

# PhotonMEADOW 2023

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## MooNpics –European metrology round-robin collaboration observing different aspects on high-quality X-Ray mirrors

We present here a summary of the European metrology round-robin project MooNpics - Metrology On One-Nanometre-Precise Optics. Established in 2017, this collaboration between ten European light sources and two X-ray optic manufacturers aimed to improve the quality and availability of high-precision X-ray mirrors. Several work packages were created to focus on the metrology and analysis methods used in the European light sources' metrology labs as well as on software and methods for focal spot reconstruction and fast mirror alignment. Different aspects of X-ray mirror production and metrology were observed. For this purpose, three high-quality X-Ray mirrors with different shapes and surface structures were investigated in a European-wide round-robin experiment over four years. Mirrors with very different parameters were chosen to meet the large variety of metrology instruments used in the facilities and to explore different aspects of height and slope error measurements. One of the round-robin mirrors, a 950 mm long plane mirror could be used to calibrate instruments and to identify errors due to its very high flatness and extremely good surface quality. One strongly curved spherical and one elliptical mirror served these purposes with their strong shapes and imprinted structures. Results of the plane mirror will be presented here.

With the large amount of metrology data collected, a cross-calibration of instruments and methods used in the facilities was made possible. In addition, it enabled the metrology labs to develop new methods, to create standards and to improve deterministic polishing methods in close collaboration with our industrial partners.

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yes

**Primary author:** SCHMIDTCHEN, Silja (European XFEL)

**Co-authors:** Ms FREIJO MARTIN, Idoia (European XFEL); Mr VANNONI, Maurizio (European XFEL); Mrs PLOENJES, Elke (Deutsches Elektronen-Synchrotron DESY); Mr SINN, Harald (European XFEL)

**Presenter:** SCHMIDTCHEN, Silja (European XFEL)

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