Fast & precise prescription Measurement of NEDs components

TRIOPTICS
See the Difference

Mohit Yadav | Philipp Beer, 27. May 2024

TRIOPTICS at a glance

Founded in 1991 in Wedel near Hamburg

Since 2020 part of the JENOPTIK AG

Over 30 years of experience in optical metrology

Over 500 employees worldwide

About 380 employees at the company headquarters

Around 50 % of our employees are physicists, engineers and software developers

9 subsidiaries and 7 partners worldwide

Structure

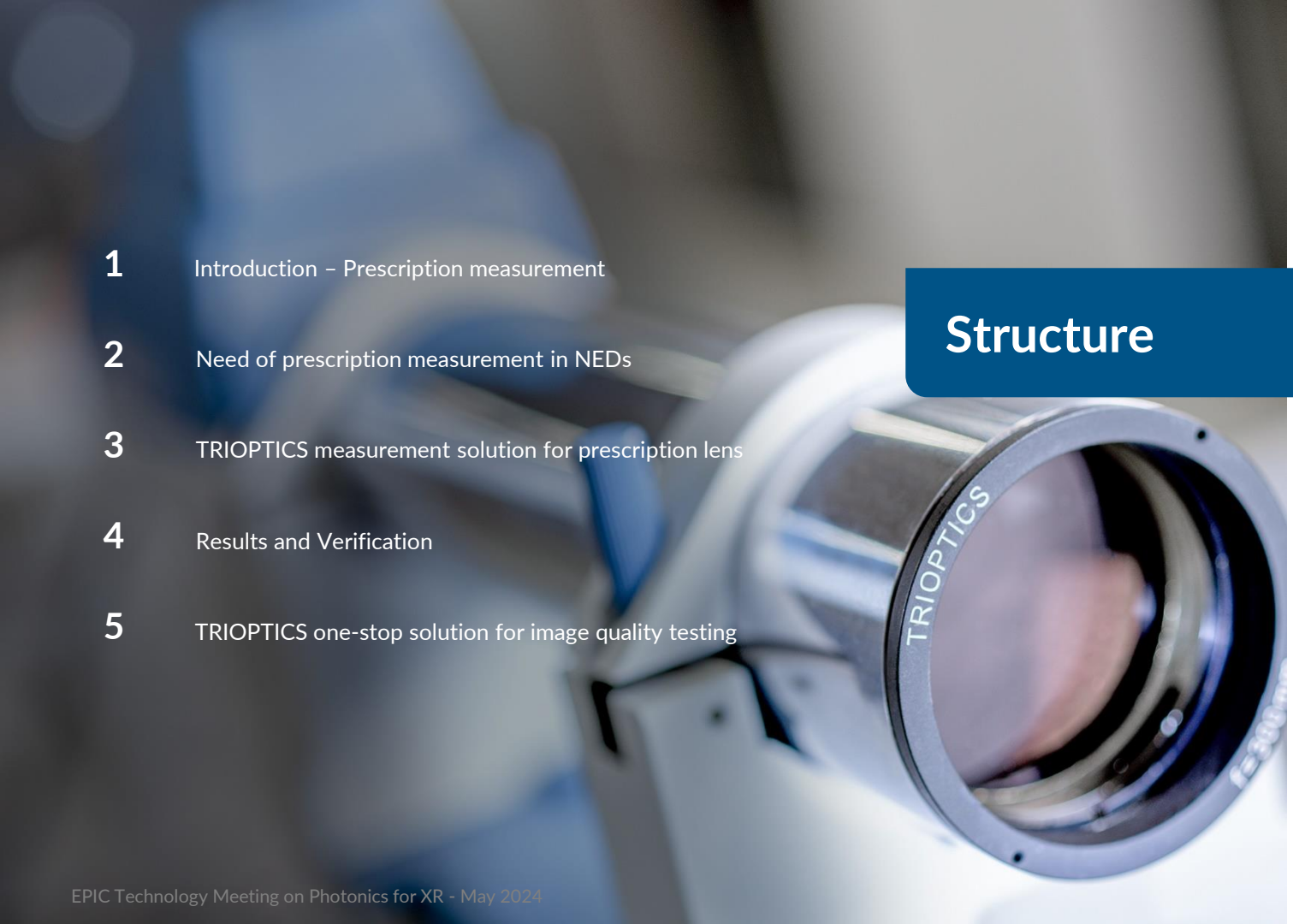
1 Introduction – Prescription measurement

2 Need of prescription measurement in NEDs

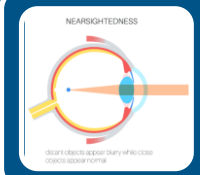
3 TRIOPTICS measurement solution for prescription lens

4 Results and Verification

5 TRIOPTICS one-stop solution for image quality testing

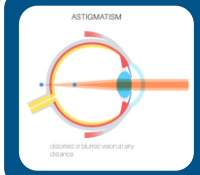


Introduction



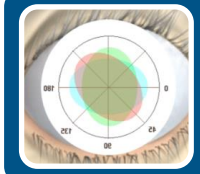
Spherical power

- Near-sightedness
- Far-sightedness



Cylindrical power

- Astigmatism



Axis

- Orientation of astigmatism

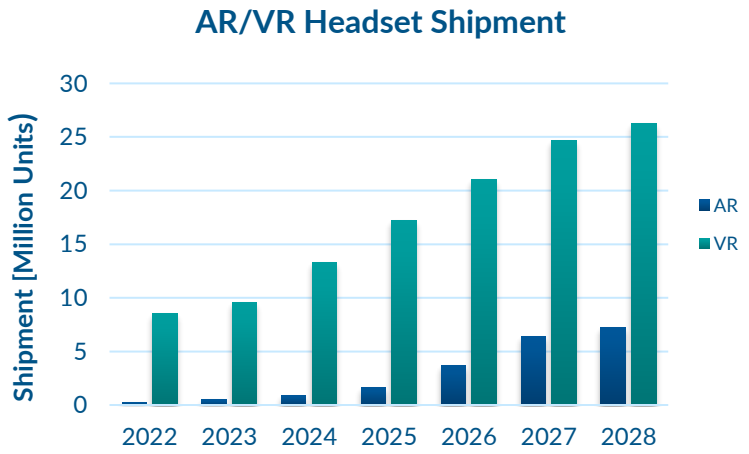
Kwan, Ping. (2014). Myopia: Current Cellular Concepts on the Pathology and Mechanisms. 10.13140/2.1.1488.5443.

Need of prescription lenses in AR/VR: Near-Eye Display

Globally, at least 2.2 billion people have near or distant vision impairment

62 percent of the population sometimes wear glasses

Future outlook: At least 4 billion people across the globe wear glasses

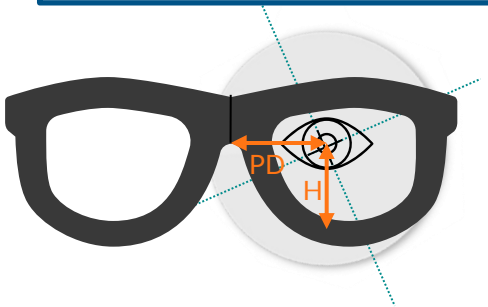


Accurate image quality testing with prescription lens in one tool

https://www.overnightglasses.com/eyewear-industry-statistics/
https://www.cbs.nl/en-gb/news/2023/36/62-percent-of-the-population-sometimes-wear-glasses
IDC Forecasts Robust Growth for AR/VR Headset Shipments Fueled by the Rise of Mixed Reality

Why correct prescription matters!

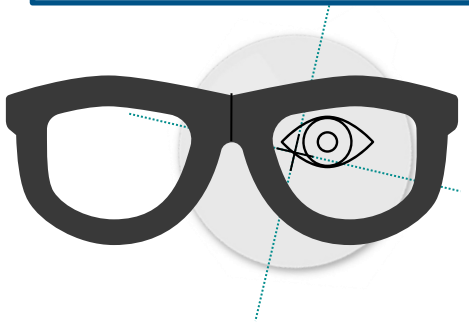
Correct vision



- ✓ Correct prescription
- ✓ Pupil distance (PD)
- ✓ Height (H)

- ➢ Comfortable view
- ➢ Perfect vision

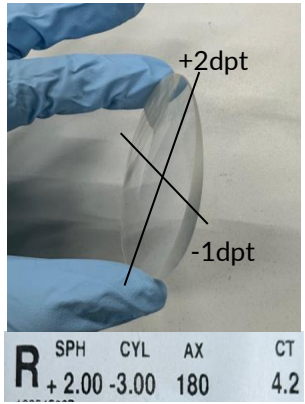
Incorrect vision

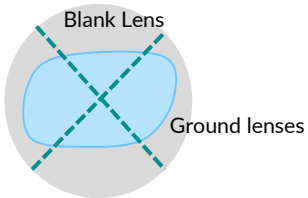


- ➢ Prismatic effects
- ➢ Discomfort
- ➢ Nausea

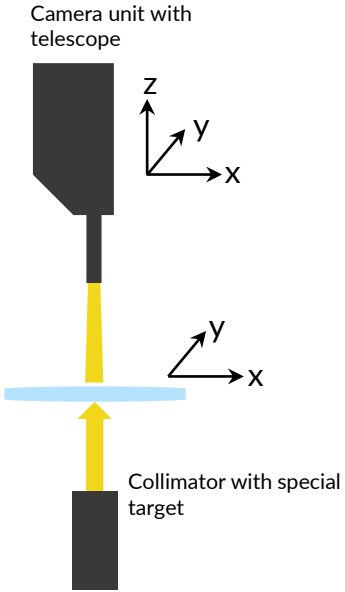
TRIOPTICS - Measurement solution

Sample



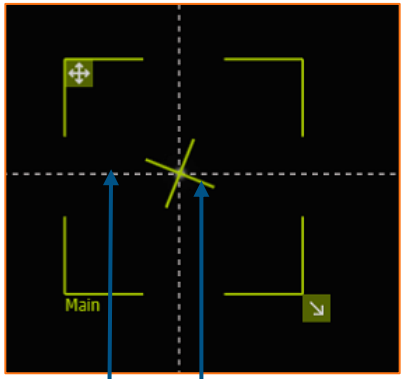


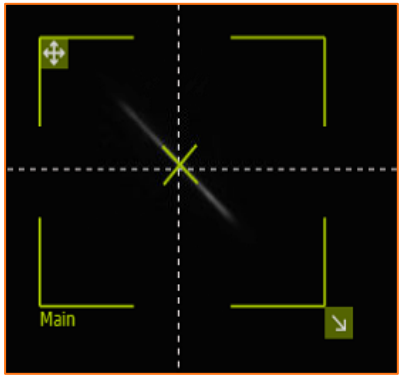
Measurement set-up



Sample alignment, finding optical axis and measurement

Camera images



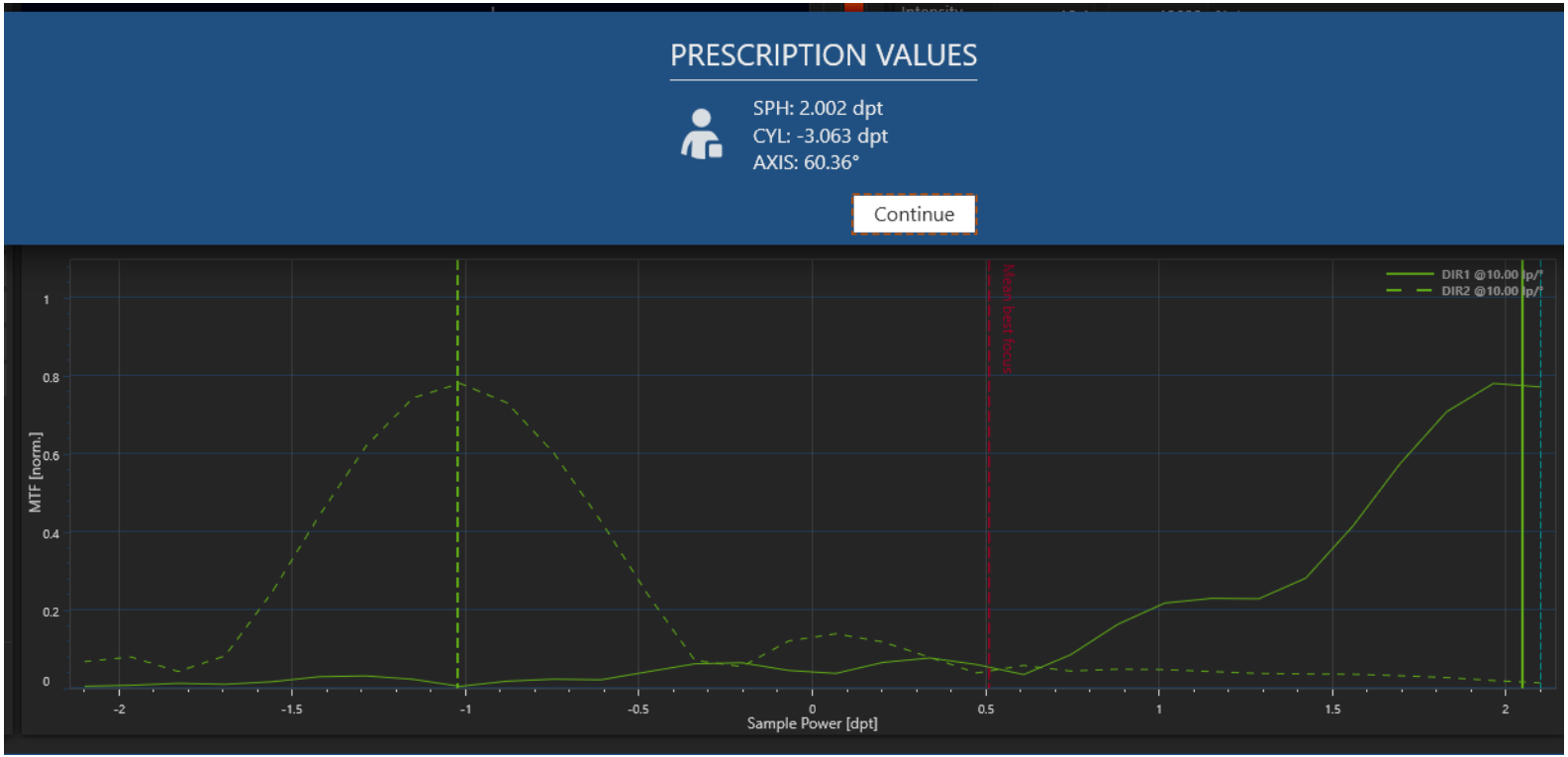


Axes of camera sensor

Orientation of the cylinder

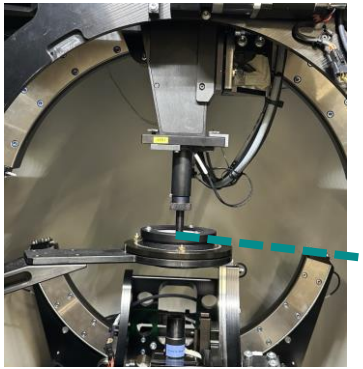
- ☑ Sphero-cylindrical optical power
- ☑ Cylinder axis

Focus curve

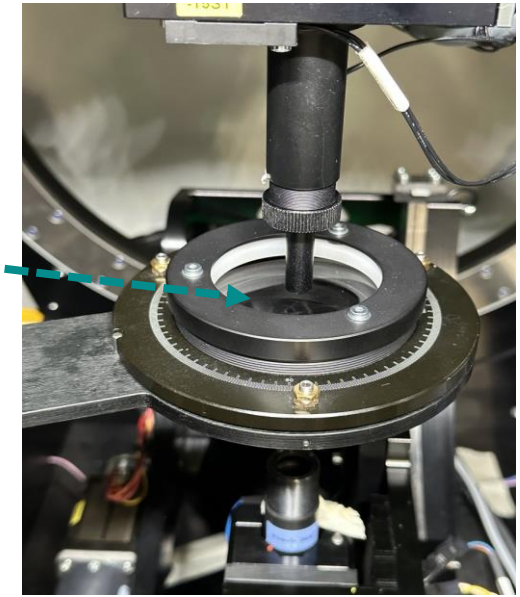

PRESCRIPTION VALUES
SPH: 2.002 dpt
CYL: -3.063 dpt
AXIS: 60.36°
Continue
Mean best focus
DIR1 @10.00 lp/°
DIR2 @10.00 lp/°
MTF [norm.]
Sample Power [dpt]
1
0.8
0.6
0.4
0.2
0
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2

Measurement set-up and results

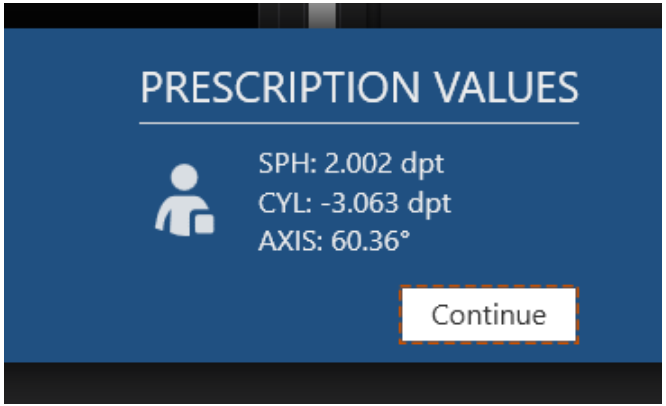
Machine configuration



Measurement and automatic alignment of sample

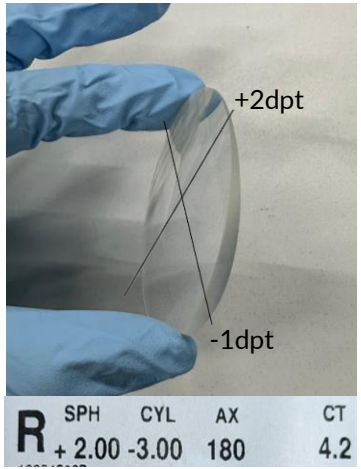


Results



Comparison with conventional method

Sample

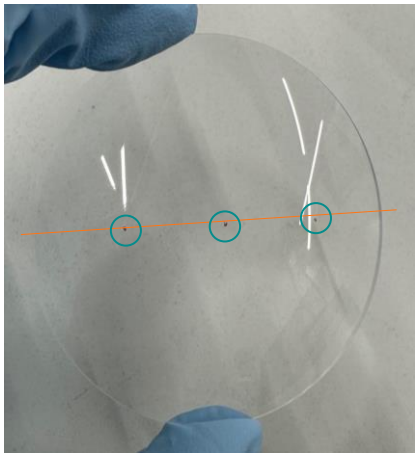


- 2 main sections with an optical power of:
  - +2.0dpt -3.0dpt = -1dpt
  - +2.0dpt

Lensometer

- To check the optical power and to mark the lens, lensometer was used

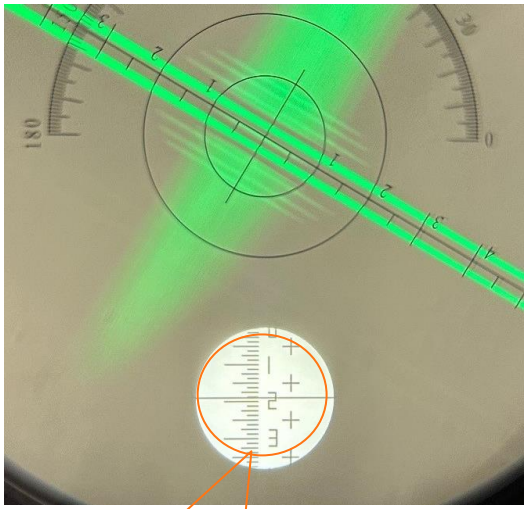
Marked lens



- The 3 dots were made by using the lensometer to mark the cylinder axis (1st main section)
- 90° opposite one can find the spherical axis (2nd main section)

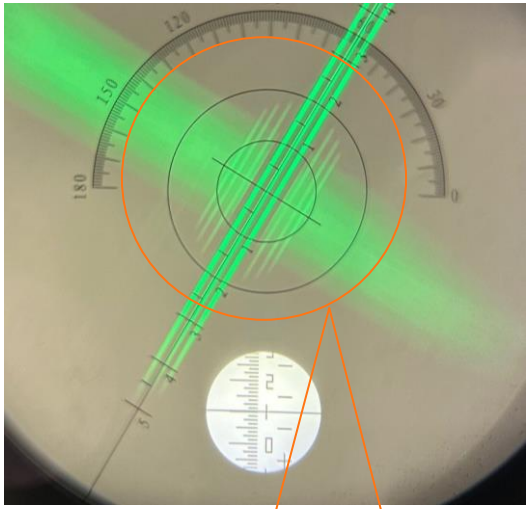
View through the lensometer

+2dpt in 150°

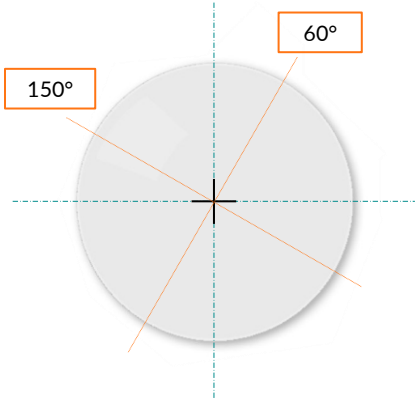


Optical power [dpt]

-1dpt in 60°

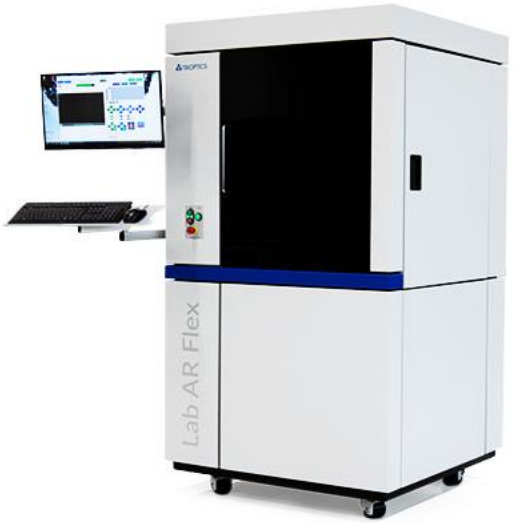


Axis control to adapt the cylinder direction for the wearer [°]



Prescription	Measured value	Lensometer value
Spherical	+ 2.048 dpt (repeatability 0.01 dpt)	+2.125 dpt (repeatability 0.125 dpt)
Cylindrical	- 3.063 dpt (repeatability 0.01 dpt)	- 3.125 dpt (repeatability 0.125 dpt)
Axis	60.36° (repeatability 0.1°)	60° (repeatability 1°)

ImageMaster® LAB AR Flex – One stop solution



Test solution for transmissive and reflective waveguides, correction glasses, light engines and complete modules

- Accurate measurement of image quality parameters (MTF, CRA, Dioptre, Color, Luminance and distortion).
- Diffraction limited optics up to 60 lp/° to ensure accuracy and precision.
- Automatic eye-box, FOV, and eye-relief scan with on- and off – axis measurement.
- 13-DOF provided by 2 goniometers and translation stages.
- Motorized optical systems for virtual image distance and diopters measurement of up to -7/+3dpt (more on request).
- Automated measurement sequence with robotic sample handling

Thank you for your attention!

Contact: sales@trioptics.com

See you at OPD: Poster session-2

“Wide-Field AR/VR Component Testing: Latest developments with conoscopic approach”

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May 2024

A member of the JENOPTIK Group