

DESIGN OF A LONG VERSATILE DETECTOR TUBE SYSTEM FOR PINK BEAM SMALL-ANGLE X-RAY SCATTERING (SAXS) BEAMLINE AT HEPS

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Introduction

X-ray scattering experiment vacuum camera device is the first set of high-energy synchrotron radiation light source applied to powder small angle scattering experiment pipe system, which has multiple experimental modes, can be WAXS, SAXS and USAXS experiments alone, can also be SAXS/WAXS/USAXS combination experiments.

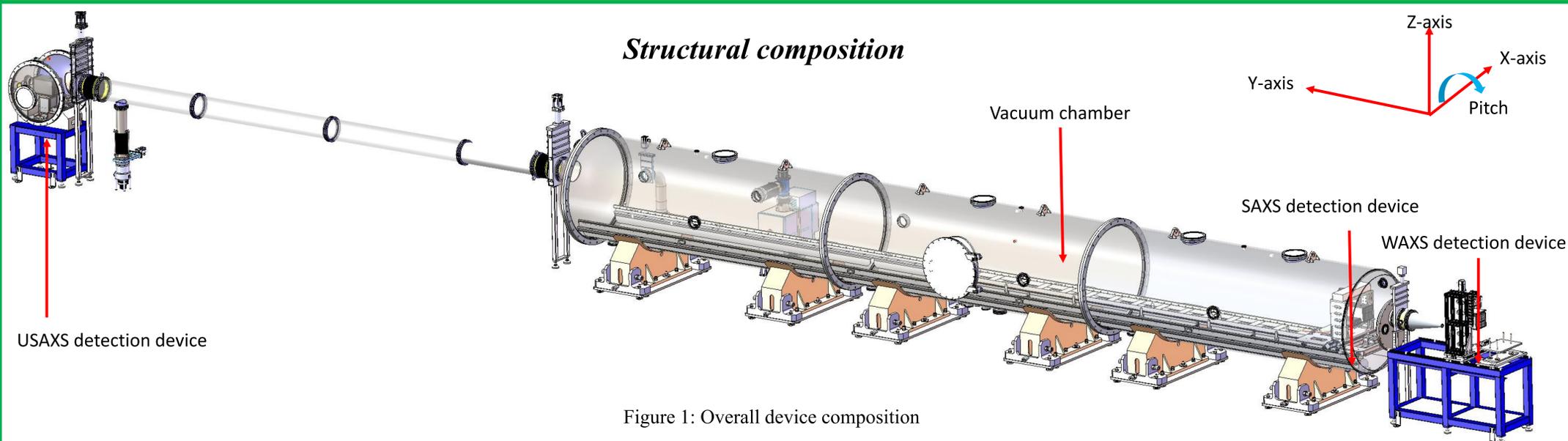


Figure 1: Overall device composition

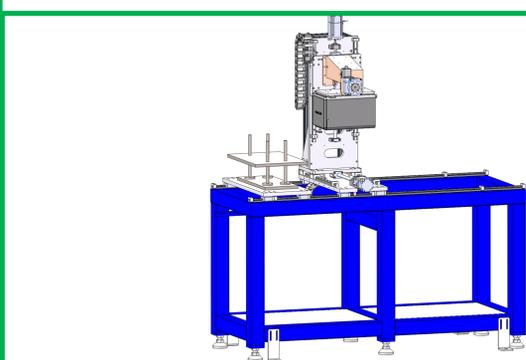


Figure 2: The device for WAXS experiment

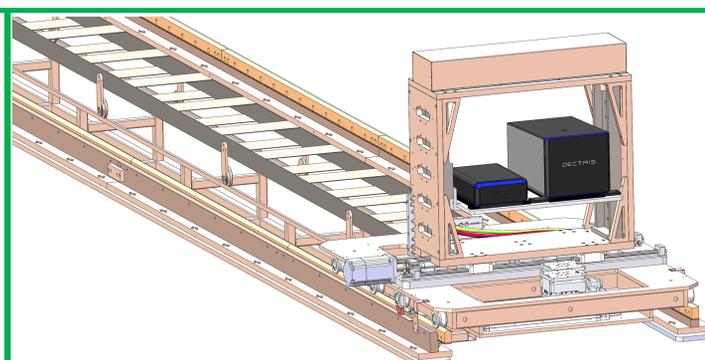


Figure 3: The device for SAXS experiment

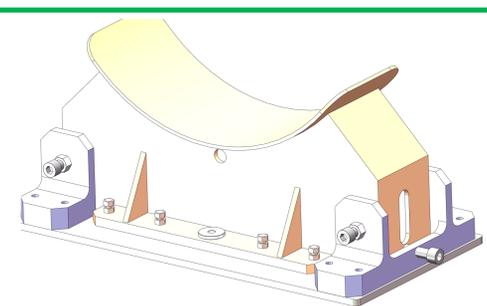


Figure 4: Support base of three thick pipes

Figure 4 shows the support base of three thick pipes. The thick pipe has the characteristics of large mass and high center of the pipeline. There is a moving mechanism inside the pipeline, so the stability of the three-section thick pipe is required by higher requirements. Combining the above characteristics, the base of the pipe is designed as a saddle type.

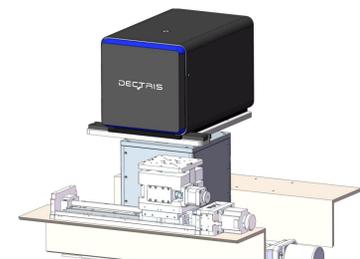


Figure 5: The device for USAXS experiment

The device of USAXS experiment only has two functions: lifting and lateral displacement. Its structure is relatively simple. Again, it is located in a vacuum and is used to do USAXS experiments.

Design parameters and indicators

The total length of the device is 26700 mm.
The inner diameter of the thick pipe is 1500 mm and the inner diameter of the thin pipe is 300 mm.
The length of the inner track of the thick pipe is 14000 mm.
The vacuum degree of the vacuum chamber is 0.5Pa.
The SAXS detector has a straightness of 1 mm in the Y direction.
The stability error of each detector is 15 μ m.
The repeatable positioning accuracy of the detector in the X-axis and Z-axis directions is 10 μ m and the resolution is 5 μ m
The resolution of the pitch angle of the WAXS detector is 0.06
For radiation protection, the thick pipe cavity has a wall thickness of 20 mm

Conclusion and contact

The X-ray scattering experiment vacuum camera device is a device that takes into account vacuum, radiation protection, ground profile, structural stability and functional design at the same time. If the requirements allow, more structural designs can be added for experiments. The design presented in this article leaves something to be desired in many areas and needs to be improved in the future.

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