



Precision UV Lenses Enable Pioneering X-Ray Research

Optical Surfaces Ltd has supplied several sets of **ultra-high quality plano-convex lenses** to the **MAX IV Laboratory** to function as key focusing elements in diagnosing the beam in their state-of-the-art **3 GeV synchrotron storage ring**.



Image Caption:

A: Intense synchrotron light extracted from the Max IV Laboratory diagnostic beam line and focused by the ultra-high precision plano convex lens. (Courtesy: L. Isaksson)

Based at Lund University (Sweden),

the MAX IV Laboratory is an internationally renowned synchrotron facility providing scientists with the most brilliant X-rays enabling groundbreaking research in materials and life sciences using spectroscopy, diffraction, scattering and imaging techniques.

The 3 GeV ring diagnostic beamlines

at the Max IV Laboratory use a much longer wavelength region within the synchrotron radiation span than is used by most other beamlines. Measurements at the facility are based on Kirchoff's diffraction theory adapted to the synchrotron radiation emission and focusing in the near UV to visible range. In this way they can use a simple optical set-up based on transmission optics. However, to do this, the Max IV Laboratory research team required focusing lenses with high-quality surface accuracies ($\lambda/20$ P-V) and offering good transmission down to 200nm.

Åke Andersson

- a researcher in the accelerator development group at the MAX IV Laboratory said "In 2019, we chose Optical Surfaces Ltd. to supply the original high precision plano convex lenses at the heart of our beam focusing set-up because of their extensive experience of delivering critical ultra-high precision optics to synchrotron facilities around the world. In 2023, leading edge accelerator science results from our 3 GeV storage ring, based on the diagnostic beam lines using these



focusing lenses, was presented in the reputed journal - Physical Review Letters <https://doi.org/10.1103/PhysRevLett.131.185001>". He added "Exposed to high intensity synchrotron radiation over a period of years we found that carbon complex growth on the lens surface facing the light was lowering their performance. We have implemented actions to reduce this effect including, earlier this year, ordering several new sets of lenses from Optical Surfaces Ltd, which will enable us to continue and expand our synchrotron x-ray research work."

For further information on the beamlines and accelerators at the Max IV Laboratory please visit <https://www.maxiv.lu.se/beamlines-accelerators/>



Image Caption: B: Visible and near UV light, dispersed by a prism, positioned just before the focal plane of the focusing plano convex lens.(Courtesy: MAX IV Laboratory)

For further information

on larger diameter, ultra-high precision lenses for demanding applications please visit <https://optisurf.com/lenses/> or contact Optical Surfaces Ltd. on +44-208-668-6126 or sales@optisurf.com. Optical Surfaces Ltd. is today accepted as one of the world's leading manufacturers of large high-precision optics and optical systems for synchrotron research.

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