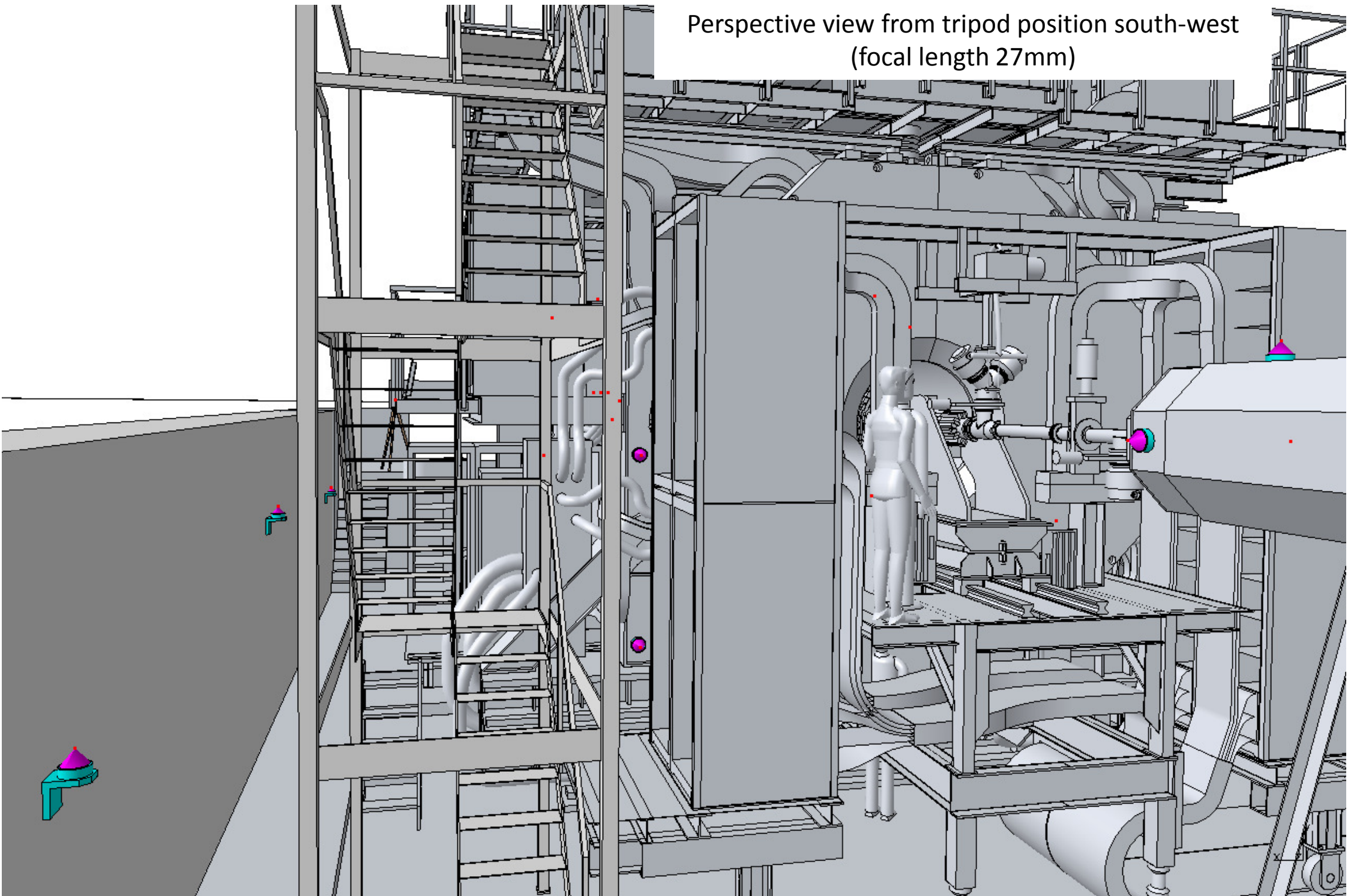
Perspective view from tripod position north-west
(focal length 11mm)



Perspective view from tripod position north-west
(focal length 35mm)



Perspective view from tripod position south-west
(focal length 27mm)



Questions

- Which optical instruments should we acquire?
- What do the detector groups need for alignment?