

Online correlation of data quality and beamline/beam instabilities

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The appearance and causes of poor quality data on ESRF beamlines is still unclear. Sources of poor data quality have been attributed to vibrations in the monochromator and mirror vessels, as well as due to instabilities of sample itself either due to its mounting or from sample environment considerations. There are also suspicions that the machine itself occasionally performs erratically in a way that is invisible to the machine group sensors.

When problems occur it is often difficult to trace back the origin of instabilities and solutions cannot be immediately found without stopping the experiment and requesting vibration analysis equipment to be installed. By the time this has been done the instabilities have often disappeared.

Vibration analyses have been completed on the monochromators and mirrors of various beamlines, and in certain cases the vibrations on these elements could be directly correlated with instabilities in the x-ray beam intensity. However, it has not been possible to perform these measurements whilst taking data, so no direct correlation between types of beam instabilities and poor data quality has been established. A measurement system is described which allows simultaneous logging of vibration data and intensity data whilst performing experiments. If data quality is suspect this system can be used for on-line diagnostic of instabilities.