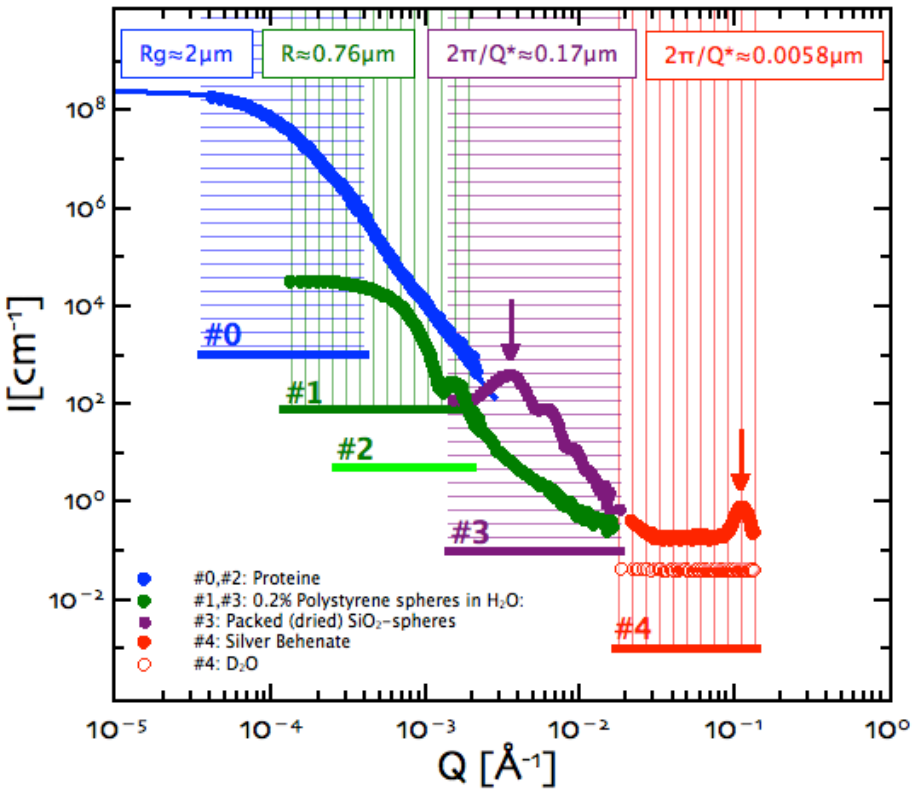
Very Small Angle Diffractometer KWS-3 at MLZ

Status: April'2016

- Q-range
- upgrade 2016 :: June'2016
- sample environment @ KWS-3
- next developments @ KWS-3 :: 2016/2017

KWS-3 current Q-range

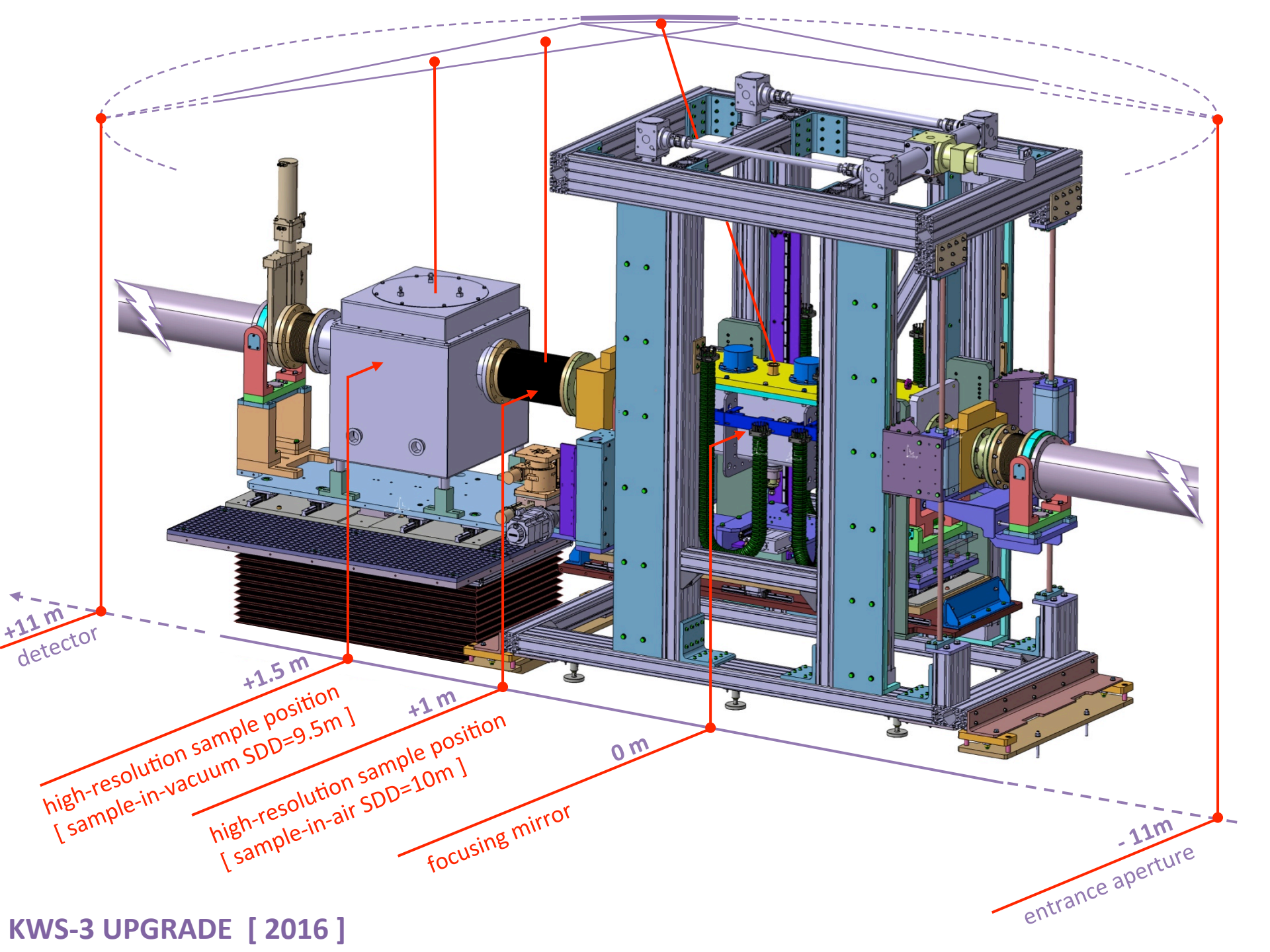


#0 VHR detector
[3x3 cm^2, ≈0.3mm resolution]

#1-#4 Standard HR detector
[⦸9cm, ≈1mm resolution]

SDD: 9.5m (#0-#2), 1.3m (#3),
0.15m (#4)

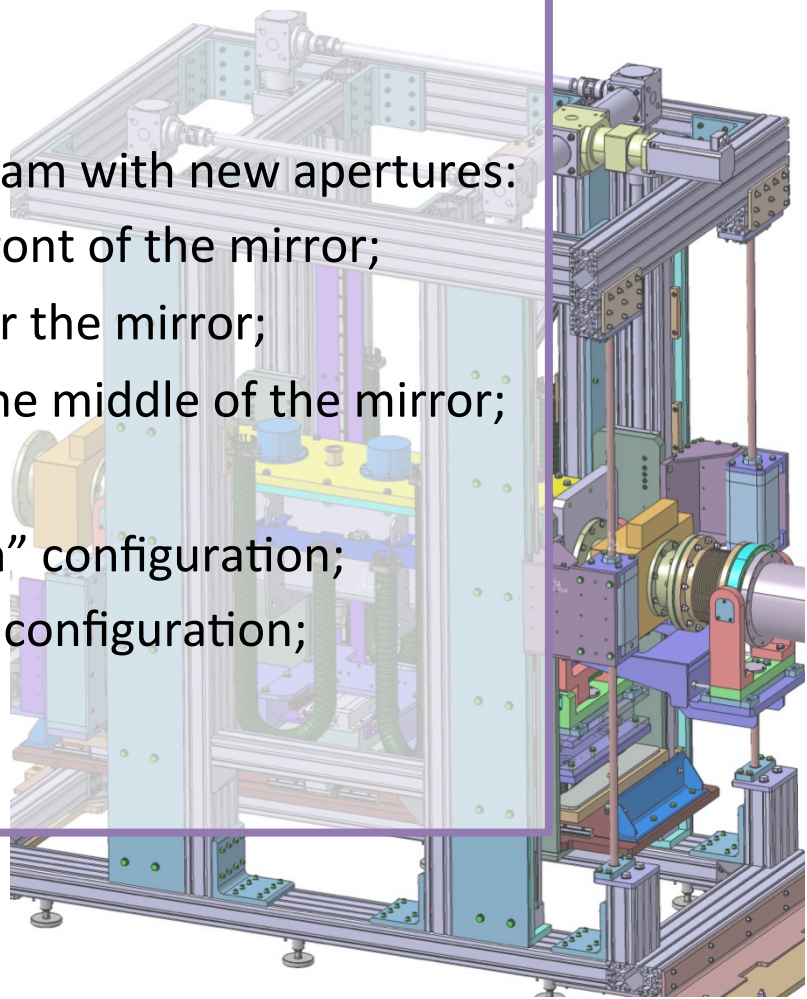
- **standard mode** :: high resolution Q_{min}=**1.0x10^{-4}**, **>22k** ✔
- **standard mode** :: high intensity Q_{min}=**2.5x10^{-4}**, **>130k** ✔
- **overlap mode** :: SANS-overlap Q_{max}=**2.0x10^{-2}**, **>130k** ✔
- **overlap mode** :: DCD-overlap Q_{min}=**4.0x10^{-5}**, **>1.5k** ✔
- **instrument calibration mode** Q_{max}=**0.2**, **>130k** ✔



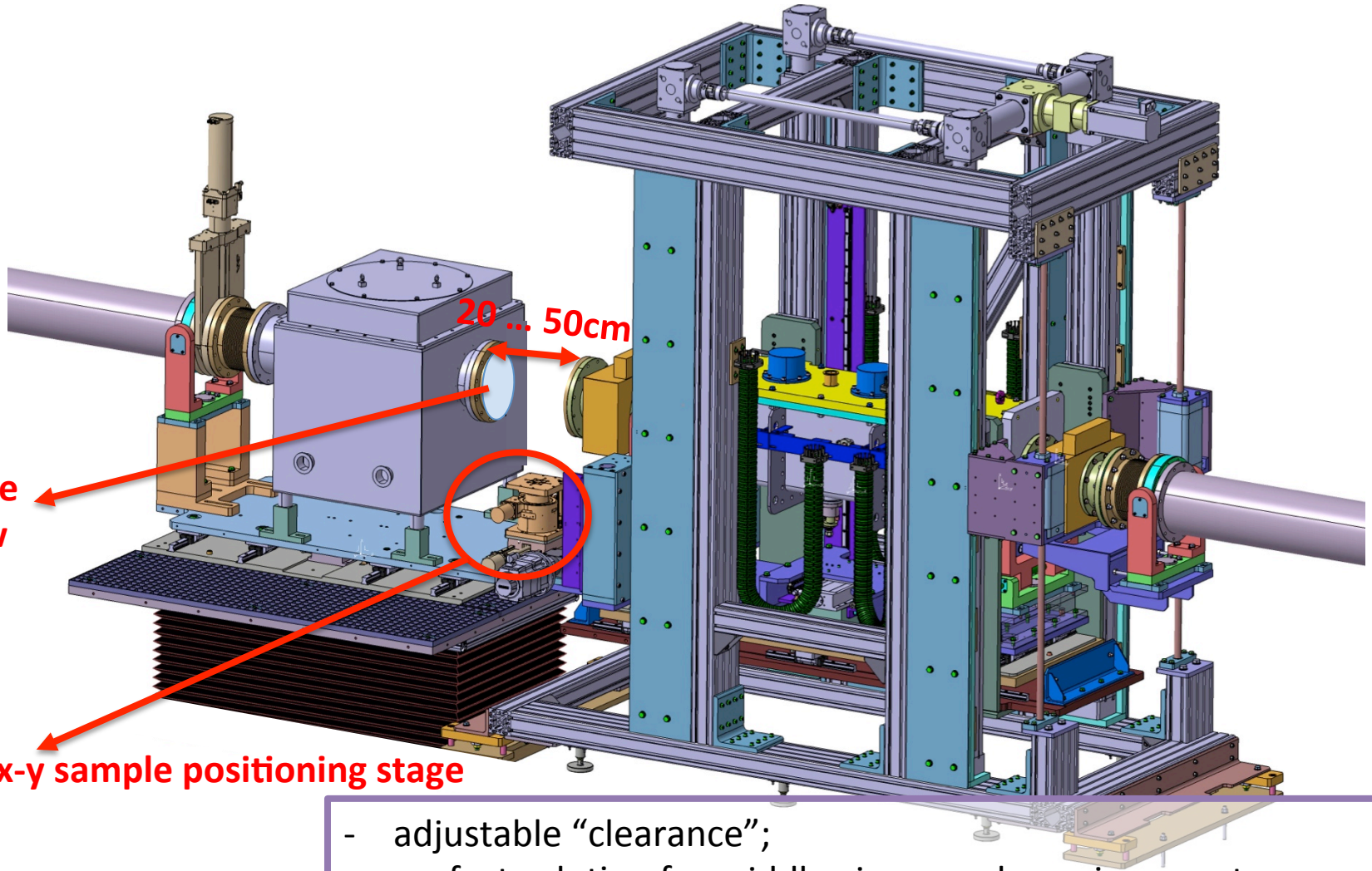
KWS-3 UPGRADE [2016]

New :: Mirror Positioning System

- mechanical decoupling of focusing system and rest of instrument;
- easy-adjustment of the focus;
- possibility to select position of mirror with maximal flux:
  - in horizontal plane;
  - in vertical plane;
- new system of beam “definition”. “Clean” beam with new apertures:
  - 4-blade aperture with mirror profile in front of the mirror;
  - 4-blade aperture with mirror profile after the mirror;
  - 1-blade aperture with mirror profile in the middle of the mirror;
- vertical angulation:
  - -0.5° … 5° [0 … 0.12Å^{-1}] in “mirror-down” configuration;
  - -5° … 0.5° [-0.12 … 0 Å^{-1}] in “mirror-up” configuration;
- horizontal angulation: ±0.05°
- ready for guiding field

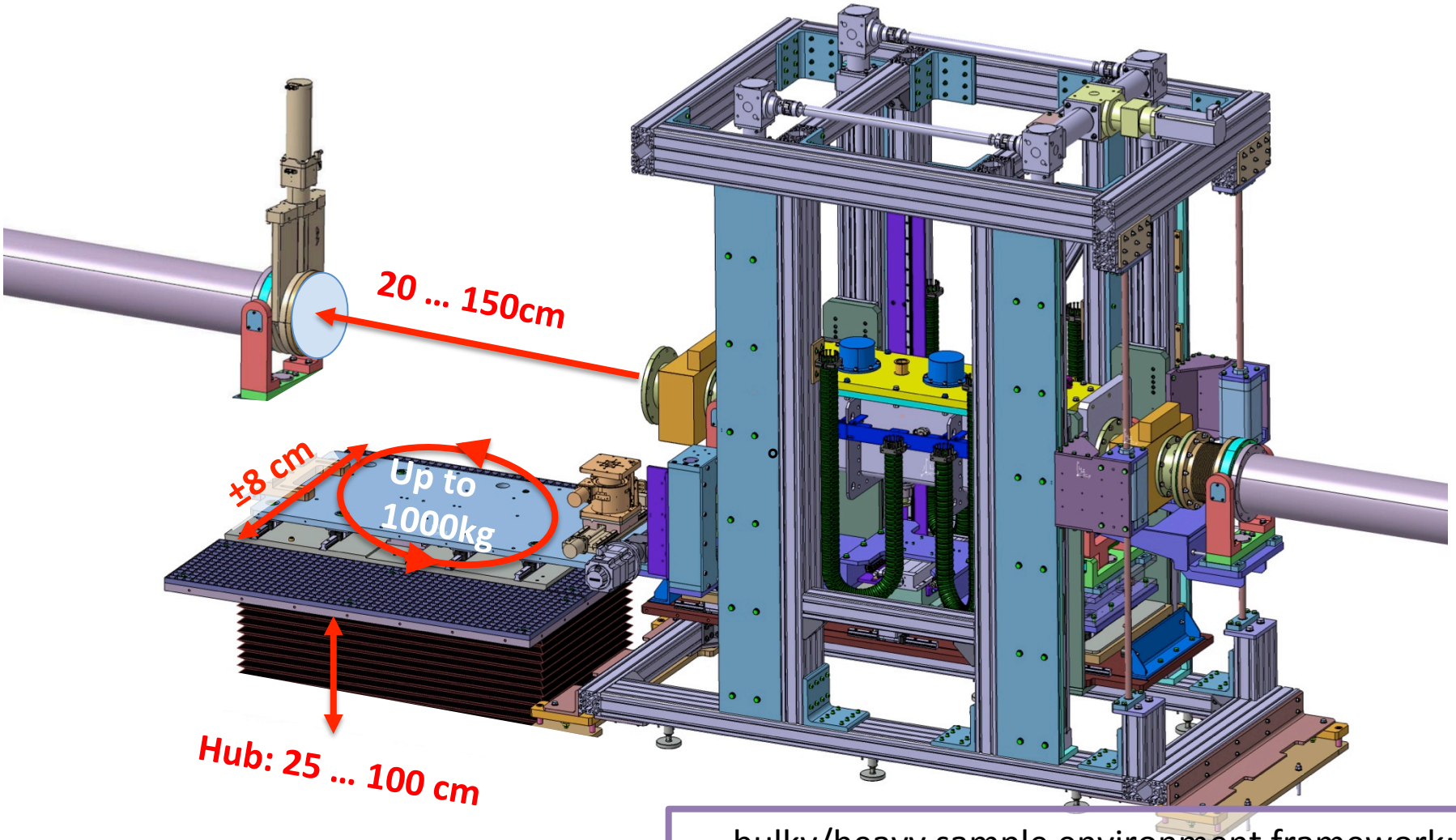


New :: High-Resolution Sample Position for samples in Air



- adjustable “clearance”;
- perfect solution for middle-size sample environment:
  - rheometers, pressure cells, magnets, cryostats, ovens, …
- >5% instrument resolution improvement;
- easy-access for mounting and sample-change;
- KWS-3 crane could support all actions here…

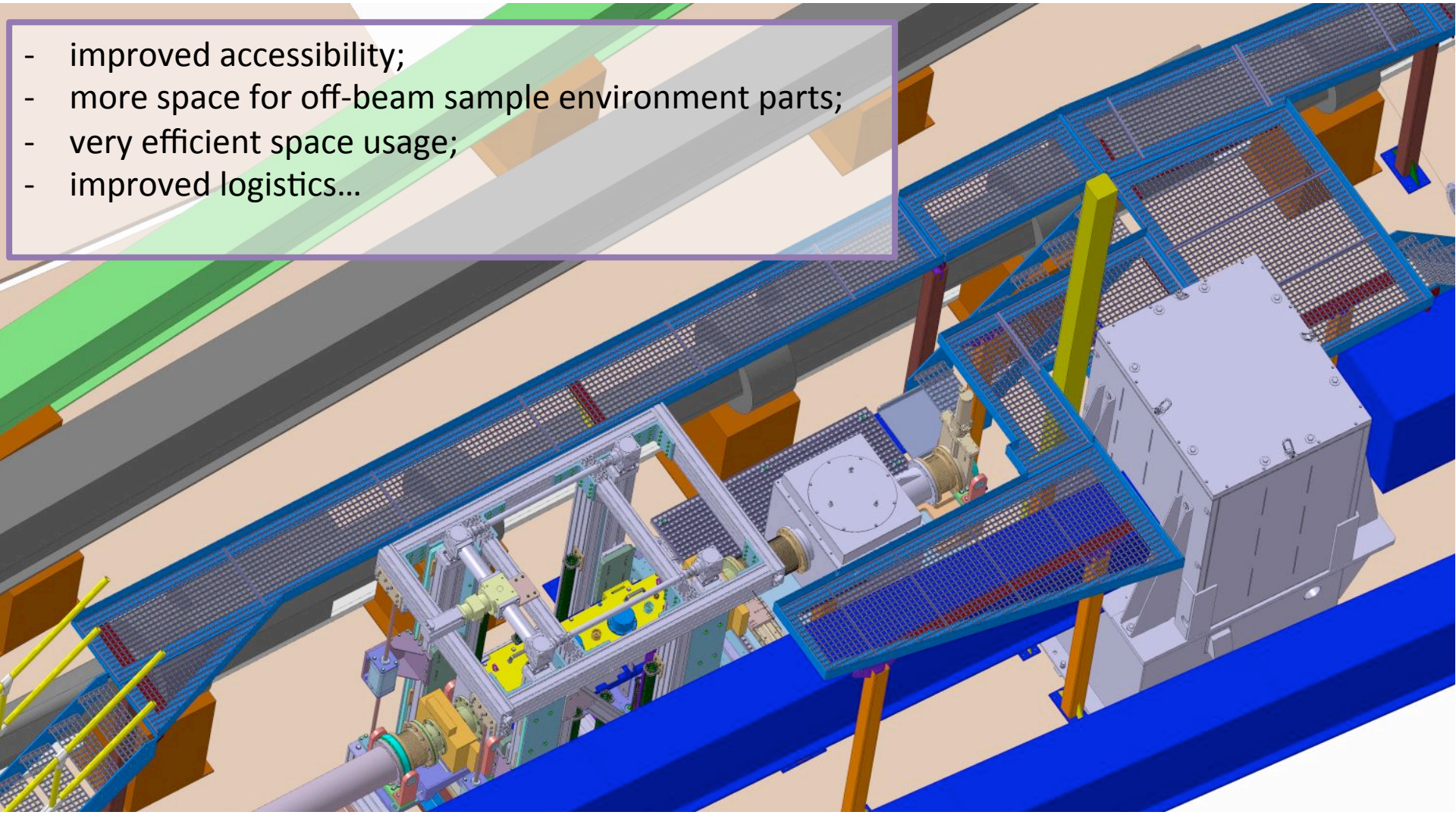
New :: Sample Positioning of Bulky/Heavy Sample Environment



- bulky/heavy sample environment framework;
- adjustable clearance;
- up to 1000 kg;
- x,y- positioning + rotation;
- removable vacuum chamber;

Platform improvement

- improved accessibility;
- more space for off-beam sample environment parts;
- very efficient space usage;
- improved logistics…

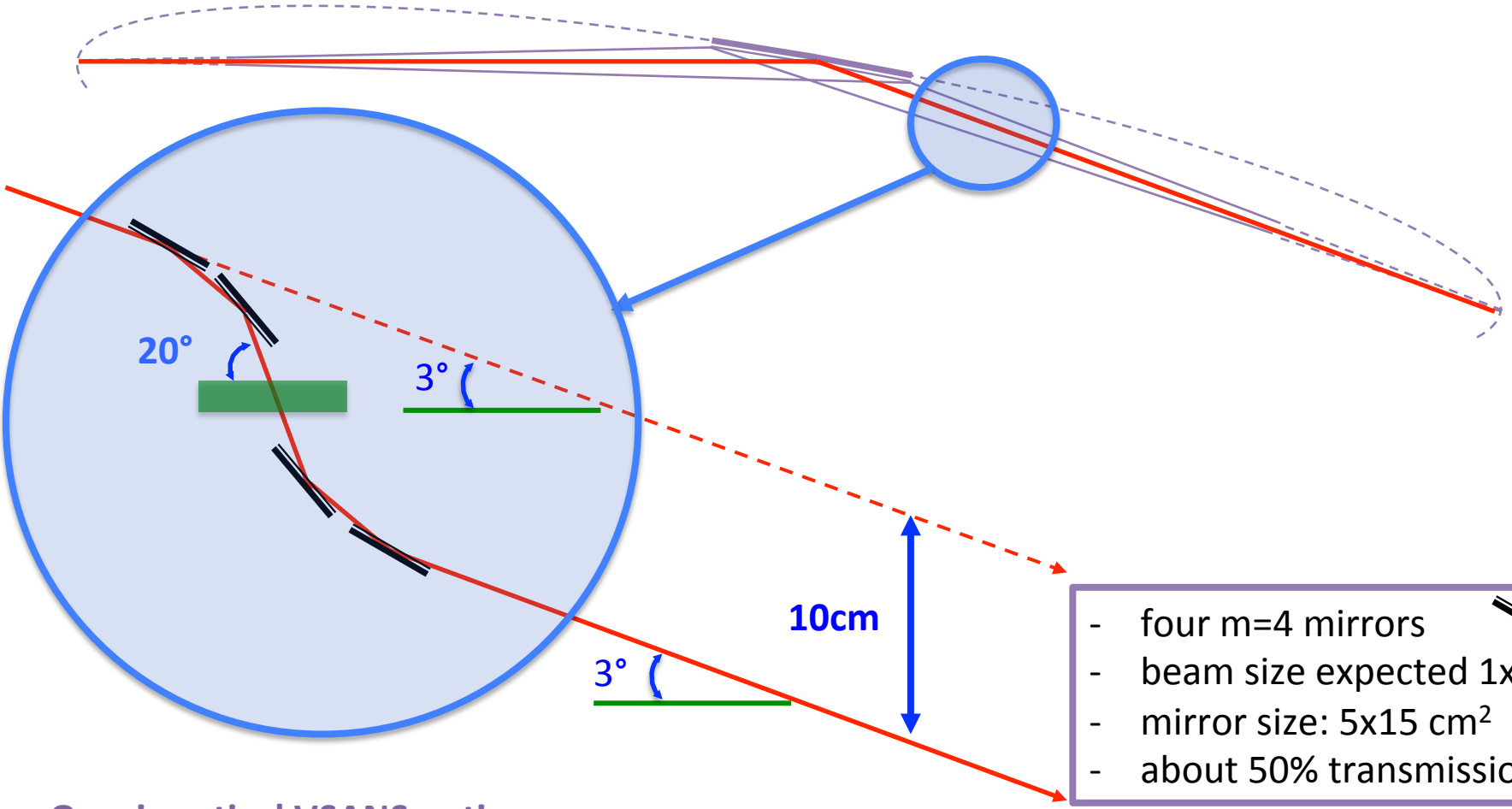


Sample Environment available @ KWS-3

- CD_4/CO_2 gas pressure cell :: up to 0.6 kBar, up to 2x2cm^2 aperture;
- liquid pressure cell :: up to 5kBar, Ø 8mm aperture;
- 5T horizontal magnet, with cryostat and He_3-insert;
- 0.6T compact horizontal magnet , with cryostat and He_3-insert;
- 2.2T vertical electromagnet;
- Biologic Stopped-flow mixer [1x1cm^2];
- rheometer;
- sample-rotating-holders, > Ø 20 mm aperture;
- different temperature control holders -20.. +200C;
- cryostat with sapphire windows;
- …

Upgrades with commissioning in January 2017

- polarized neutrons;
- quasi-vertical VSANS option (see below)



- four m=4 mirrors
- beam size expected 1x4cm^2
- mirror size: 5x15 cm^2
- about 50% transmission

Quasi-vertical VSANS option