

# High Precision Alignment at the European Synchrotron Radiation Facility

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## SUMMARY

The European Synchrotron Radiation Facility (ESRF) is an accelerator laboratory located in Grenoble – France. It is supported and shared by 20 countries. The ESRF operates the most powerful synchrotron radiation light source in Europe.

A synchrotron is a stadium-sized machine that produces many beams of bright X-ray light. Each beam is guided through a set of lenses and instruments called a beamline, where the X-rays illuminate and interact with samples of material being studied. Many countries operate synchrotrons—there are 10 in Europe—but only four worldwide are similar in design and power to the ESRF. Synchrotrons provide flexible, powerful methods for learning about the structure and behaviour of matter at the molecular and atomic level. Scientists use the ESRF to explore everything from exotic states of matter to snake fossils to the reason why chocolate sometimes develops a white film when it melts. There are dozens of highly specialised techniques for using synchrotron X-rays, each with its own strengths and applications.

The ESRF beamlines and their experiments cannot function without high precision alignment. Typically tolerances are less than 1 mm and often in the order of a few tens of microns over distances ranging between 70 m and 200 m. We will discuss the techniques that used to achieve these extremely tight tolerances.