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## Performance of x-ray optics at the European Synchrotron Radiation Facility

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The European Synchrotron Radiation Facility in Grenoble is the first operational and presently the brightest third generation high energy synchrotron source in the world. It provides X-ray beams of unprecedented quality in an energy range from hundred eV to a few hundred keV. In order to fully exploit the source quality adequate X-ray optics is needed that can cope with not only the low emittance but also the high brilliance and the severe heat load. A very strong effort has been devoted at the ESRF to this vital issue since its creation.

This paper will give a general overview of the challenges, the strategies, and the solutions in the X-ray optics research and development at the ESRF, followed by a presentation of the experience gathered on the beamlines. The performances of state-of-the-art mirrors, single crystal monochromators and multilayer structures including supports for bending and cooling, will be given. Amongst the topics are: adaptive optics and cryogenic cooling to solve the heat load problem, Bragg-Fresnel optics for microfocusing, X-ray phase plates for polarization and diamond crystals. A metrology laboratory for accurate surface evaluation and an optics test beamline will be described briefly.

It is shown that today's X-ray optical elements at the ESRF are capable of preserving the high quality of the present X-ray beams, a result that was not at all obvious a few years ago [1,2].

[1] A. K. Freund, SPIE Proceedings Vol. 2515, 445 (1995).

[2] A. K. Freund, J. Susini and E. Ziegler, Synchr. Rad. News 8(4), 28 (1995).