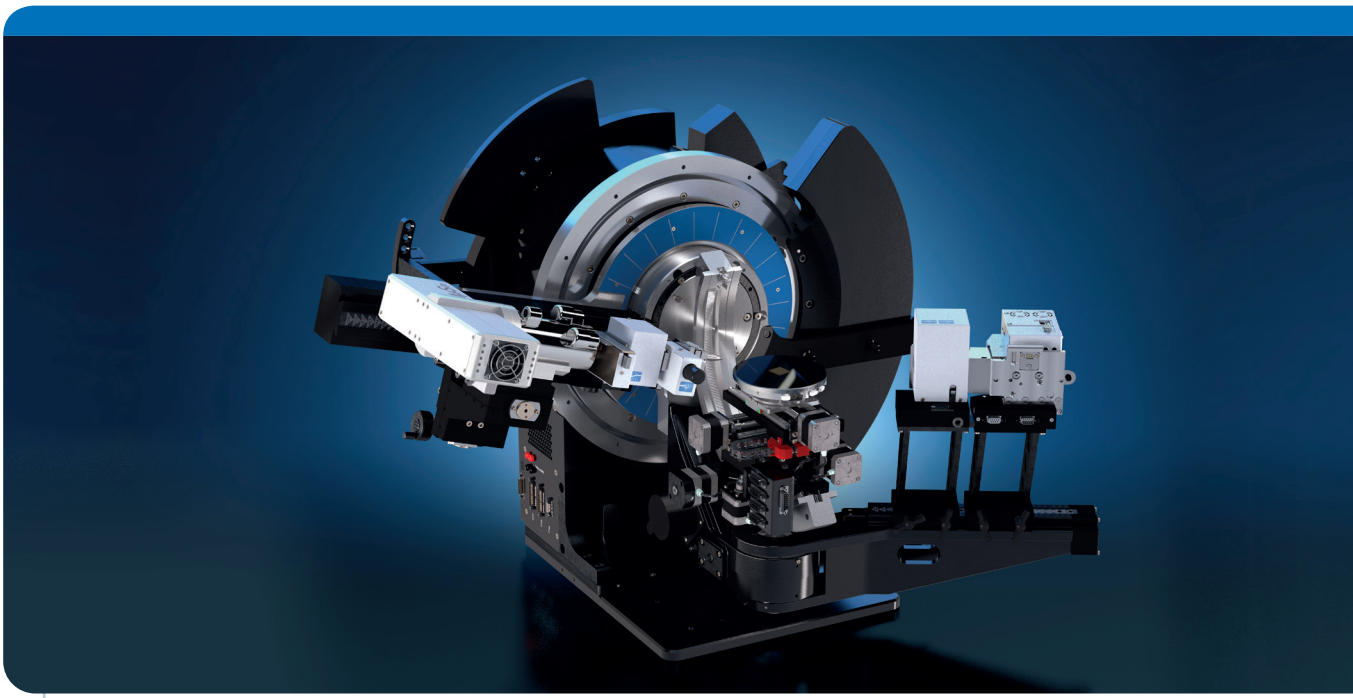


D8 DISCOVER Plus

ATLAS™ Goniometer and Non-Coplanar Detector Arm

The new ATLAS™ goniometer for the D8 DISCOVER Plus provides an unprecedented angular and beam positioning accuracy. Particularly demanding applications can benefit from more accurate and reliable data quality in terms of peak position, shape and intensity. Additionally, the optional non-coplanar detector arm allows high accuracy in-plane grazing incidence diffraction (IPGID) investigations of sample properties parallel to the surface and surface sensitive studies of ultrathin films. The ingenious mechanics of the ATLAS goniometer increase the accuracy in the movement of heavier components while minimizing mechanical wear.

Key Benefits of ATLAS™

- Industry leading accuracy – guaranteed
- Designed for long lifetime without need for maintenance
- All-inclusive compatibility with D8 Family components

Key Benefits of Non-Coplanar Detector Arm

- Unmatched accuracy with direct angular encoder
- Seamless integration in DIFFRAC.SUITE software
- Up to 160° 2Theta range for most accurate Non-Coplanar structure determination

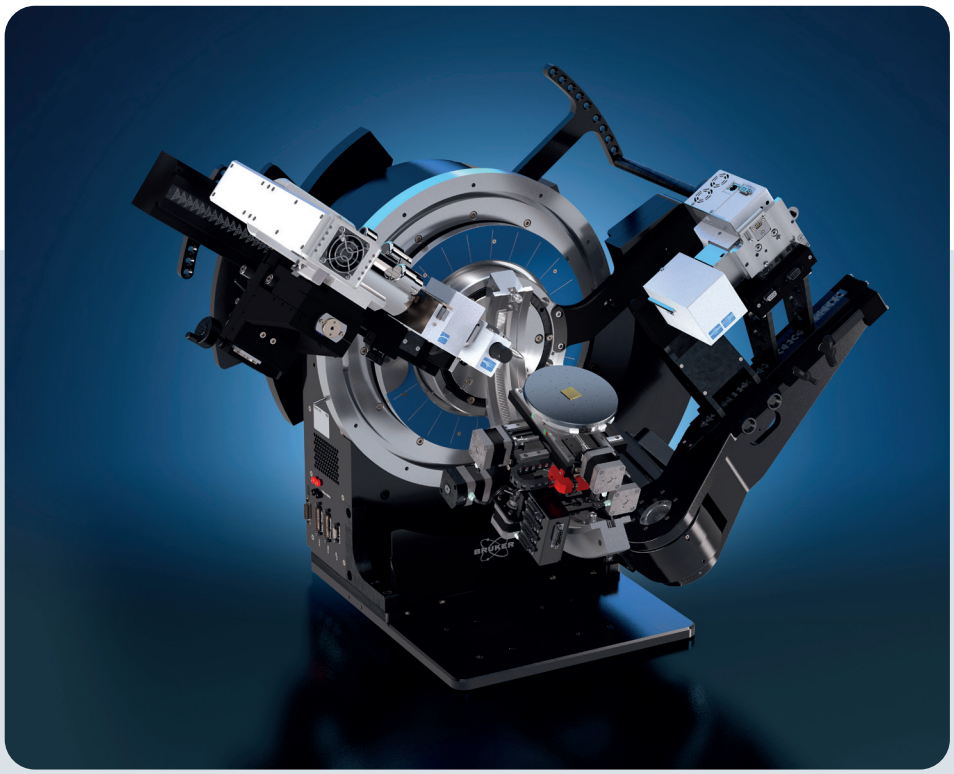
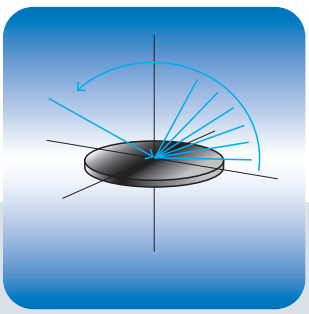
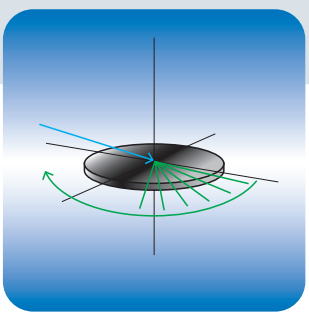


Figure 1. D8 DISCOVER Plus in coplanar measurement geometry



Coplanar Diffraction
In coplanar diffraction geometry, the incident beam, diffracted beam and the normal of the sample surface are in the same plane. This geometry is commonly used for a wide variety of applications ranging from powder diffraction to rocking curves analysis and reciprocal space mapping.



Non-Coplanar Diffraction
In non-coplanar diffraction geometry, the incident beam and diffracted beam are in the plane parallel to the sample surface. This geometry is commonly used to investigate ultrathin films and lateral surface properties of coatings.

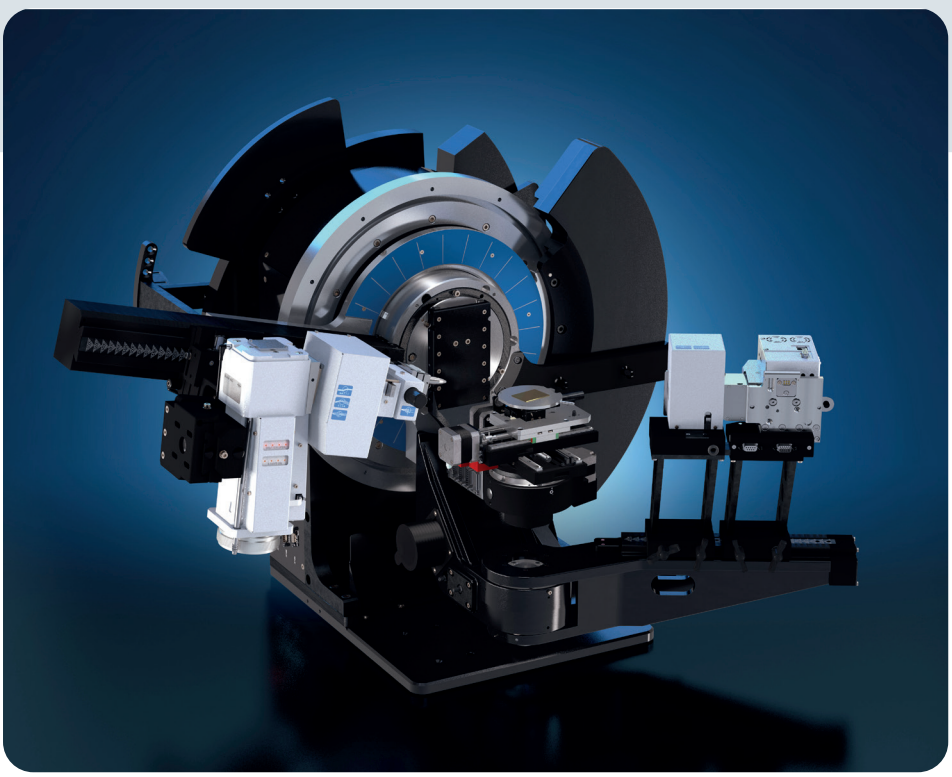


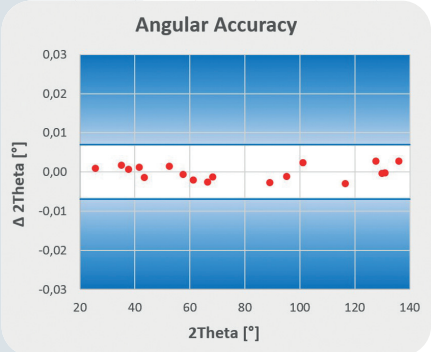
Figure 2. D8 DISCOVER Plus in non-coplanar measurement geometry

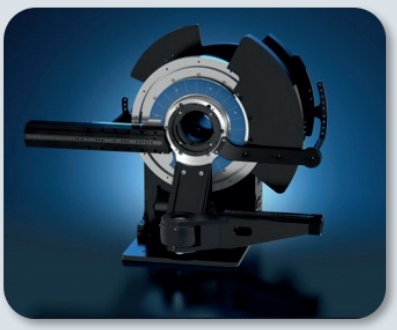
D8 DISCOVER Plus

The D8 DISCOVER Plus with the ATLAS goniometer is the bedrock for reliable sample analysis. Methods like in-plane grazing incidence diffraction of ultrathin films require fine control of the penetration depth via the incident angle; whereas stress analysis depends on accurate peak positions, directly impacted by beam positioning and angular accuracy of the goniometer over a wide angular range. The advanced goniometer design delivers the highest guaranteed angular positioning accuracy, increasing the reliability of measured data for all applications, from classic powder diffraction to epitaxial thin-film characterization.

The ATLAS Goniometer

- Industry leading angular accuracy : ±0.007° 2θ guaranteed over the entire angular range determined on NIST SRM 1976
- Dedicated spatial accuracy providing highest beam position stability
- Seamless integration of D8 family of components, including optics, positioning cameras, sample stage, non-ambient and detector technologies





Non-Coplanar Detector Arm

- Third goniometer axis for investigating ultra-thin layers and in-plane sample properties
- Direct Angular Encoder for highest accuracy
- Automated distance detection for real-time detector calibration
- High precision mounting track for flexible beam path configuration

Versatile Sample Handling

The D8 DISCOVER Plus can be equipped with different sample stages, matching application specific requirements, ranging from standard powder diffraction and screening of crystallization well-plates to stress/texture and wafer mapping. All stages are fitted with a bayonet mount that allows fast and alignment-free exchange.

Compact UMCPlus 80

- Fast spinner for XRPD
- 5 position sample changer for 51 mm sample diameter
- Mapping of 2-4″ wafers

Compact UMCPlus 150

- Mapping 6-8″ wafers
- Reflection mode 96 well plate
- Vacuum and electric feedthroughs for wafer chuck and tilt stages

Centric Eulerian Cradle

- Mapping of 2-4″ wafers
- > 90° of side-inclination for stress and texture

Extensive Component Compatibility

Advanced X-ray Sources

- Low maintenance, high intensity sources utilizing the latest technology
- IµS Microfocus source with second generation optics creating a brilliant point-beam – without the need for water cooling
- TXS-HE offering the highest available power density of 6 kw/mm^2 with Snap-Lock and push button optic options

Efficient Detection Technologies

- Proprietary LYNXEYE Family of detectors offering exceptional energy resolution yielding superior peak-to-background and filtering of fluorescence
- EIGER2 R 500K offering over 500k perfectly sized pixels with ultra high dynamic range ideal for materials research applications
- Unrivalled system integration with full support of the DIFFRAC.SUITE PLAN.MEASURE.ANALYZE workflow.

Technical Data for D8 DISCOVER Plus			
Configuration	Vertical Goniometer with Theta/Theta Geometry (Non-Coplanar Arm optional)		
X-Ray Source Available sources	**Sealed Tube (TWIST TUBE)[1]**	**IµS microfocus source**	**TXS-HE**
Available anode materials	Cr, Cu, Mo, Ag	Cr, Cu, Mo, Ag	Cr, Co, Cu, Mo
Power (and filament)	2,2 kW (0,4 x 16 mm²)	50 W (< 100 µm x 100 µm)	5,4 kW (0,3 x 3 mm² filament)
Measuring circle diameter (depending on setup)	Source-to-Sample Distance: 280 mm – 540 mm Sample-to-Detector Distance: 250 mm - 340 mm		
Detectors	LYNXEYE Family and EIGER2 with 0D, 1D and 2D mode		
Measurement Geometry	**Coplanar Mode**	**Non-Coplanar Mode (optional)**	
Smallest addressable increment	0.0001°	0.001°	
2Theta range (depending on system configuration)	-10°, … 168°	-5°, … 155°	
Max. scan speed (depending on accessories)	20° / s	5° / s	
Guaranteed 2Theta accuracy[2]	< ±0,007°	< ±0,015°	
Miscellaneous			
Weight (without optional accessories)	945 kg / 2,085 lbs		
Exterior dimensions (h x w x d)	202 x 168 x 129 cm or 79.5 x 66.0 x 50.6 inch		
Operating conditions	Ambient temperature (15 … 35°C), 20 … 80 % rel. humidity (no condensation), max. 2000 m altitude		
Compliances	Radiation safety < 1µSv/h H*(10), RÖV, NJC,FDA, NFC 74-100, TÜV, EN 13849, full CE compliance (electrical equipment (2006/95/EC), electromagnetic compatibility (2004/108/EC), machinery directive (2006/42/EC))		

[1] patent: EP 1 923 900 B1 [2] As detailed in the "Instrument Verification Booklet" (DOC-M88-EXX299).

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