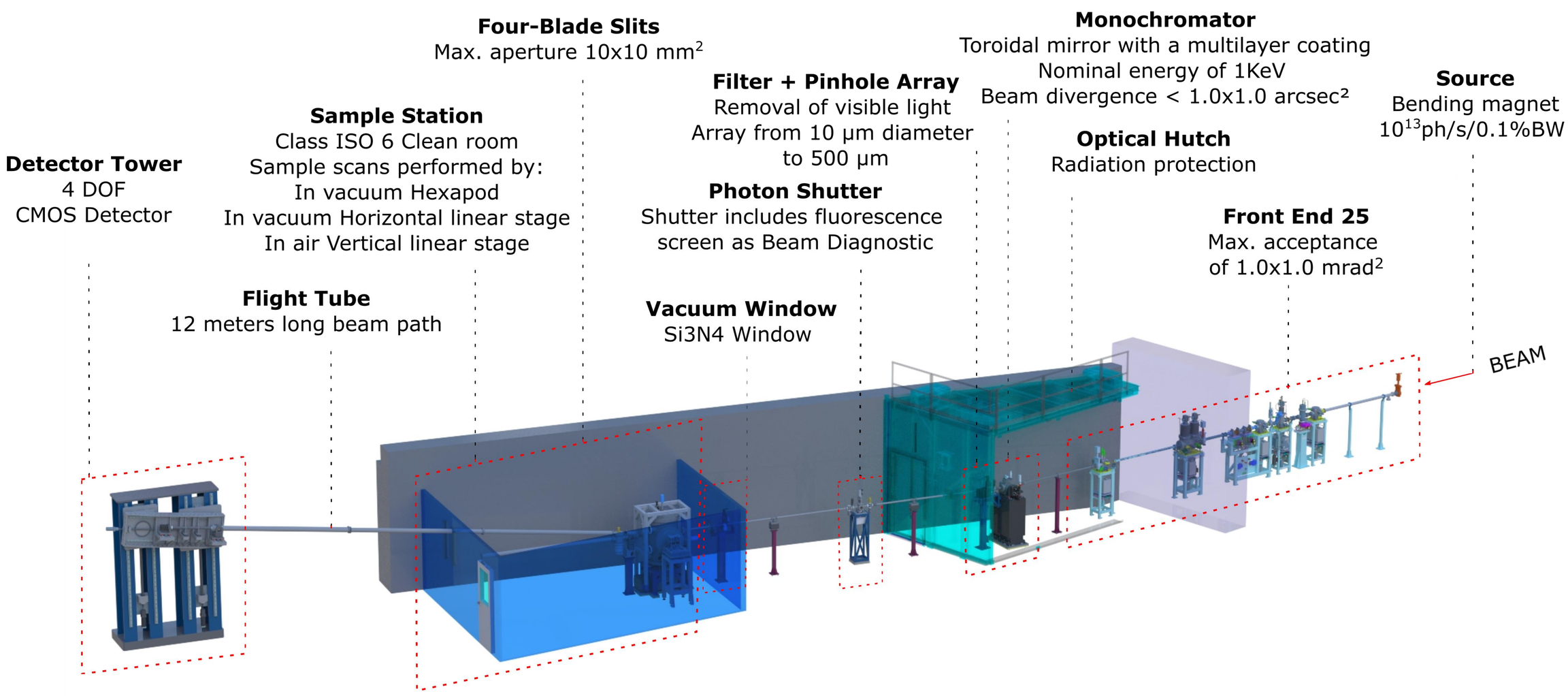
X-RAY FACILITY FOR THE CHARACTERIZATION OF THE ATHENA MIRROR MODULES AT THE ALBA SYNCHROTRON

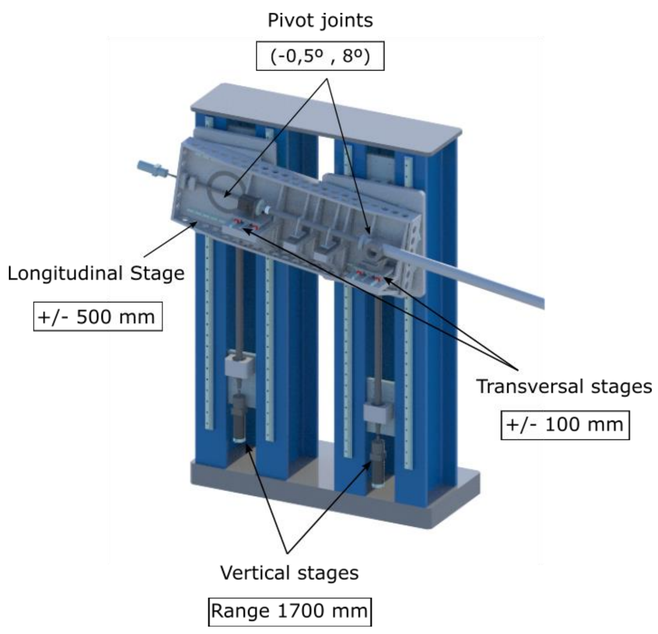
Antonio Carballedo[a], Dominique Heinis[a], Carles Colldelram[a], Guifré Cuní[a], Núria Valls Vidal[a], Óscar Matilla[a], Jordi Marcos[a], Alejandro Sánchez[a], Joan Casas[a], Josep Nicolàs[a],
Nicolas Barrière[b], Maximilien J. Collon[b], Giuseppe Vacanti[b], Evelyn Handick[c], Peter Müller[c], Michael Krumrey[c], Ivo Ferreira[d], and Marcos Bavdaz[d]

[a]ALBA Synchrotron, Carrer de la Llum 2-26, 08290 Cerdanyola del Vallès, Spain
[b]cosine measurement systems, Oosteinde 36, 2361 HE Warmond, The Netherlands
[c]Physikalisch-Technische Bundesanstalt (PTB), Abbestr. 2-12, 10587 Berlin, Germany
[d]European Space Agency, ESTEC, Keplerlaan 1, PO Box 299, 2200 AG Noordwijk, The Netherlands

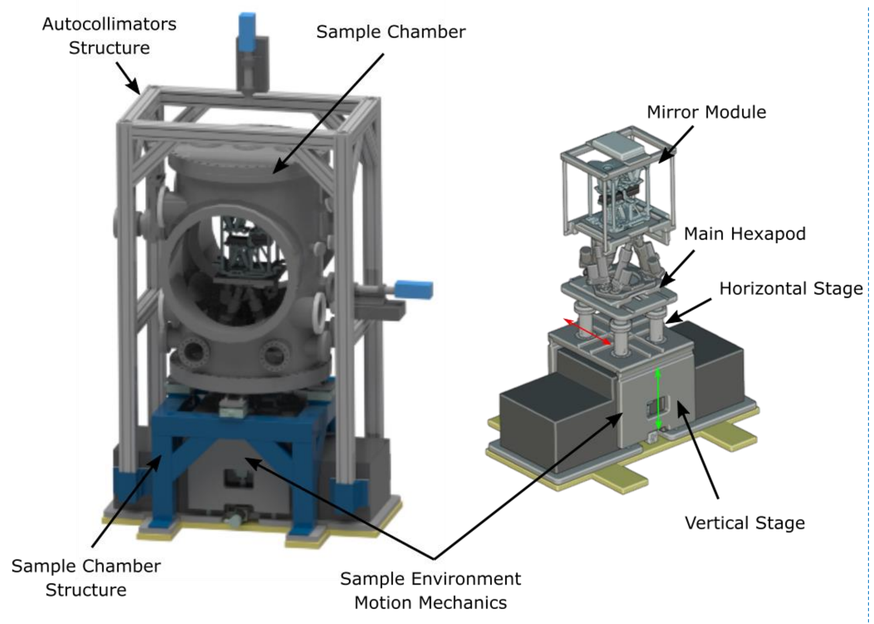
ABSTRACT

MINERVA is a new X-ray facility under construction at the ALBA synchrotron specially designed to support the development of the ATHENA (Advanced Telescope for High Energy Astrophysics) mission [1]. The beamline design is originally based on the monochromatic pencil beam XPBF 2.0 from the Physikalisch-Technische Bundesanstalt (PTB), at BESSY II already in use at this effect [2]. MINERVA will host the necessary metrology equipment to integrate the stacks produced by the cosine company in a mirror module (MM) and characterize their optical performances [3]. From the opto-mechanical point of view, the beamline is made up of three main subsystems. First of all, a water-cooled multilayer toroidal mirror based on a high precision mechanical goniometer [4], then a sample manipulator constituted by a combination of linear stages and in-vacuum hexapod and finally an X-ray detector which trajectory follows a cylinder of about 12 m radius away from the MM. MINERVA is funded by the European Space Agency (ESA) and the Spanish Ministry of Science and Innovation. MINERVA is today under construction and will be completed to operate in 2022.

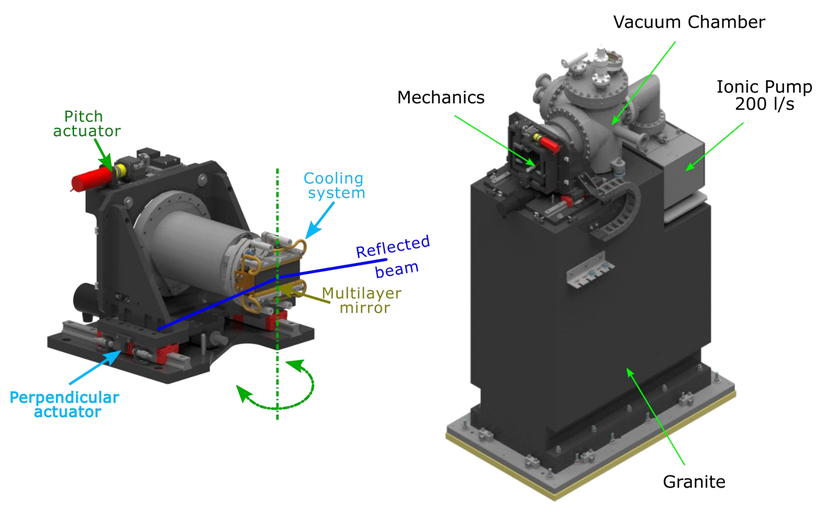




- 4 DOF system.
- Detector follow the beam in a cylindrical shape of 12 m radius.
- Open design to allow Laser Tracker Feedback of detector screen.



- High precision in-air vertical motion based on a skin concept [5].
- High precision in-vacuum horizontal stage.
- In-vacuum 6 DOF Hexapod.
- Autocollimator feedback for sample orientation.



- Toroidal Mirror with a multilayer coating at 1 KeV.
- Top-side water cooling system based on a KM mount.
- Granite support for high stability.
- Submicron resolution horizontal stage normal to mirror surface.
- Submicron resolution pitch stage with vertical axis on mirror surface.

STATUS

- Detailed design almost complete. Production phase started. First critical installation (optical hutch) done.
- Beamline commissioning expected by the end of 2022.

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CONTACT

Antonio Carballedo, **acarballedo@cells.es**

ALBA Synchrotron
Carrer de la Llum 2-26
08290 Cerdanyola del Vallès,
Barcelona, Spain
Tel: +34 93 592 43 00