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Elettra Sincrotrone Trieste

Powder Diffraction with Synchrotron Radiation

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X-Ray powder diffraction (XPD) is a well-known technique that has found application in numerous scientific fields, such as green energy research, pharmaceutical sciences, geology, mechanical engineering, cultural heritage and material science. Although XPD is commonly used in laboratories, there are many applications that can benefit from the special characteristics of synchrotron radiation. In this lecture the fundamentals of the technique will be discussed with a special emphasis on the advantages of synchrotron radiation in various applications of XPD. The lecture will also provide a short overview of the instrumentation used at powder diffraction beamlines.

The theoretical aspects will be accompanied by practical examples of experiments conducted at XPD beamlines. These include phase identification in cultural heritage research, structure determination in non-ambient conditions using the Rietveld method, *operando* measurements on batteries and microstructural characterization of materials using Whole Powder Pattern Modelling (WPPM).