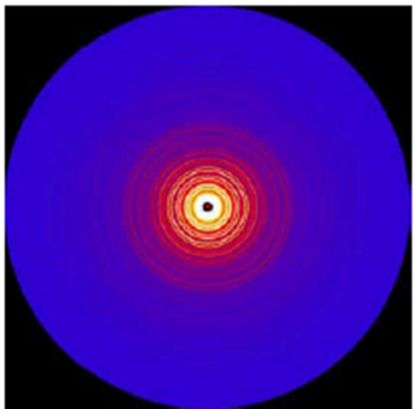
LABNOTE

POWDER EXPOSURES ON THE STOE IPDS II AND IPDS 2T

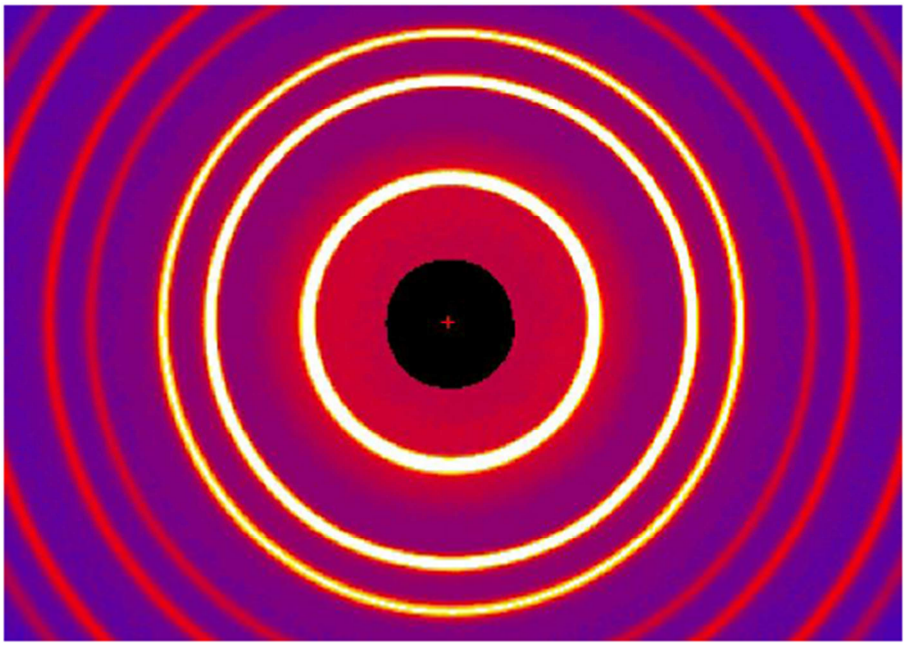
On an STOE IPDS II and IPDS 2T resp. powder samples can be examined as well as single crystals. Additional accessories are not required. Textures and grain size effects can be recognized easily. Diagrams 'intensity as a function of 2θ' can be created from the frames with the aid of a STOE tool.

The powder samples to be examined are filled into glass or quartz capillaries which usually have a diameter between 0.2 and 0.7 mm. During an exposure a capillary can be rotated automatically about one or two goniometer axes all the time to yield best-possible statistics. Debye-Scherrer rings (powder rings) are obtained as shown in the following example (0.5 mm capillary with silicon powder, IPDS II, 2 kW, Mo-K_α (point focus), planar graphite monochromator, 40 mm detector distance, 5 min irradiation).

Overview picture:



Zoomed-in picture of the inner Debye-Scherrer rings:



Advantages are the immediate visual recognition of texture and grain size effects along the rings. Considering the example such effects are virtually not present demonstrating the fine grains and the good statistical distribution of the crystallites within the capillary.

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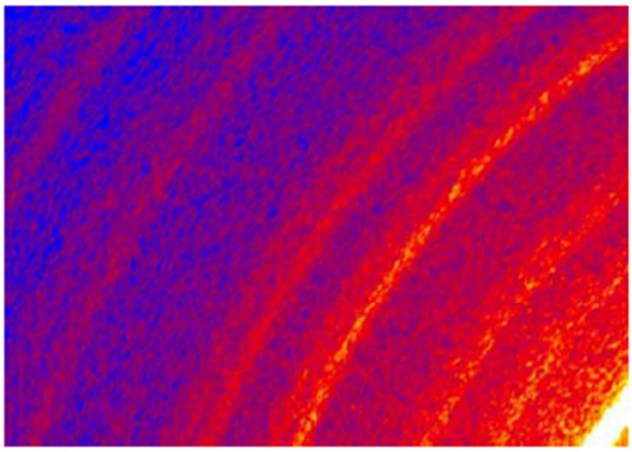
With the aid of a sophisticated STOE software tool the intensities of the pixels along the rings may be accumulated to compose a powder diagram (intensity as a function of 2θ).

This yields a very good statistics because (in contrary to a measurement on a powder diffractometer) *complete* rings are recorded and evaluated here.

These diagrams can be stored as STOE-formatted files as well as FullProf-formatted ones, enabling a further data processing with additional software, e.g. with ***WinX^{POW}***, the STOE software package for powder exposures.

Zoomed-in picture of powder rings at bigger 2θ angles:



On the pictures the large dynamic range and the superior X-ray sensitivity of the Image Plate can be recognized. Although usually the irradiation periods are in the region of some minutes for powder exposures, very long irradiations are possible too on Image Plates being an advantage over other area detector systems.

The 2θ range being recorded is a function of the instrument, the selected 2θ offset (if the instrument is an IPDS 2T) and the distance between the detector surface and the powder sample.

Some examples:

IPDS II				
40 mm	2θ:	5.7	to	76.8 deg.
100 mm	2θ:	2.3	to	59.5 deg.
200 mm	2θ:	1.5	to	40.4 deg.

IPDS 2T			
30 deg.	40 mm	$2\theta_{max.}$:	106.8 deg.
	200 mm	$2\theta_{max.}$:	70.4 deg.
60 deg.	40 mm	$2\theta_{max.}$:	136.8 deg.
	200 mm	$2\theta_{max.}$:	100.4 deg.

STOE & Cie GmbH | Hilpertstrasse 10 | 64295 Darmstadt | Germany
P +49 (0)6151 9887-0 | F +49 (0)6151 9887-88 | stoe@stoe.com | www.stoe.com