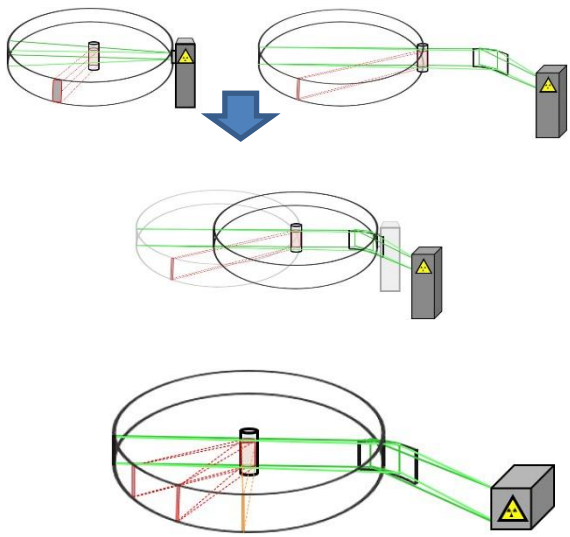
STOE STADI P: WHY POWDERS SHOULD ALWAYS BE MEASURED IN TRANSMISSION-/ DEBYE-SCHERRER GEOMETRY

THE STOE TRANSMISSION GEOMETRY

The STOE Transmission geometry is a hybrid of the Scherrer (left) and the Guinier camera (right) using the sample position centered in the detector circle from the first and the focusing optic from the latter.

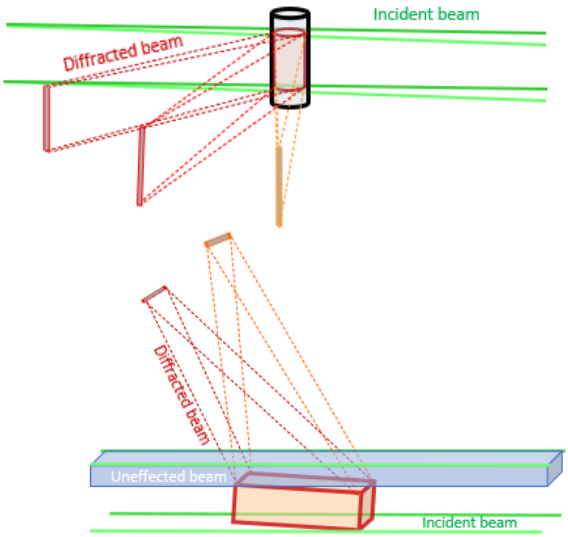
A (111)-cut Ge monochromator (Johann-type) provides pure $K\alpha_1$-radiation. It focuses primary and diffracted beam on the detector circle yielding highest resolution in 2θ (FWHM<0.03° for a LaB_6 (110) reflection and Mo $K\alpha_1$-radiation).



The STOE STADI P Transmission-/Debye-Scherrer geometry

CONSTANT SAMPLE VOLUME

With a constant sample volume in the beam, the Transmission-/Debye-Scherrer geometry provides reliable intensities over the full 2θ scale (appr. 0.3 to 140°) while the variable amount of unaffected beam as a function of the θ-value in a reflection setup yields false intensities up to at least 10° 2θ if not corrected by variable slits!



Comparison of beam path in transmission (above) and reflection geometry (below).

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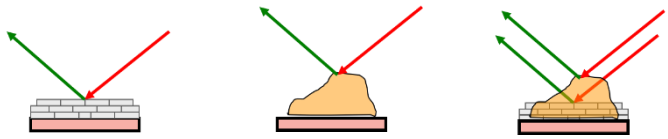
NO HEIGHT DISPLACEMENT

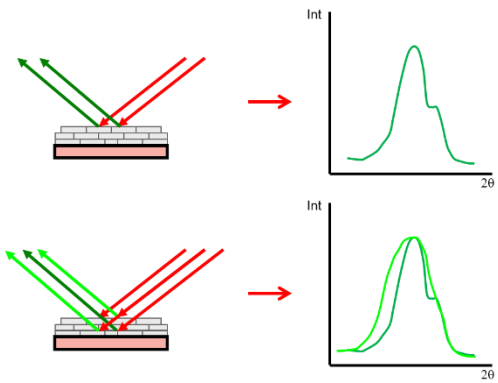
Reflection data often yields a zero shift in 2θ if the sample thickness varies and cannot be corrected by an automated z-translation. An aligned capillary is always in the center of the goniometer.



Height displacements in reflection mode.

NO LINE BROADENING FOR WEAK ABSORBERS

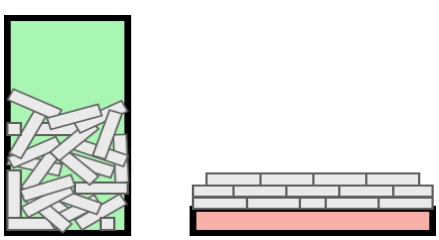
In reflection geometry the difference in the depth penetration as a function of the absorption factor yields a remarkable peak broadening for weak absorbers. Powder diffraction in Transmission-/ Debye-Scherrer geometry avoids this phenomenon.



Comparison between a strong (top) and weak absorbing material (bottom) in reflection geometry.

LESS EFFECTED BY PREFERED ORIENTATION

The statistical distribution of the particles in a capillary yields a pattern less effected by the effects of preferred orientation than the periodic stacking sequence of the planes in reflection mode.



Plane crystallites in a capillary (left) and the same particles pressed in a reflection sample holder (right).