LAMÉRIS OOTECH

T.b.v. van de deelnemers aan de TOA dag op zaterdag 22 April 2017 in de Schakel te Nijkerk, bieden wij de volledige presentatie aan over voorsegment map interpretatie en sleutelfactoren voor een goed onderzoek.

Daarnaast bieden wij u toegang tot de Ziemer e-learning site. U kunt zich hier gratis registreren, ook als u gebruiker bent van andere apparatuur.

https://www.e-learning.ziemergroup.com

De site biedt een verzameling korte video's over zowel de toepassingen (ESCRS lezingen e.d.), maar ook duidelijke uitleg over bijv. het begrip elevatie map en nog veel meer.
Van harte aanbevolen.

Meer informatie kunt u krijgen bij Laméris Ootech BV te Ede: 030-6008711 of via ootech@ootech.nl.

Corneal Topography & Tomography

Introduction to measurement parameters and basic map interpretation,

and key factors for obtaining good quality measurements

Gregor Schmid, PhD

Senior Expert Clinical Applications (R&D)
Ziemer Ophthalmic Systems AG, Switzerland

Topography & Tomography

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GALILEI

Key Principles

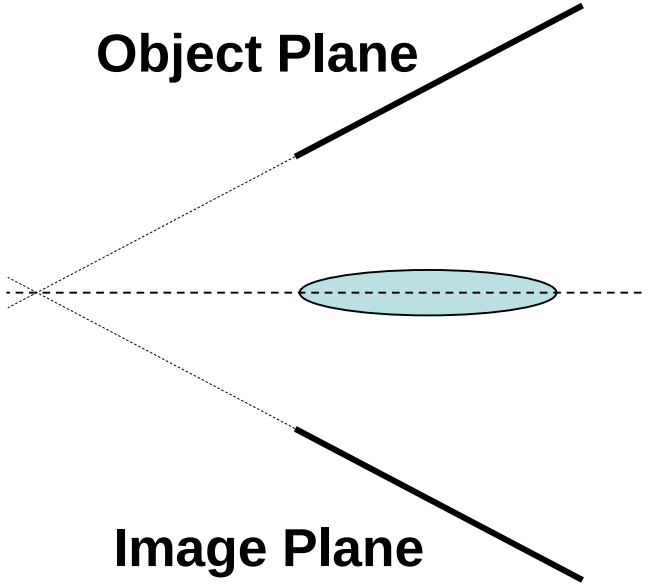
+

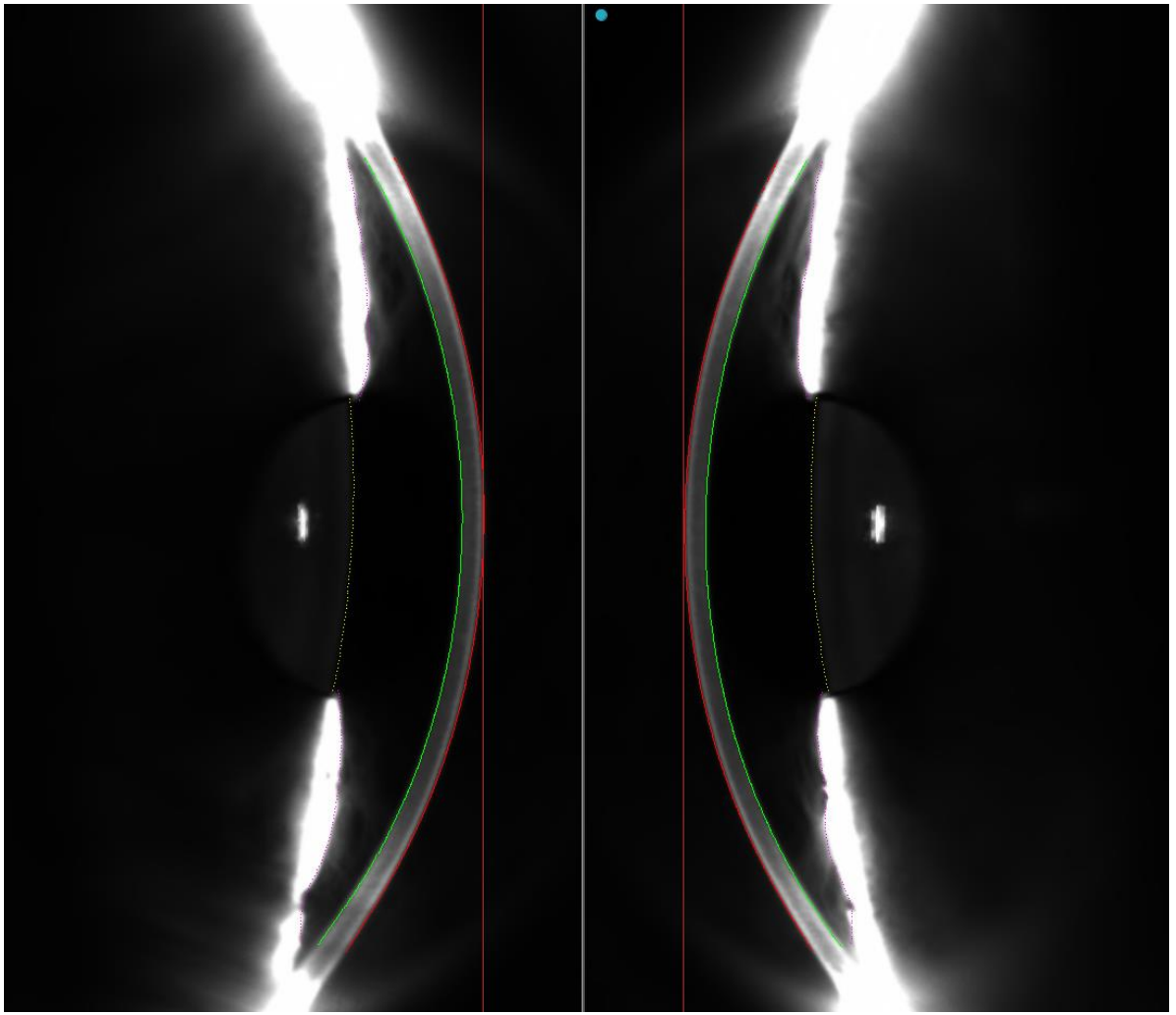
Dual-Scheimpflug Tomography

Placido Disk Topography

Scheimpflug Tomography

Scheimpflug Principle





Scheimpflug Tomography

Single Scheimpflug:

Pros:

- Can measure anterior **and** posterior corneal surface
- Allows 3D view of the cornea
- Works well even in dry eyes
- Permits precise pachymetry **when well centered**
- Provides peripheral data

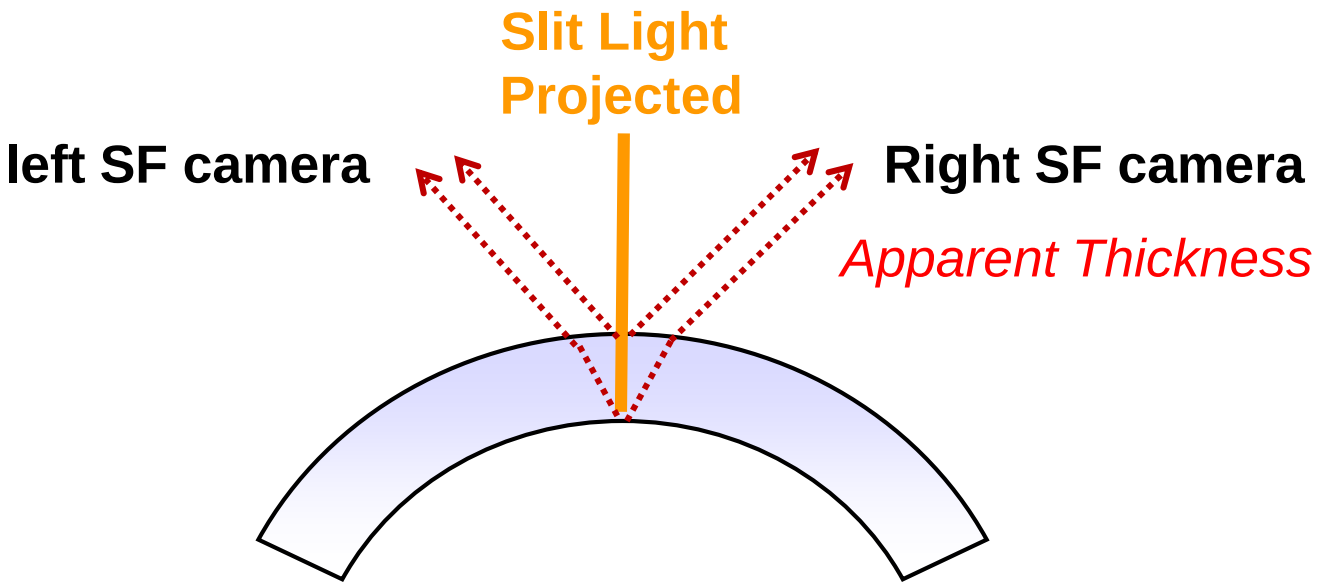
Cons:

- Does not permit precise pachymetry when decentered
- Precision for curvature is reduced in central area

Dual-Scheimpflug:

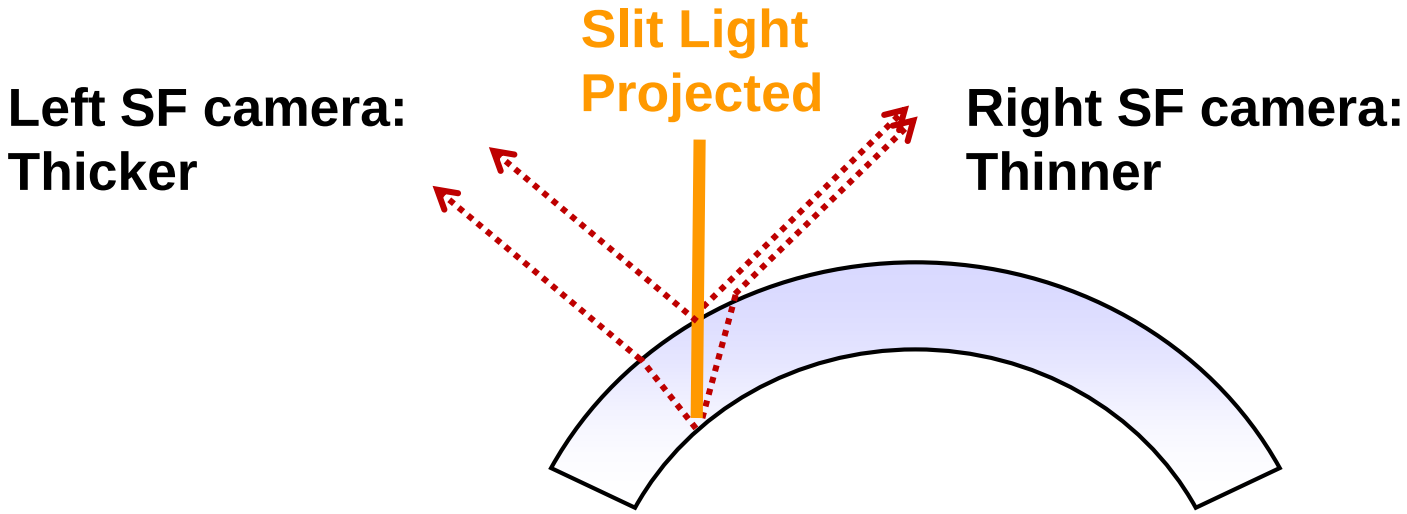
Compensation of eye decentration allows precise pachymetry under difficult circumstances (e.g. poor fixation, eye movements, inexperienced operator).

Apparent Corneal Thickness when centered



- When centered, the slit light is perpendicular to the surface
- Apparent thickness with the right and left SF camera are equal

Apparent Corneal Thickness when de-centered

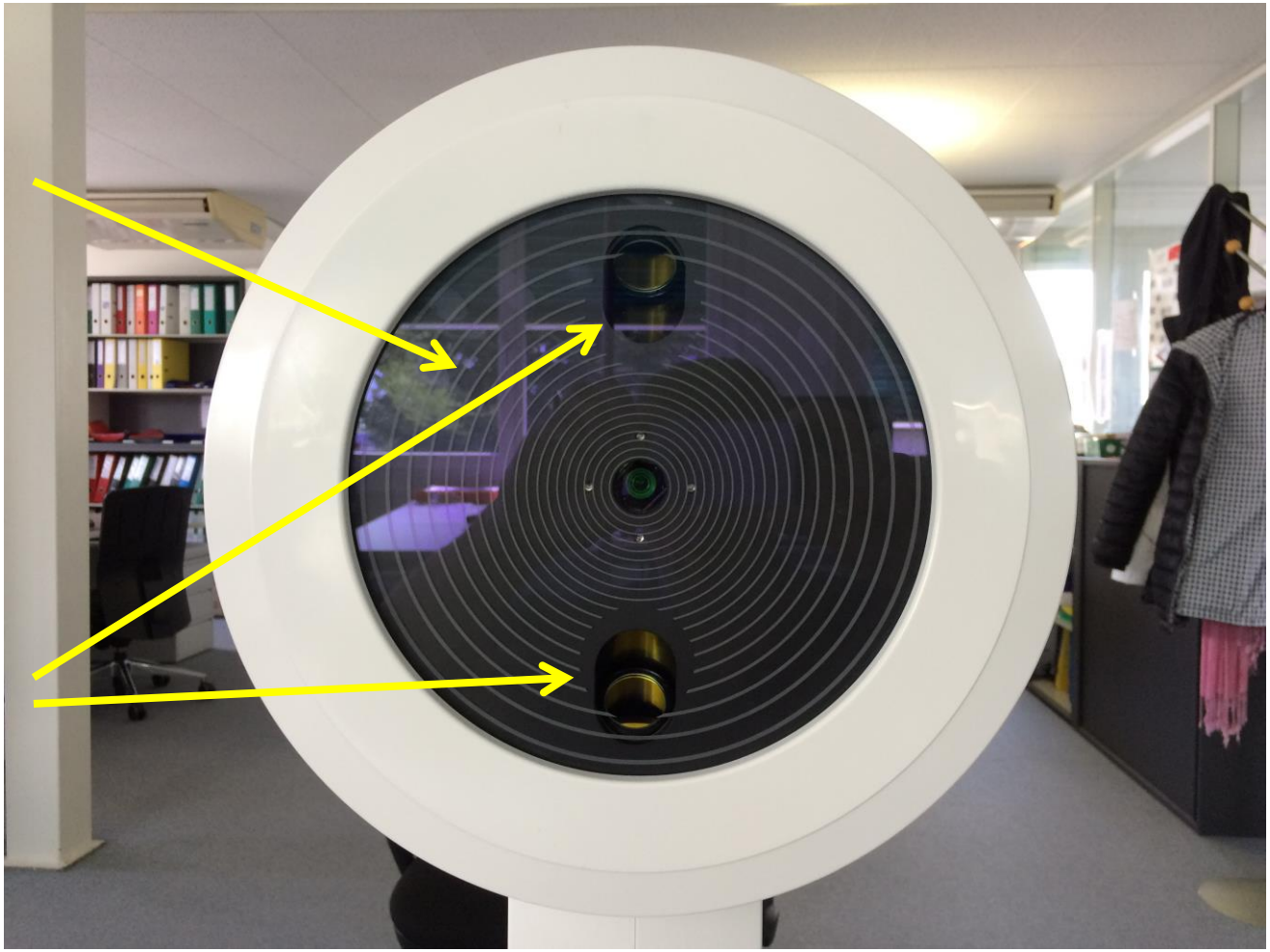


- The slit light is not perpendicular to the surface
- Apparent thickness is thinner/thicker than at center
- Averaging automatically corrects de-centration

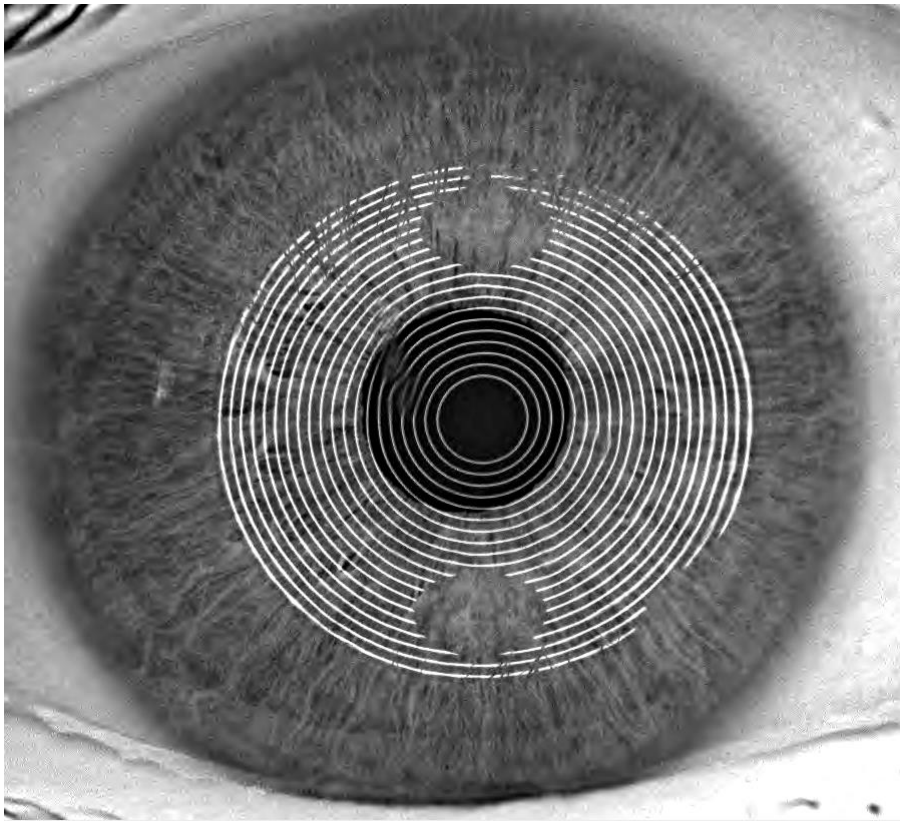
Placido Topography

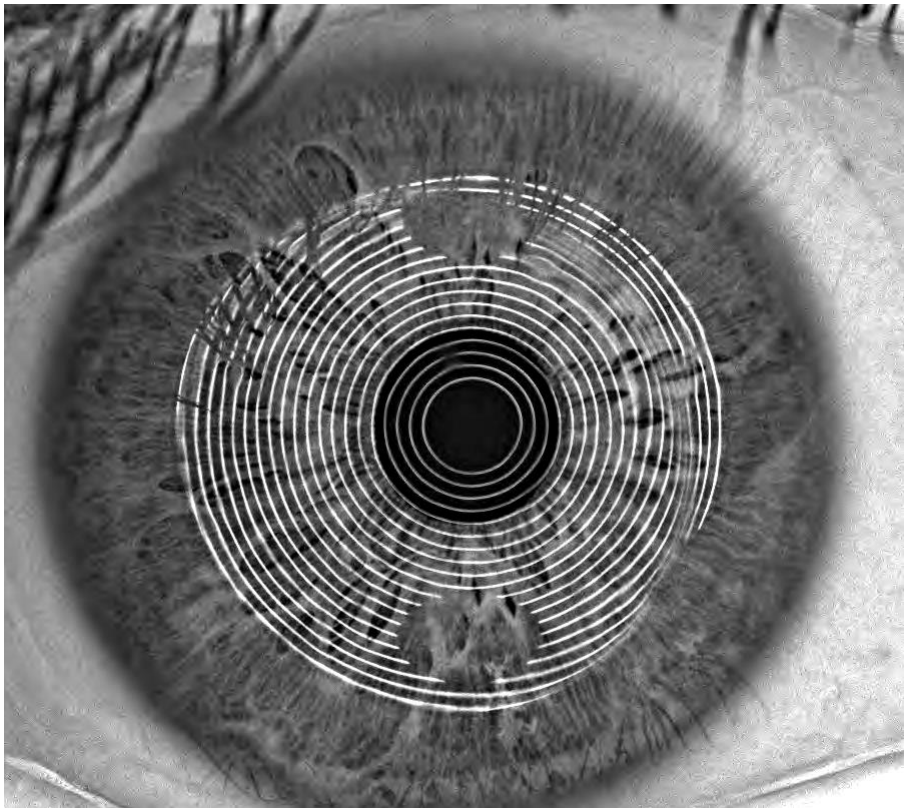
Placido Rings

SF Cameras



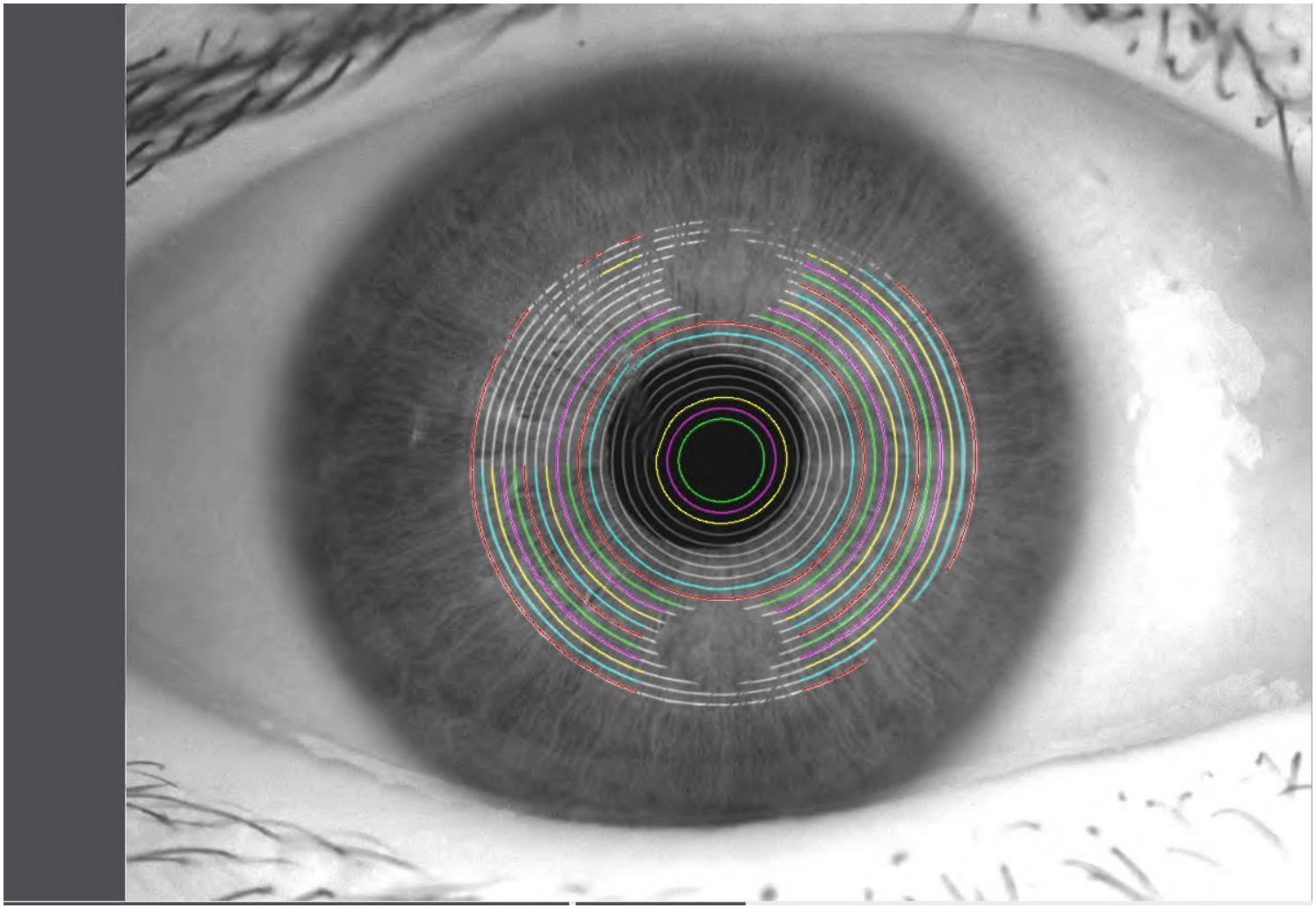
Placido Topography





Placido based topographers work on the principle of assessing the reflection of a concentric set of white rings from the convex anterior surface of the cornea

Placido Topography



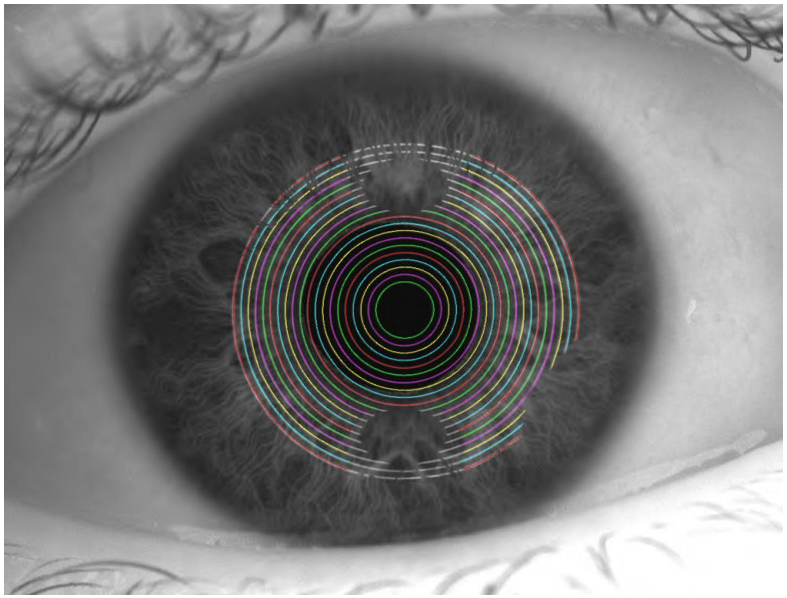
Placido Topography

Pros:

- Allows accurate measurement of the anterior surface curvature

Cons:

- Suffers from dependency on tear film quality
- Provides no information on posterior surface and pachymetry
- Is limited to central area



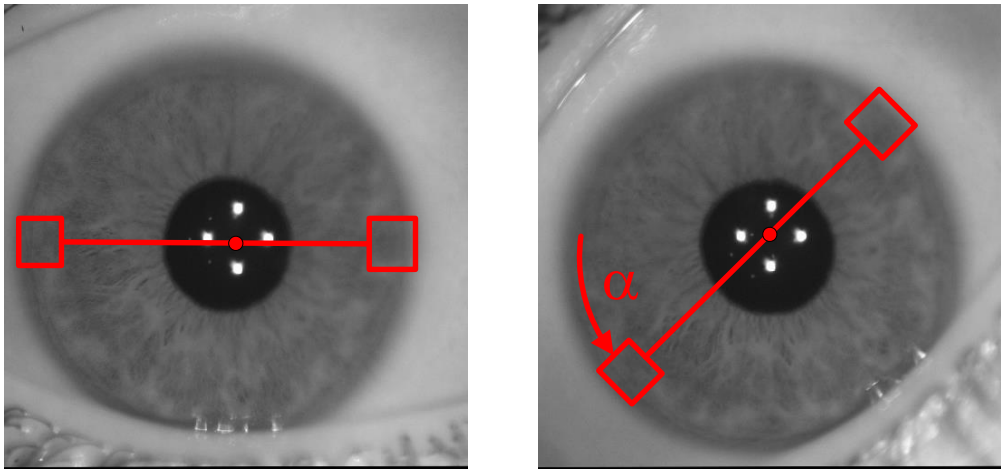
Dual Scheimpflug + Placido

→ **Combines the best of both worlds to produce the most complete data set of the anterior segment**

Maps and measurements aligned to apex (1st Purkinje images)

Motion Compensation using iris pattern

a) Lateral motion correction (x/y-directions)
b) Rotational correction (around z-axis)



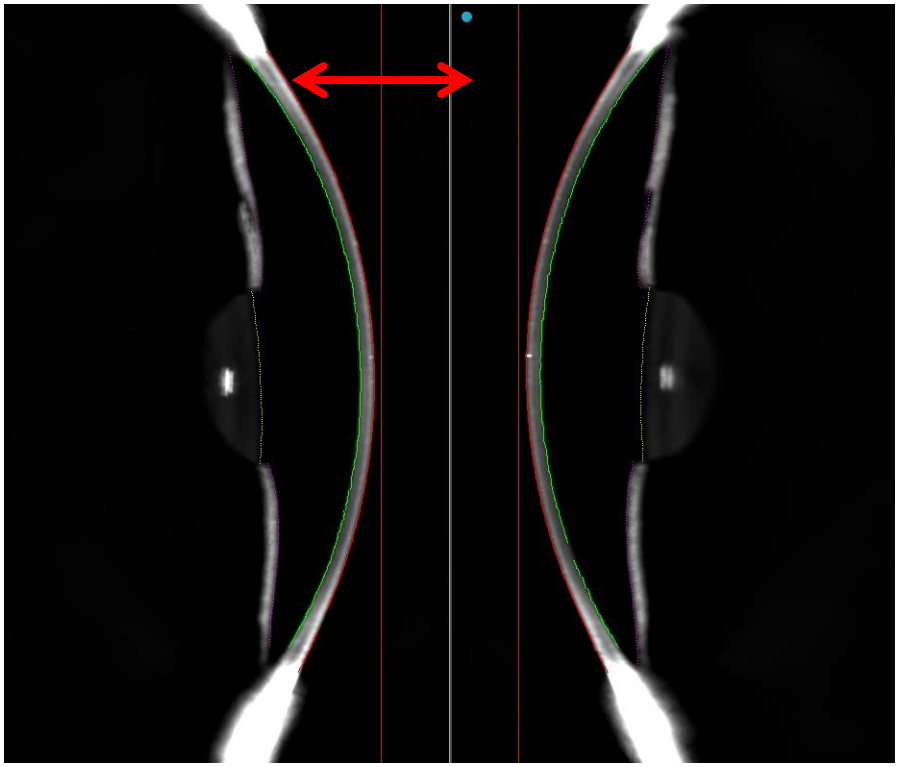
a) b)

HOW TO GET GOOD MEASUREMENTS

1. Alignment

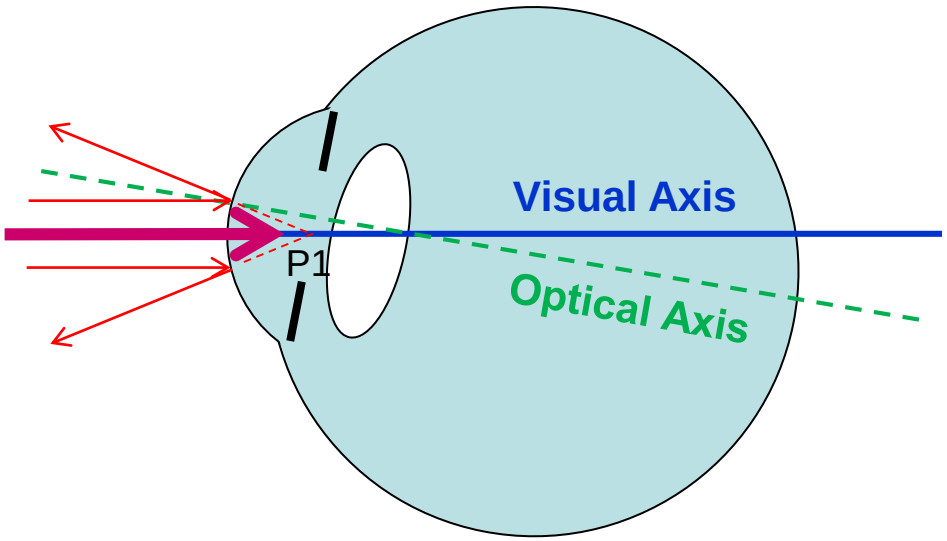
Left-Right/Up-Down

In-Out

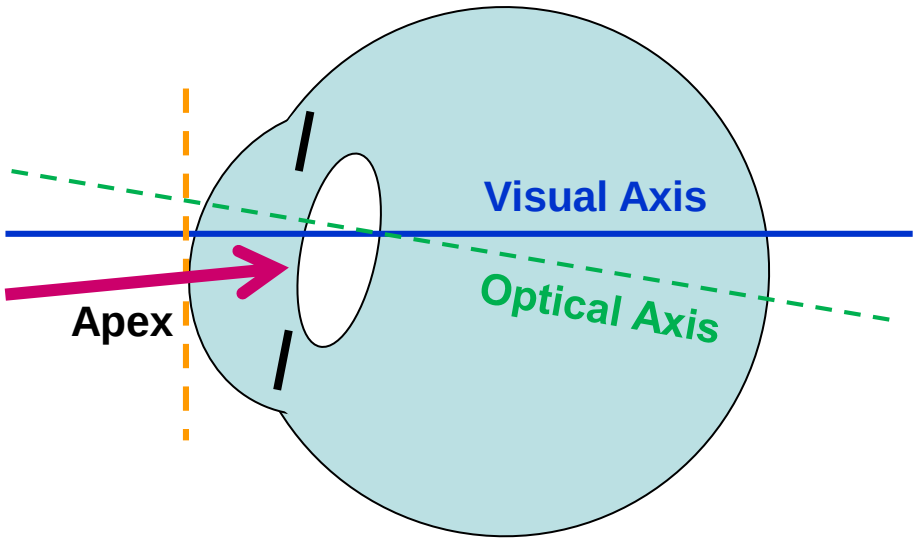


Alignment: Purkinje Image 1

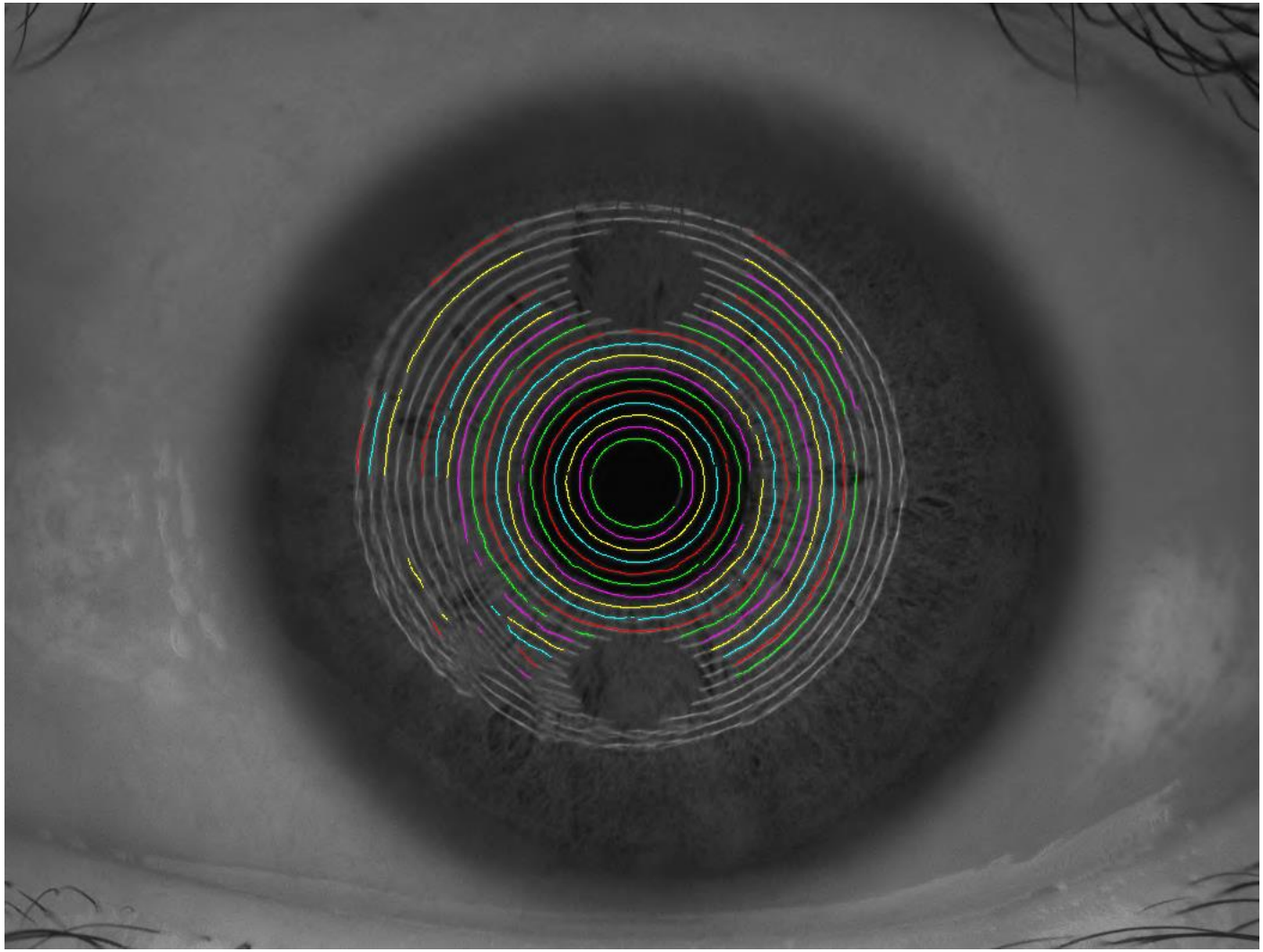
Alignment to P1 ↔ Visual Axis



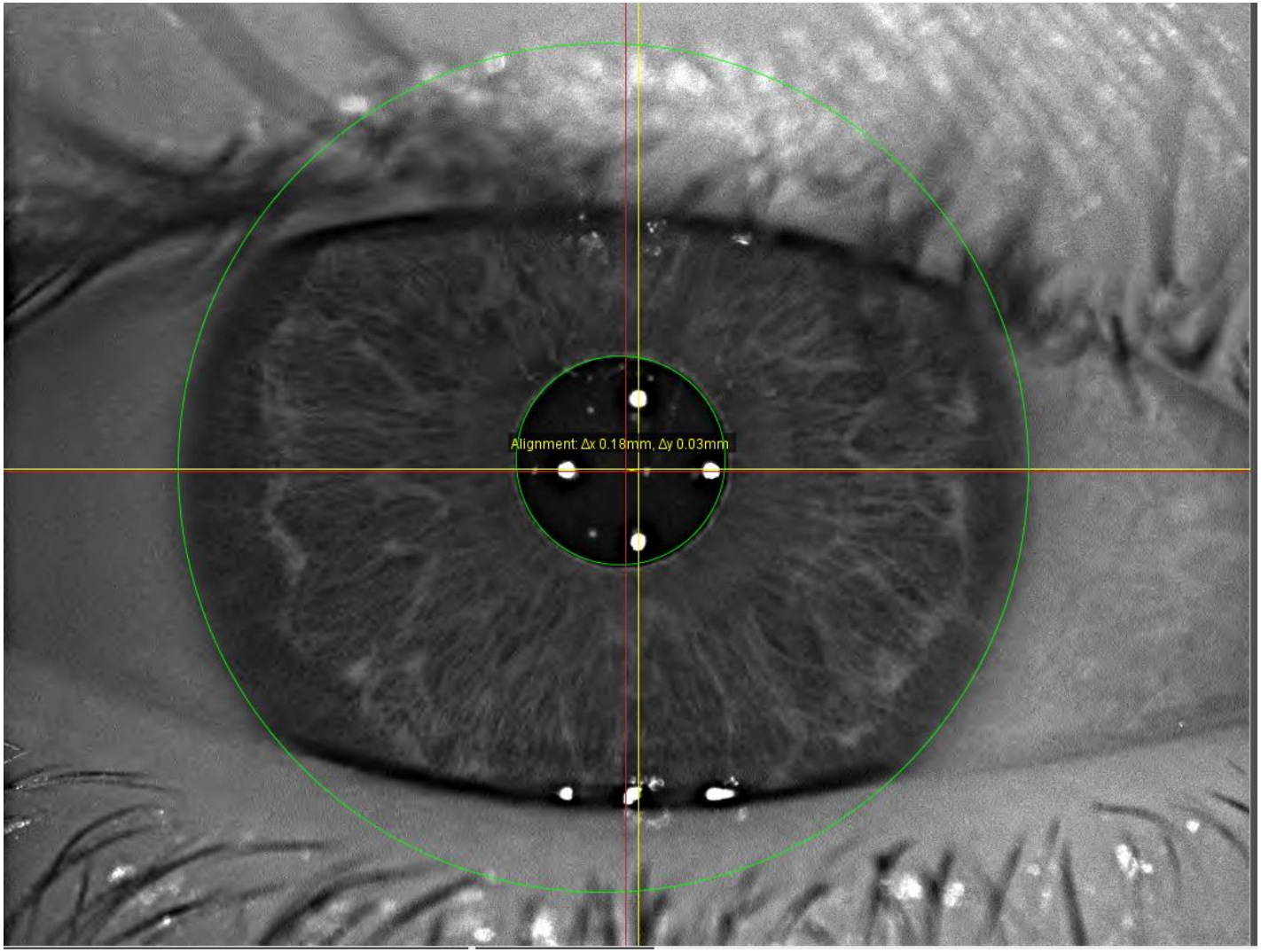
Alignment to Apex ↔ ??



2. Tear Film



3. Partial Lid Closure



4. Eye Movement

Tips for good quality measurements

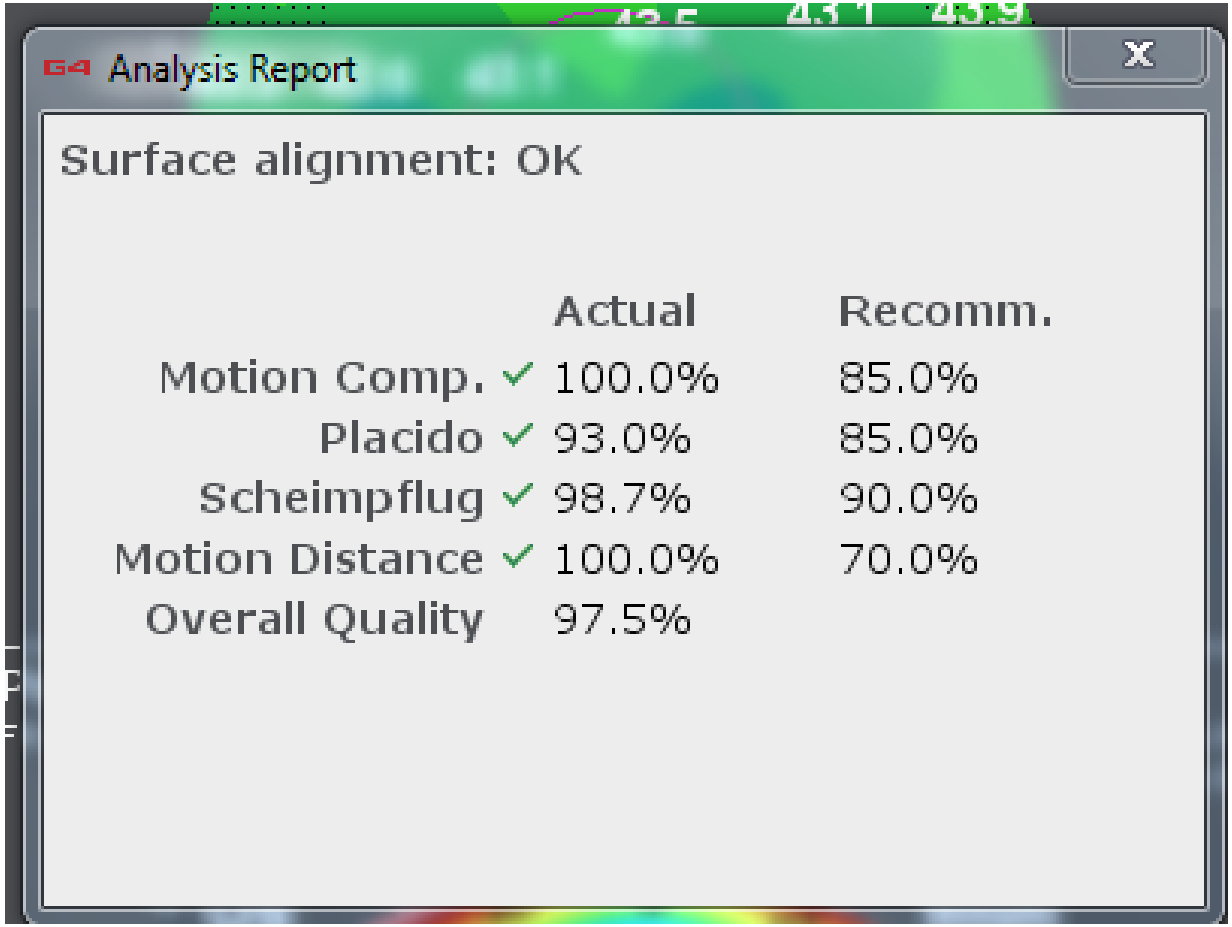
Make sure…

- Patient is well instructed
- Head is correctly aligned (fore-front, chin, head-turn)
- Mouth/jaw is closed
- Eye is wide open during scans

Procedure:

1. Align the device
2. Tell patient to blink one more time and open wide
3. Fine-align and initiate the measurement quickly
4. Start again if needed, there is no need to rush

Measurement Quality Values



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Quick Guide
to taking successful Measurements

1. Position Patient
Adjust table height to maximize patient's comfort. Patient's head should be straight, positioned centrally with forehead against the headrest and chin touching the front edge of the chinrest.

2. Adjust Headrest
Align patient's lower lid to black marker on the headrest post. Turn the headrest to the left to measure OD and to the right to measure OS.

3. Dim Room Lights
Dim lighting in the room to prevent interfering light reflections during the capture.

4. Gross Alignment
Enter scan mode.

a. Move the device to the OS or OD sign on the table (consider the correct position of your headrest, see 2.)

b. Using the joystick, align the measurement head so that the horizontal blue light from the slit lamp is centered on the patient's pupil.

c. Move the joystick right or left for horizontal and rotate up or down for vertical alignment. Move forward or backward to put the eye into focus.

5. Fixate Target
Ask patient to fixate on visible red bull's eye target.

6. Center
Align the red crosshair to the 4 white dots in the top view image by rotating the joystick.

7. Fine Alignment
Align the red reference line to the anterior surface of the cornea by moving the joystick forward or backward. The red line should not intersect the cornea, but just touch it.

8. Blink and Open Wide
Ask the patient to blink and keep the eye open wide.

9. Scan
Press the scan button on the joystick.

Doc.-Nr. 3941-0126-00
Ref. 410 931.016

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Quality Check Guide

✓ ✗

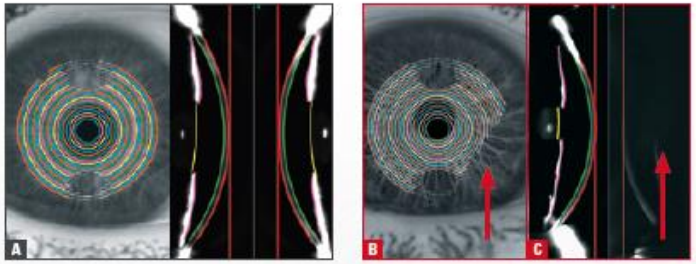
Check quality of Scheimpflug/ Placido ring images

1

A Good quality measurement: measurement is centered and cornea aligned to the red reference line

B Poor quality measurement: nose shadow, here at the bottom right, is covering the eye

C Poor quality measurement: eye lashes or lid are covering the eye

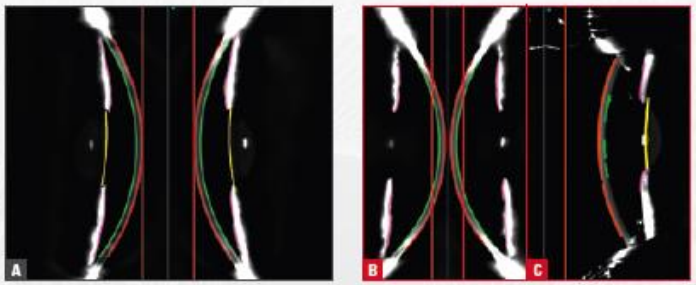


2

A Good quality measurement: cornea is touching the red reference line

B Poor quality measurement: cornea is intersecting the red reference line

C Poor quality measurement: cornea is too far from the red reference line

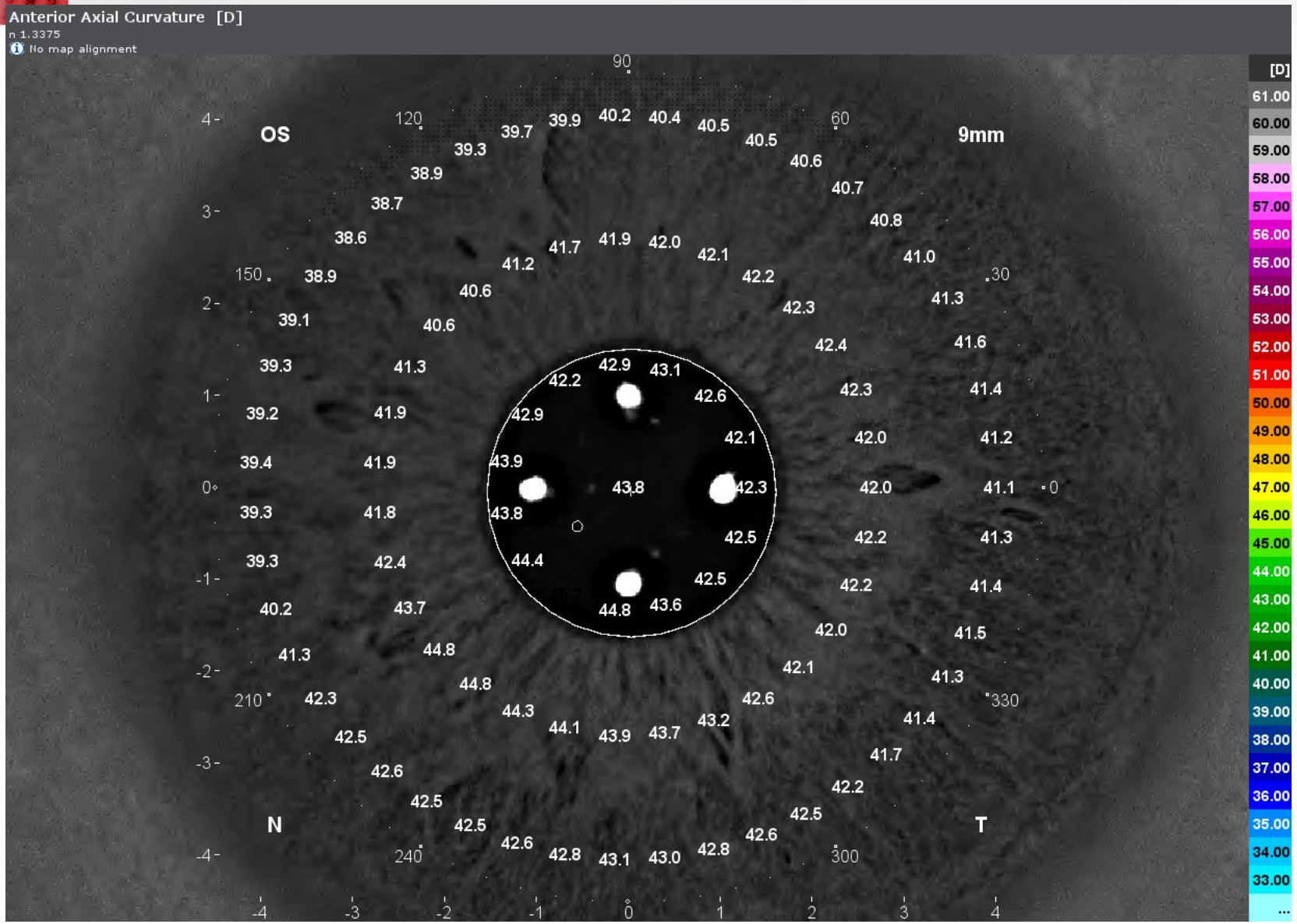


3

A Head should be straight, positioned centrally with forehead against the headrest and chin touching the front edge of the chinrest. Patient is focusing well on the red reference target.

B Head is not positioned correctly: head is tilted, forehead is not touching the headrest, chin is not touching the front edge of the chinrest. Patient is not focusing well on the red reference target. Adjust height of table and chinrest to correct your patient's position.

Photo vs. Map


Anterior Axial Curvature [D]
n 1.3375
No map alignment
OS
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150
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300
[D]
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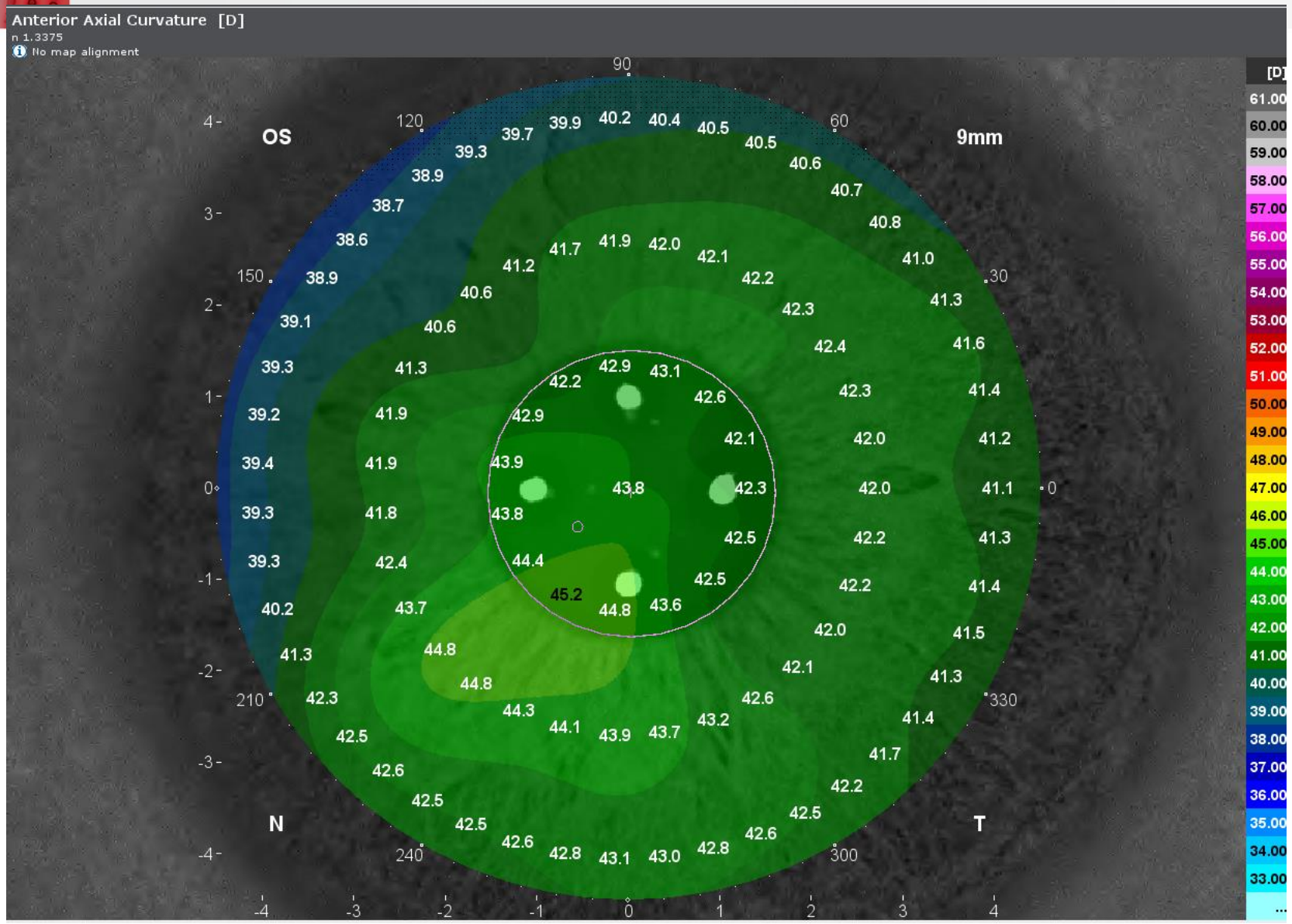
35.00
34.00
33.00

Photo vs. Map


Anterior Axial Curvature [D]
n 1.3375
No map alignment
OS
9mm
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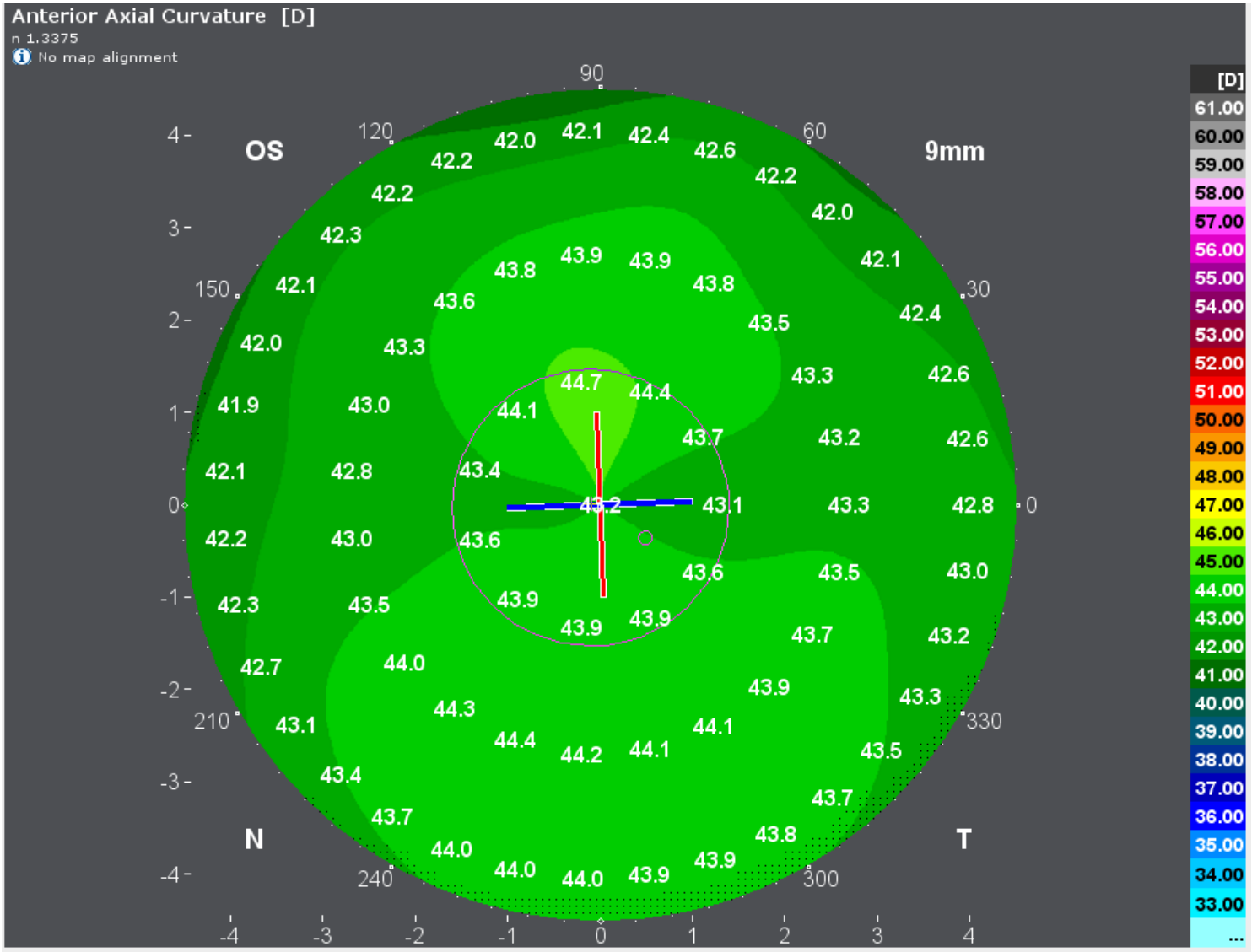
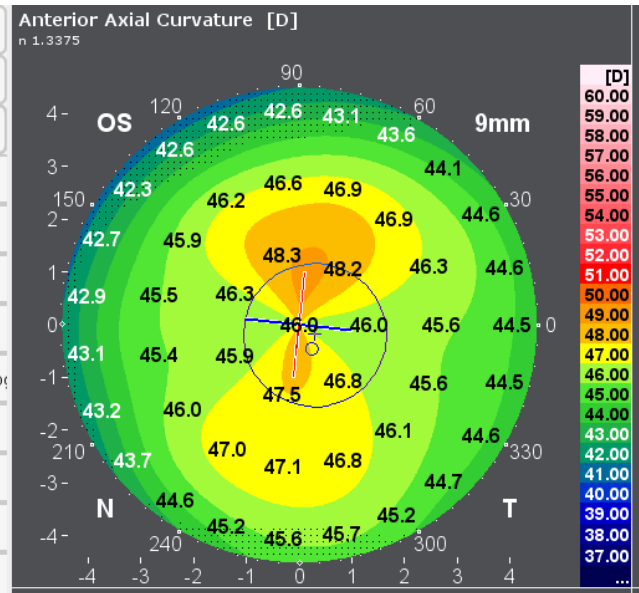
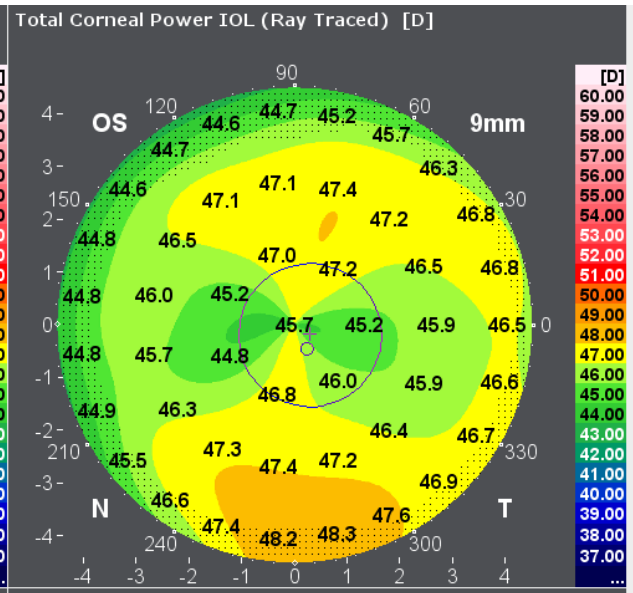
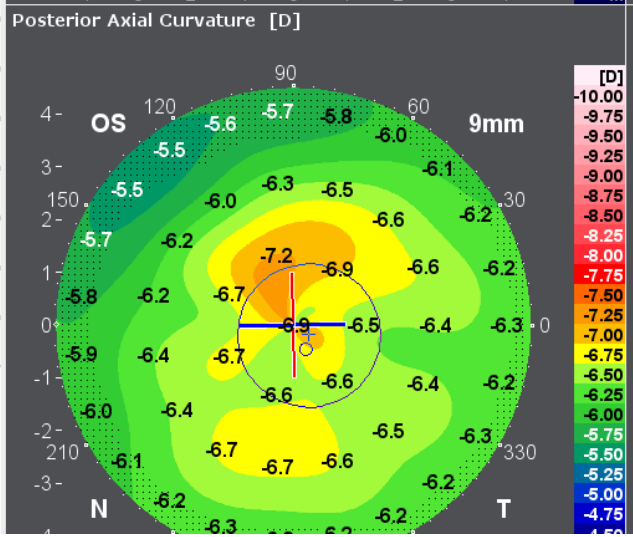
Anterior Axial Curvature

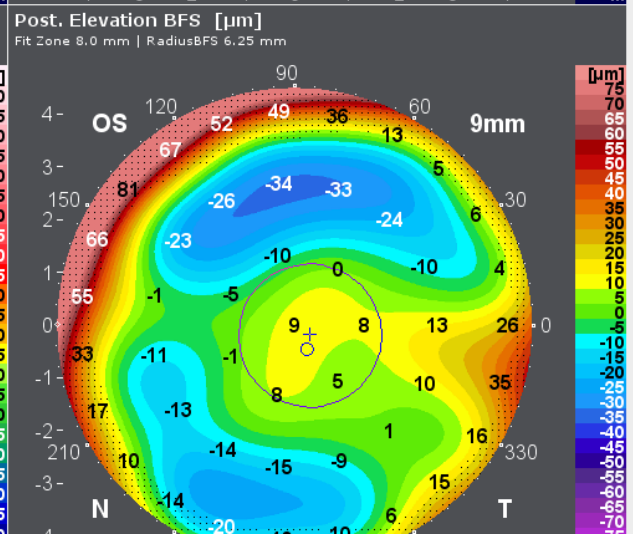


WTR Astigmatism



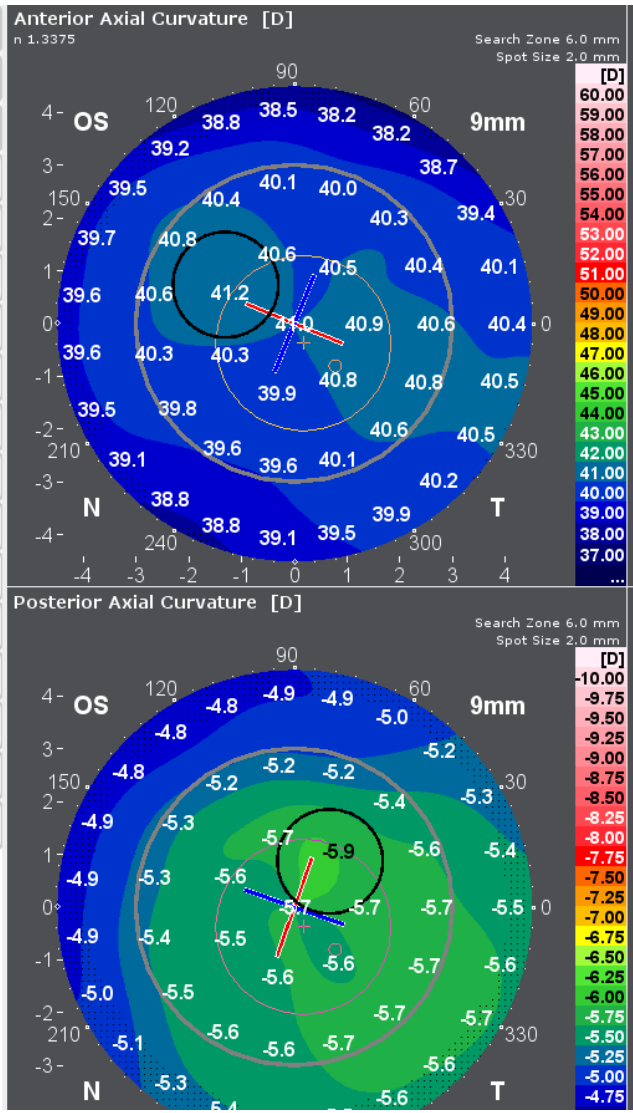






SimK					n 1.3375
SimK	46.95 D		R	7.19 mm	
Flat SimK	45.85 D	174°	R1	7.36 mm	
Steep SimK	48.05 D	84°	R2	7.02 mm	
Astig	2.20 D	84°	e² (-Q)	0.34	
Anterior Axial Curvature Zones					n 1.3375
Central	47.03 D	7.18 mm			
Mid	46.19 D	7.31 mm			
Periph	43.55 D	7.75 mm			
Kmax	48.68 D	6.93 mm	location x,y	0.14 mm	0.89 mm
Posterior Axial Curvature					
Mean K	-6.70 D		R	5.97 mm	
Flat K	-6.57 D	1°	R1	6.09 mm	
Steep K	-6.83 D	91°	R2	5.85 mm	
Astig	-0.27 D	91°	e² (-Q)	0.68	
Pachymetry					
Thinnest	620 µm		x,y	0.23 mm	-0.45 mm
Central	630 µm		CCT	621 µm	
Mid	667 µm				
Periph	725 µm		Corneal Vol.	34.8 mm³	
Total Corneal Power IOL (Ray Traced)					
Mean TCPIOL	45.97 D		Central	45.89 D	
Flat TCPIOL	44.84 D	172°	Mid	46.60 D	
Steep TCPIOL	47.10 D	82°	Periph	45.66 D	
Astig	2.26 D	82°			
Anterior Chamber and Biometry					
WTW, N-T	11.52 mm		Mean Angle	30.9 °	
ACV	90 mm³		Kappa Dist	0.34 mm	
ACD	3.05 mm		ASL endo	n/a	
+ Pupil Diam	2.71 mm		location x,y	0.29 mm	-0.18 mm
Corneal Shape Asymmetry					
KPI	9.4 %		Kprob	8.1 %	
CLMIaa	0.94 D		PPK	1.2 %	

ATR Astigmatism



Database
Measure
Analyze
Verify
Refractive
Keratoconus
Decision Tree
CLMIX
PTA
Wavefront
IOL Power
Map x 1
IOL Calculator
ZLASIK
Comparison
Densitometry
Eye Metrics

SimK					n 1.3375
SimK	40.65 D		R	8.30 mm	
Flat SimK	40.18 D	68°	R1	8.40 mm	
Steep SimK	41.12 D	158°	R2	8.21 mm	
Astig	0.94 D	158°	e² (-Q)	0.20	
Anterior Axial Curvature Zones					n 1.3375
Central	40.61 D	8.31 mm			
Mid	40.25 D	8.39 mm			
Periph	39.23 D	8.60 mm			
Kmax	41.21 D	8.19 mm	location x,y	-0.96 mm	0.53 mm
Posterior Axial Curvature					
Mean K	-5.67 D		R	7.05 mm	
Flat K	-5.61 D	161°	R1	7.13 mm	
Steep K	-5.74 D	71°	R2	6.97 mm	
Astig	-0.13 D	71°	e² (-Q)	0.58	
Pachymetry					
Thinnest	540 µm		x,y	0.76 mm	-0.79 mm
Central	552 µm		CCT	545 µm	
Mid	584 µm				
Periph	622 µm		Corneal Vol.	30.4 mm³	
Total Corneal Power IOL (Ray Traced)					
Mean TCPIOL	39.84 D		Central	39.76 D	
Flat TCPIOL	39.24 D	69°	Mid	40.43 D	
Steep TCPIOL	40.45 D	159°	Periph	41.06 D	
Astig	1.21 D	159°			
Anterior Chamber and Biometry					
WTW, N-T	12.52 mm		Mean Angle	25.7 °	
ACV	100 mm³		Kappa Dist	0.39 mm	
ACD	2.79 mm		ASL endo	n/a	
+ Pupil Diam	3.31 mm		location x,y	0.16 mm	-0.35 mm
Keratoconus Probability					
KPI	0.0 %		Kprob	0.3 %	
CLMIaa	0.08 D		PPK	0.2 %	

Oblique Astigmatism

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Database
Measure
Analyze
Verify
Refractive
Keratoconus
Decision Tree
CLMIX
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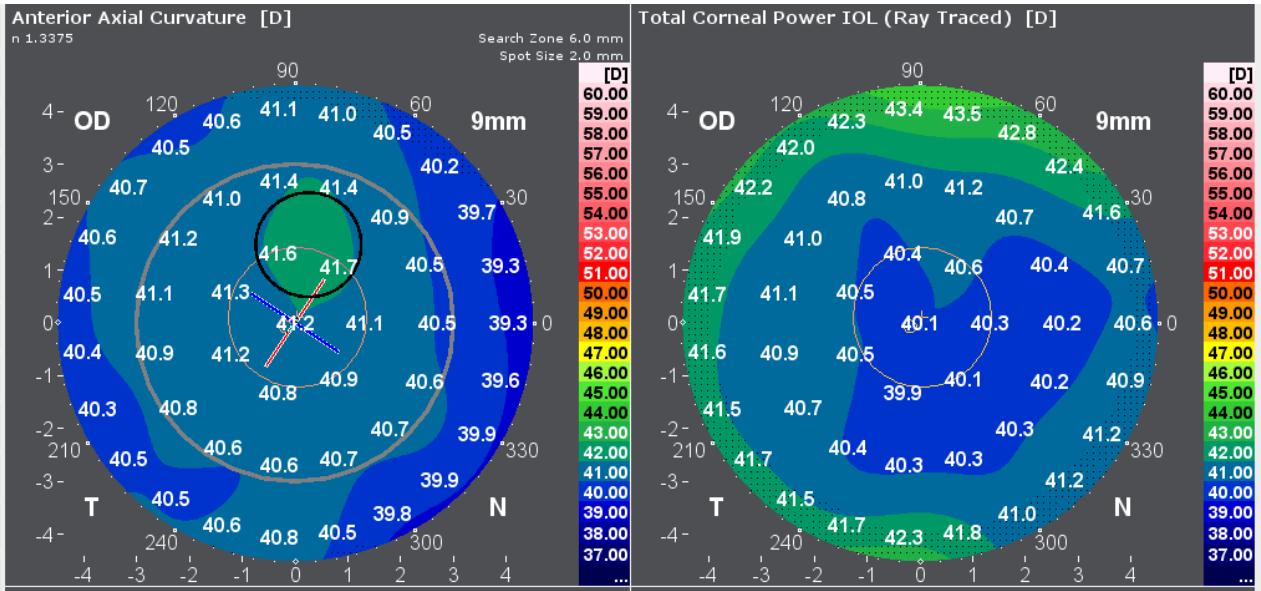
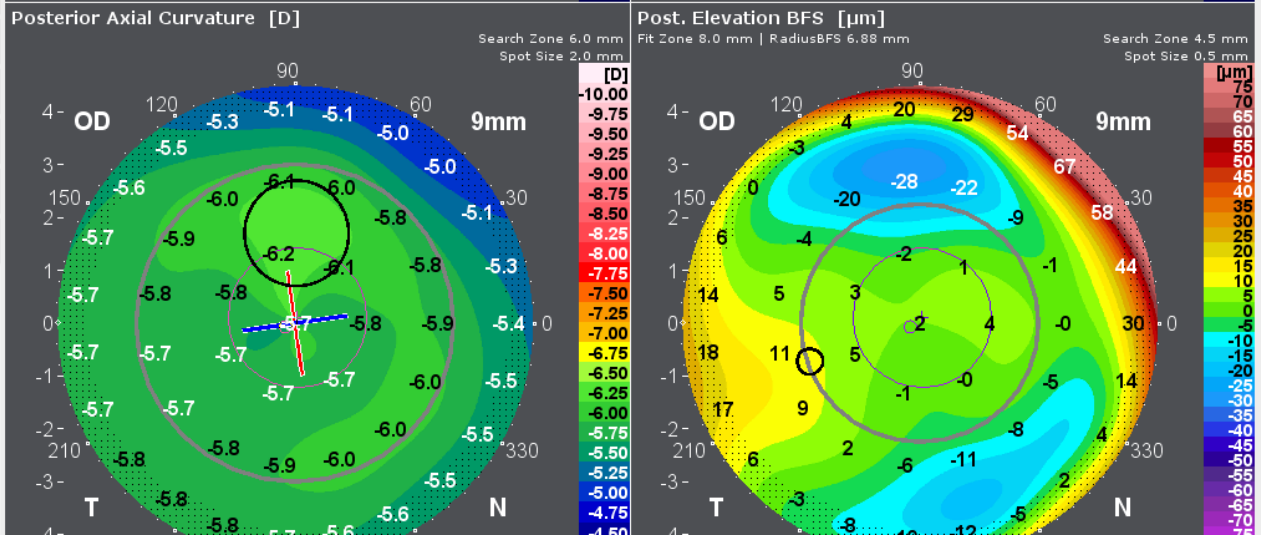
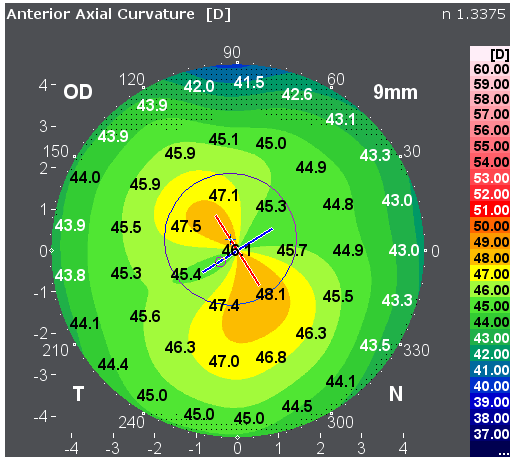
Wavefront
IOL Power
Map x 1
IOL Calculator
ZLASIK
Comparison
Densitometry
Eye Metrics

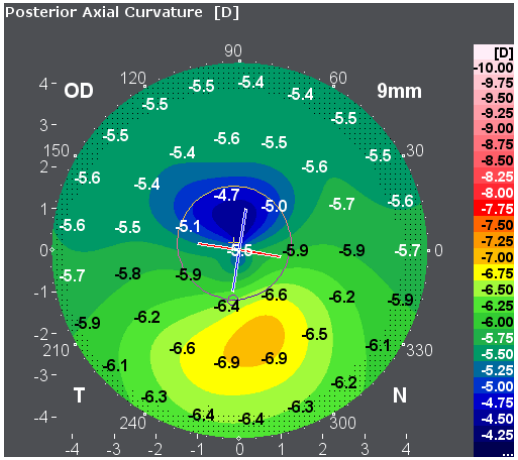




SimK					n 1.3375
SimK	41.23 D		R	8.19 mm	
Flat SimK	41.14 D	146°	R1	8.20 mm	
Steep SimK	41.33 D	56°	R2	8.17 mm	
Astig	0.20 D	56°	e² (-Q)	0.16	
Anterior Axial Curvature Zones					n 1.3375
Central	41.24 D	8.18 mm			
Mid	40.85 D	8.26 mm			
Periph	40.21 D	8.39 mm			
Kmax	41.85 D	8.06 mm	location x,y	0.27 mm	1.27 mm
Posterior Axial Curvature					
Mean K	-5.88 D		R	6.80 mm	
Flat K	-5.73 D	8°	R1	6.97 mm	
Steep K	-6.02 D	98°	R2	6.64 mm	
Astig	-0.29 D	98°	e² (-Q)	0.26	
Pachymetry					
o Thinnest	527 µm		x,y	-0.19 mm	-0.06 mm
Central	535 µm		CCT	527 µm	
Mid	584 µm				
Periph	654 µm		Corneal Vol.	30.6 mm³	
Total Corneal Power IOL (Ray Traced)					
Mean TCPIOL	40.29 D		Central	40.26 D	
Flat TCPIOL	40.11 D	116°	Mid	40.69 D	
Steep TCPIOL	40.46 D	26°	Periph	41.93 D	
Astig	0.35 D	26°			
Anterior Chamber and Biometry					
WTW, N-T	12.43 mm		Mean Angle	n/a	
ACV	n/a		Kappa Dist	0.13 mm	
ACD	n/a		ASL endo	n/a	
+ Pupil Diam	2.63 mm		location x,y	0.03 mm	0.13 mm
Keratoconus Probability					
KPI	0.0 %		Kprob	1.1 %	
CLMIaa	0.90 D		PPK	1.1 %	

Curvature





Curvature = n/r

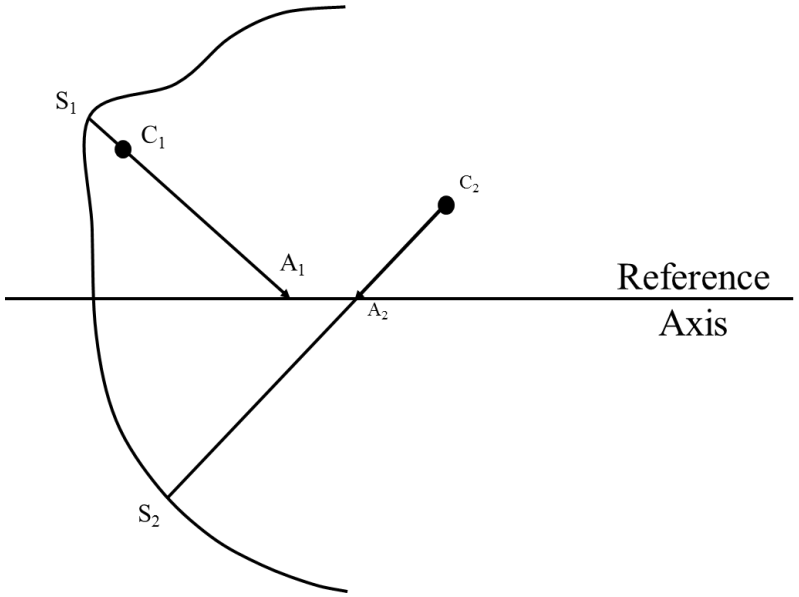
Anterior:

- SimK = calculated with keratometric index (1.3375)
  assuming constant ratio of anterior & posterior cornea
- Scale with adjustable step-size
- Towards red/white: steeper, towards blue = flatter

Posterior:

- Posterior K = calculated with index of refraction of cornea (1.376) and aqueous humour (1.336) with ray-tracing
- Negative power

Curvature



- **Instantaneous Curvature** = **local** representation of curvature (C_1, C_2)
- **Axial Curvature** = **smoothened** curvature (radius extended to reference axis: A_1, A_2), making steep areas flatter, and flat areas steeper

Axial Curvature

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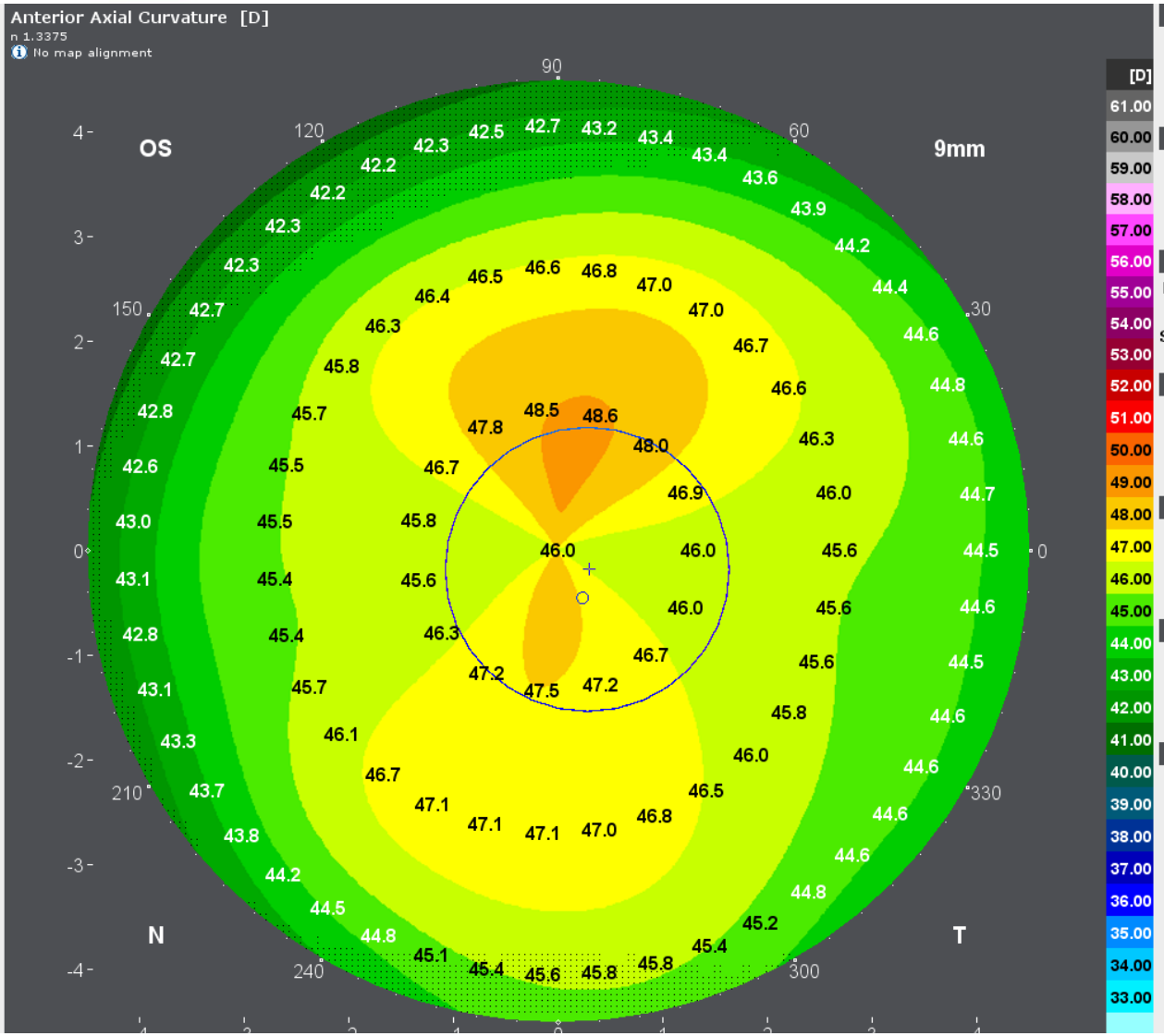
- Database
- Measure
- Analyze
  - Verify
  - Refractive
  - Asymmetries
  - CLMIX
  - Thickness Pro
  - PTA
  - Wavefront
  - IOL Power
  - Map x 1
  - Mapx4 1
  - Mapx4 2
  - IOL Calculator
  - ZLASIK.
  - Comparison
  - Densitometry
  - Eye Metrics



SimK					n 1.3375
SimK	46.95 D		R	7.19 mm	
Flat SimK	45.85 D	174°	R1	7.36 mm	
Steep SimK	48.05 D	84°	R2	7.02 mm	
Astig	2.20 D	84°	e² (-Q)	0.34	
Posterior Axial Curvature					
Mean K	-6.70 D		R	5.97 mm	
Flat K	-6.57 D	1°	R1	6.09 mm	
Steep K	-6.83 D	91°	R2	5.85 mm	
Astig	-0.27 D	91°	e² (-Q)	0.68	
Total Corneal Power IOL (Ray Traced)					
Mean TCPIOL	45.97 D		Central	45.89 D	
Flat TCPIOL	44.84 D	172°	Mid	46.60 D	
Steep TCPIOL	47.10 D	82°	Periph	45.66 D	
Astig	2.26 D	82°			
Pachymetry					
o Thinnest	620 µm		x,y	0.23 mm	-0.45 mm
Central	630 µm		CCT	621 µm	
Mid	667 µm				
Periph	725 µm		Corneal Vol.	34.8 mm³	
Anterior Axial Curvature Zones					n 1.3375
Central	47.03 D	7.18 mm			
Mid	46.19 D	7.31 mm			
Periph	43.55 D	7.75 mm			
Kmax	48.68 D	6.93 mm	location x,y	0.14 mm	0.89 mm
Anterior Chamber and Biometry					
WTW, N-T	11.52 mm		Mean Angle	30.9 °	
ACV	90 mm³		Kappa Dist	0.34 mm	
ACD	3.05 mm		ASL endo	n/a	
+ Pupil Diam	2.71 mm		location x,y	0.29 mm	-0.18 mm
Corneal Shape Asymmetry					
KPI	9.4 %		Kprob	8.1 %	
CLMIaa	0.94 D		PPK	1.2 %	

Instantaneous Curvature

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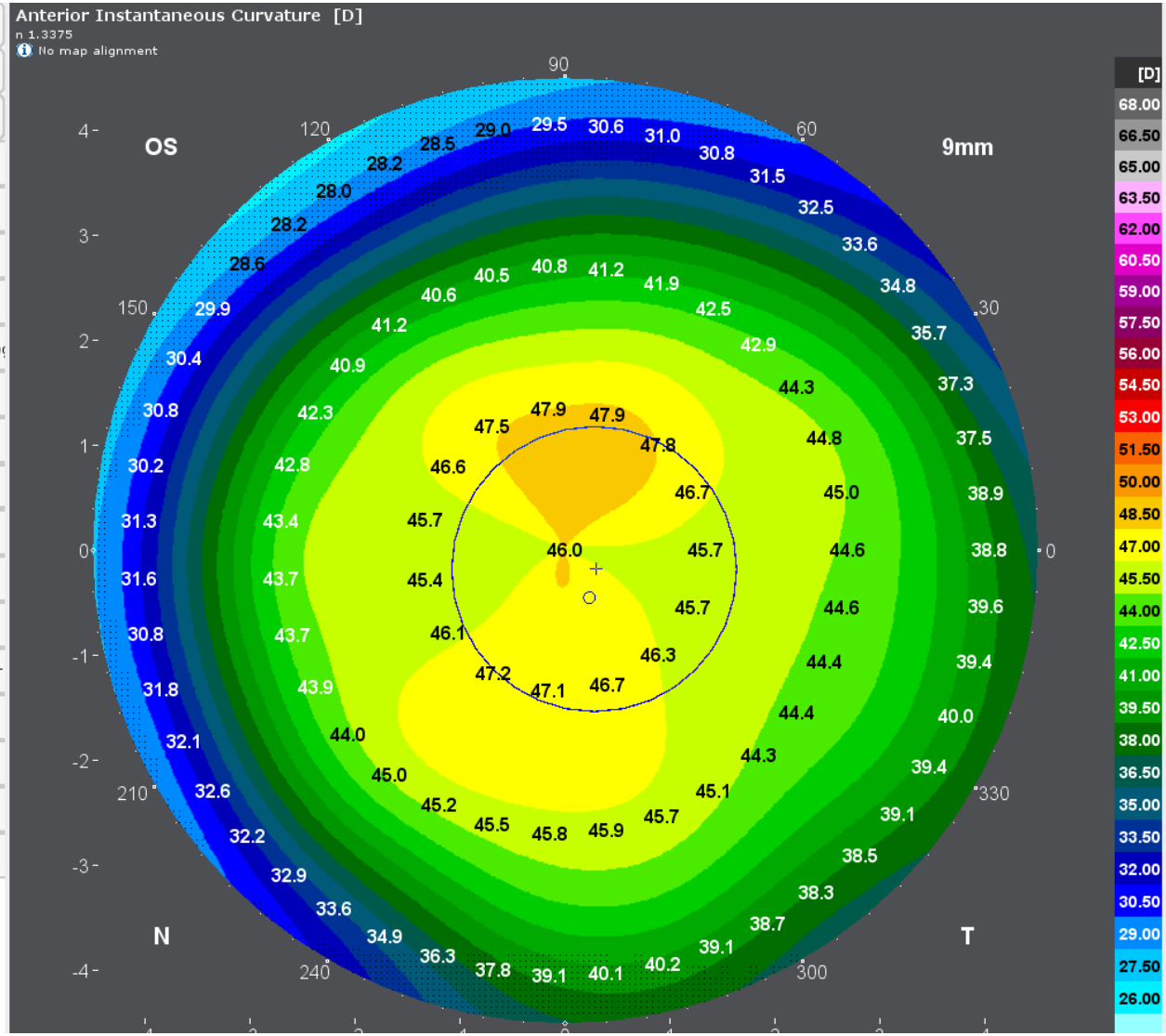
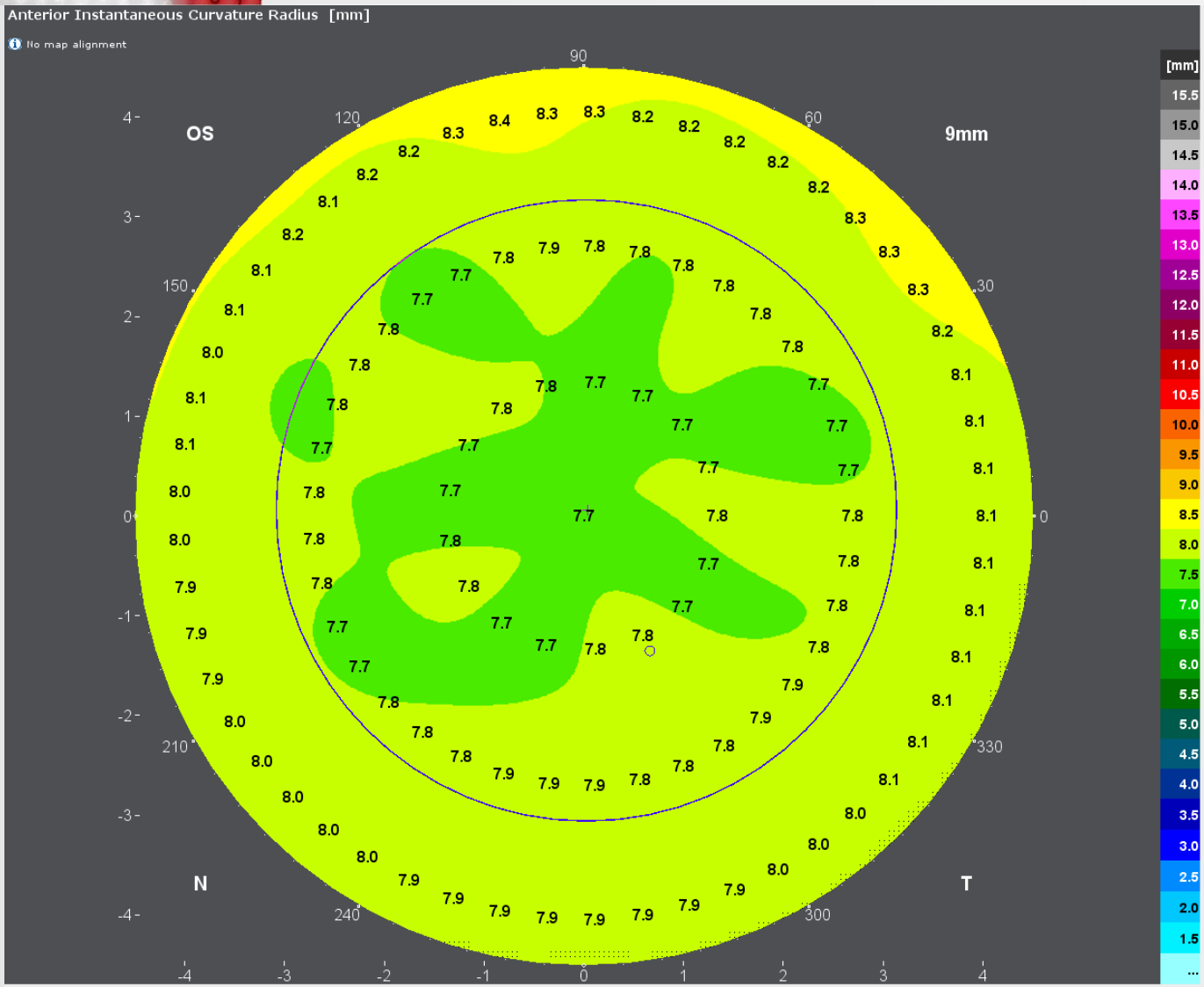
Database
Measure
Analyze
Verify
Refractive
Asymmetries
CLMIX
Thickness Prog
PTA
Wavefront
IOL Power
Map x 1
Mapx4 1
Mapx4 2
IOL Calculator
ZLASIK.
Comparison
Densitometry
Eye Metrics



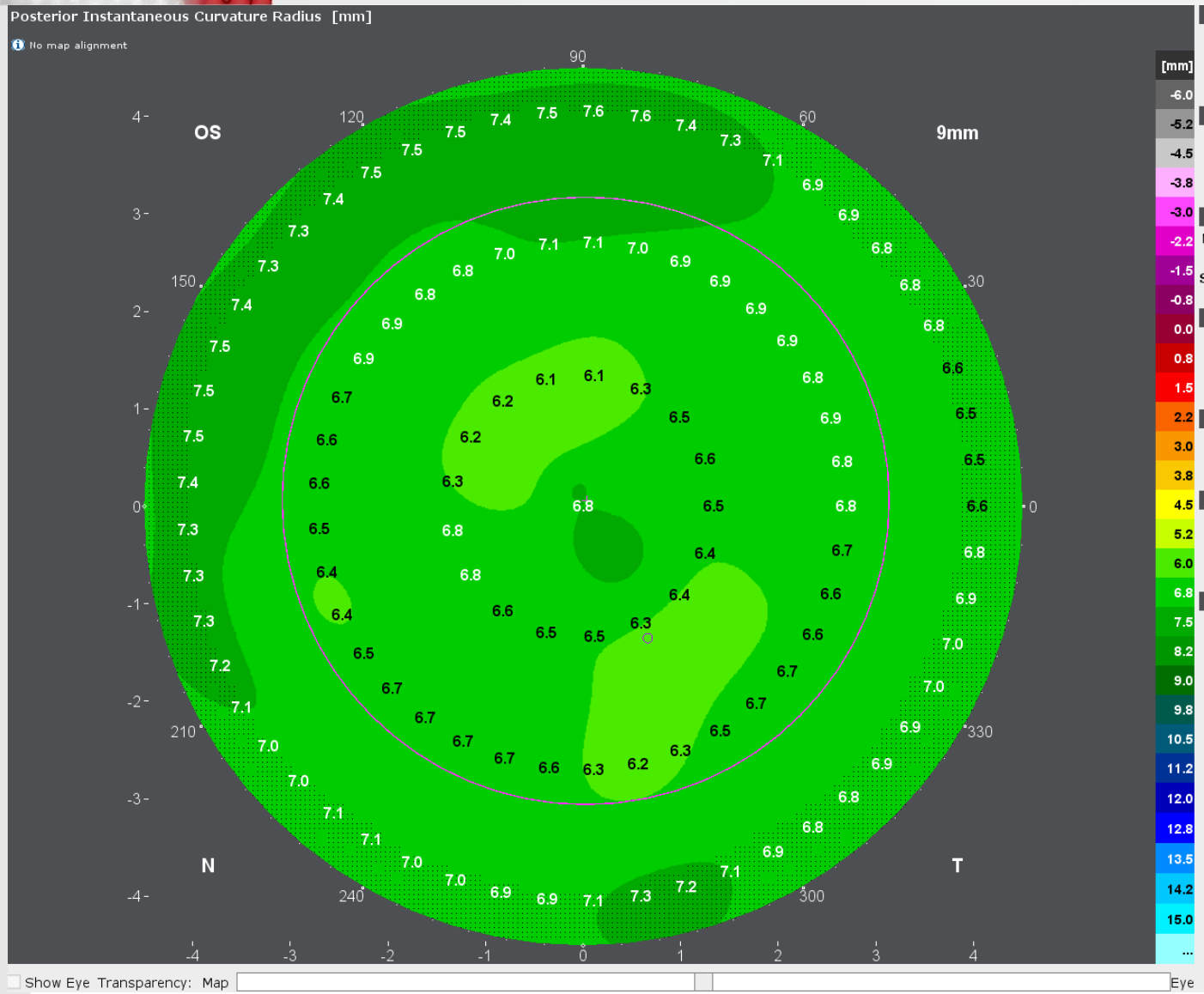
SimK					n 1.3375
SimK	46.95 D		R	7.19 mm	
Flat SimK	45.85 D	174°	R1	7.36 mm	
Steep SimK	48.05 D	84°	R2	7.02 mm	
Astig	2.20 D	84°	e² (-Q)	0.34	
Posterior Axial Curvature					
Mean K	-6.70 D		R	5.97 mm	
Flat K	-6.57 D	1°	R1	6.09 mm	
Steep K	-6.83 D	91°	R2	5.85 mm	
Astig	-0.27 D	91°	e² (-Q)	0.68	
Total Corneal Power IOL (Ray Traced)					
Mean TCPIOL	45.97 D		Central	45.89 D	
Flat TCPIOL	44.84 D	172°	Mid	46.60 D	
Steep TCPIOL	47.10 D	82°	Periph	45.66 D	
Astig	2.26 D	82°			
Pachymetry					
o Thinnest	620 µm		x,y	0.23 mm	-0.45 mm
Central	630 µm		CCT	621 µm	
Mid	667 µm				
Periph	725 µm		Corneal Vol.	34.8 mm³	
Anterior Instantaneous Curvature Zones					n 1.3375
Central	46.80 D	7.21 mm			
Mid	43.21 D	7.81 mm			
Periph	33.90 D	9.96 mm			
Kmax	48.85 D	6.91 mm	location x,y	0.15 mm	0.68 mm
Anterior Chamber and Biometry					
WTW, N-T	11.52 mm		Mean Angle	30.9 °	
ACV	90 mm³		Kappa Dist	0.34 mm	
ACD	3.05 mm		ASL endo	n/a	
+ Pupil Diam	2.71 mm		location x,y	0.29 mm	-0.18 mm
Corneal Shape Asymmetry					
KPI	9.4 %		Kprob	8.1 %	
CLMIaa	0.94 D		PPK	1.2 %	

Instantaneous Curvature: mm



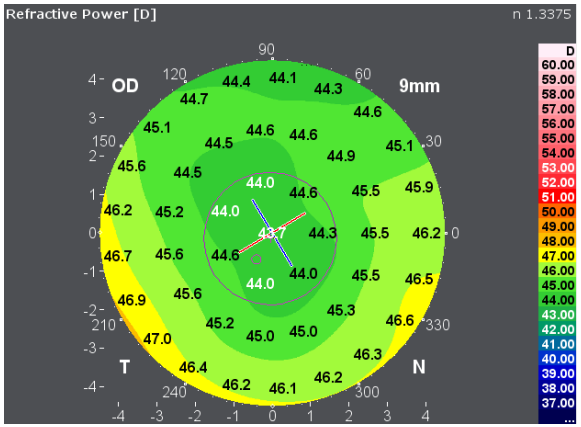
SimK					n 1.3375
SimK	43.94 D		R	7.68 mm	
Flat SimK	43.70 D	53°	R1	7.72 mm	
Steep SimK	44.18 D	143°	R2	7.64 mm	
Astig	0.48 D	143°	e² (-Q)	0.17	
Posterior Axial Curvature					
Mean K	-5.90 D		R	6.78 mm	
Flat K	-5.78 D	110°	R1	6.92 mm	
Steep K	-6.01 D	20°	R2	6.65 mm	
Astig	-0.23 D	20°	e² (-Q)	-1.36	
Total Corneal Power IOL (Ray Traced)					
Mean TCPIOL	43.28 D		Central	43.30 D	
Flat TCPIOL	42.95 D	45°	Mid	43.98 D	
Steep TCPIOL	43.61 D	135°	Periph	45.64 D	
Astig	0.67 D	135°			
Pachymetry					
o Thinnest	450 µm		x,y	0.66 mm	-1.35 mm
Central	459 µm		CCT	455 µm	
Mid	489 µm				
Periph	549 µm		Corneal Vol.	25.6 mm³	
Anterior Instantaneous Curvature Zones					
Central	43.76 D				
Mid	43.25 D				
Periph	41.70 D				
Kmax	44.43 D	7.60 mm	location x,y	-0.08 mm	0.06 mm
Anterior Chamber and Biometry					
WTW, N-T	11.23 mm		Mean Angle	52.5 °	
ACV	233 mm³		Kappa Dist	0.07 mm	
AQD	3.93 mm		ASL endo	n/a	
+ Pupil Diam	6.22 mm		location x,y	0.03 mm	0.06 mm
Corneal Shape Asymmetry					
CLMIaa	0.10 D		PPK	0.2 %	

Instantaneous Curvature: mm



SimK					n 1.3375
SimK	43.94 D		R	7.68 mm	
Flat SimK	43.70 D	53°	R1	7.72 mm	
Steep SimK	44.18 D	143°	R2	7.64 mm	
Astig	0.48 D	143°	e² (-Q)	0.17	
Posterior Axial Curvature					
Mean K	-5.90 D		R	6.78 mm	
Flat K	-5.78 D	110°	R1	6.92 mm	
Steep K	-6.01 D	20°	R2	6.65 mm	
Astig	-0.23 D	20°	e² (-Q)	-1.36	
Total Corneal Power IOL (Ray Traced)					
Mean TCPIOL	43.28 D		Central	43.30 D	
Flat TCPIOL	42.95 D	45°	Mid	43.98 D	
Steep TCPIOL	43.61 D	135°	Periph	45.64 D	
Astig	0.67 D	135°			
Pachymetry					
o Thinnest	450 µm		x,y	0.66 mm	-1.35 mm
Central	459 µm		CCT	455 µm	
Mid	489 µm				
Periph	549 µm		Corneal Vol.	25.6 mm³	
Posterior Instantaneous Curvature Zones					
Central	-6.03 D				
Mid	-5.93 D				
Periph	-5.73 D				
Anterior Chamber and Biometry					
WTW, N-T	11.23 mm		Mean Angle	52.5 °	
ACV	233 mm³		Kappa Dist	0.07 mm	
AQD	3.93 mm		ASL endo	n/a	
+ Pupil Diam	6.22 mm		location x,y	0.03 mm	0.06 mm
Corneal Shape Asymmetry					
CLMIaa	0.10 D		PPK	0.2 %	

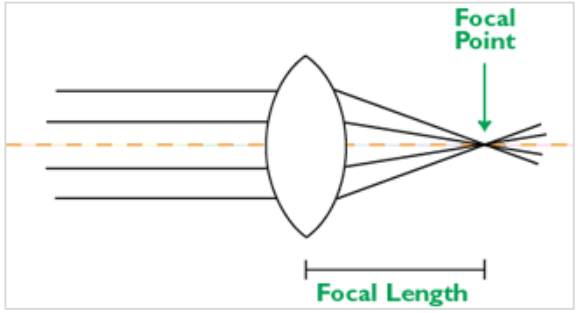
Refractive Power



- Calculated by ray-tracing through the anterior corneal surface

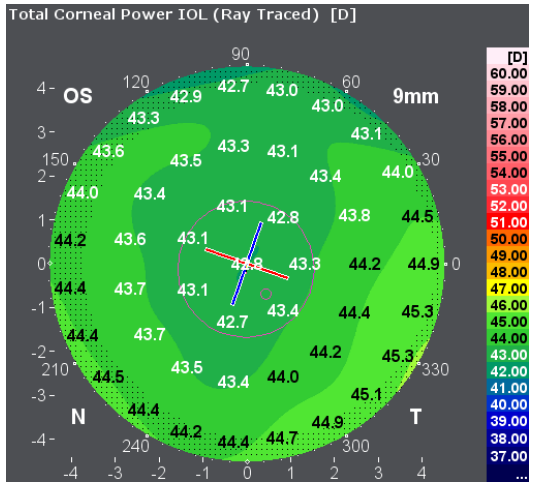
Power = n/f

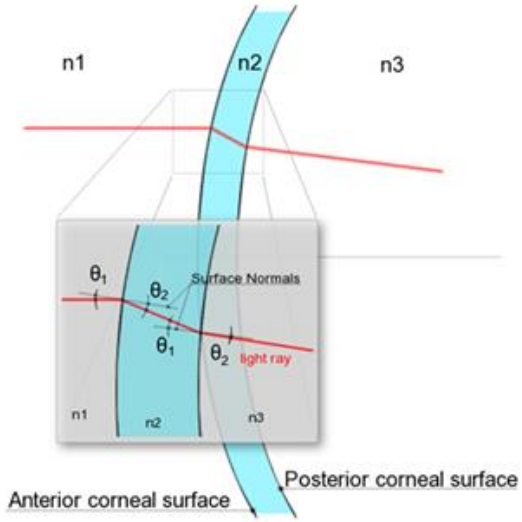
- f = focal length, n = refractive index



- Focal length is determined as the distance from the reference plane to the intersection of the ray with the central axis
- To determine the focal length the reference plane is the anterior corneal suface in this case

Total Corneal Power (TCP)





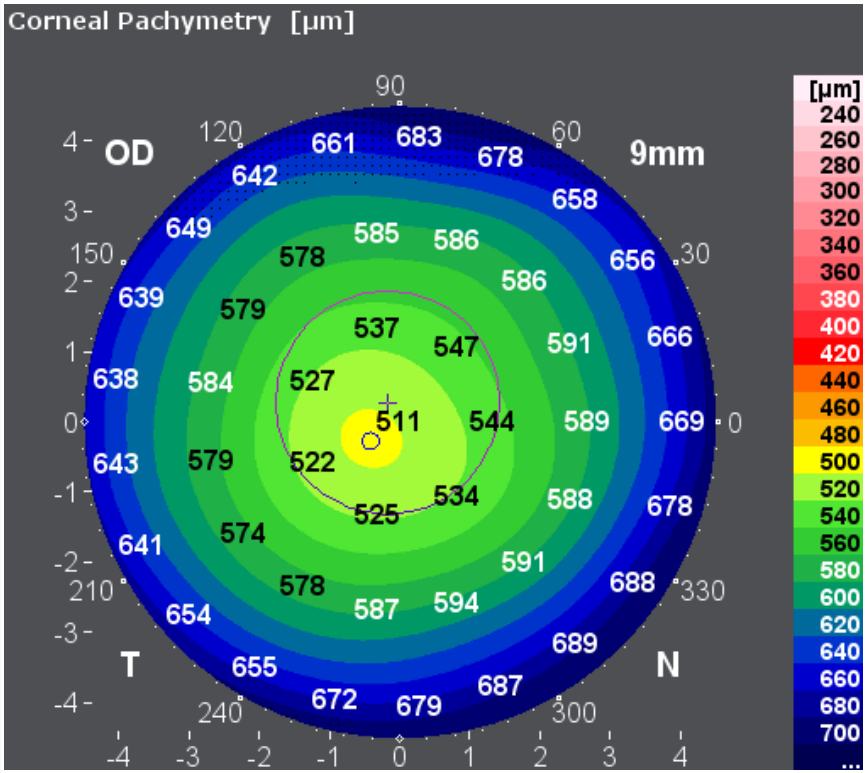
- Calculated by ray-tracing through the anterior and posterior corneal surface, taking into account the actual indices of refraction (n)

TCP = n/f

- TCP_{IOL} is calculated using $n_{aqueous}$ = 1.336. To determine the focal length (f), the reference plane is the posterior corneal suface
- TCP_{IOL} gives a more realistic characterisation of the anterior and posterior corneal surface.

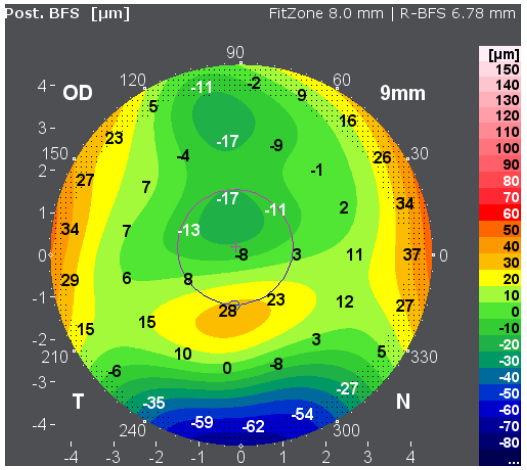
  The results will however deviate from SimK and cannot be used in traditional IOL formulas.

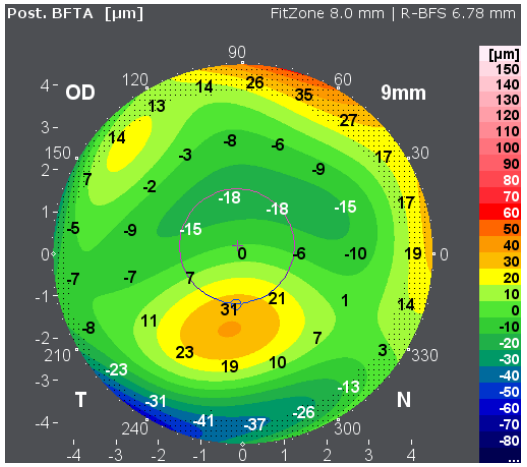
Pachymetry



- Shows corneal thickness profiles in 20 µm steps
- Towards red/white: thinning, towards blue: thickening
- Thinnest point = indicated by a small circle
- CCT = central corneal thickness; corresponds to central value of the map

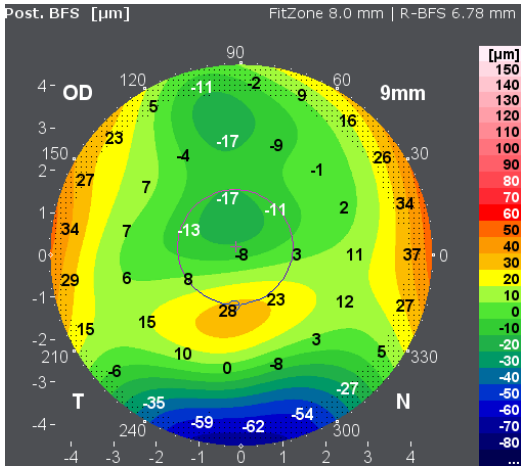
Elevation

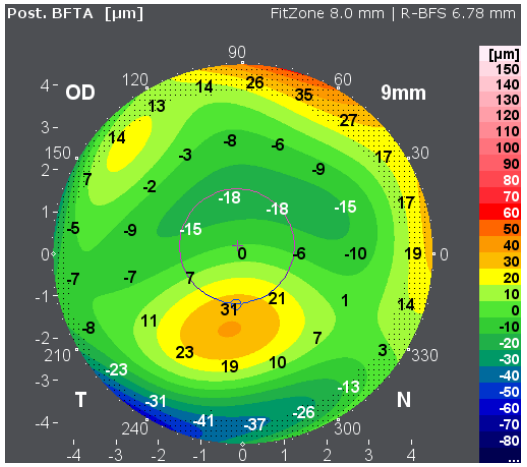


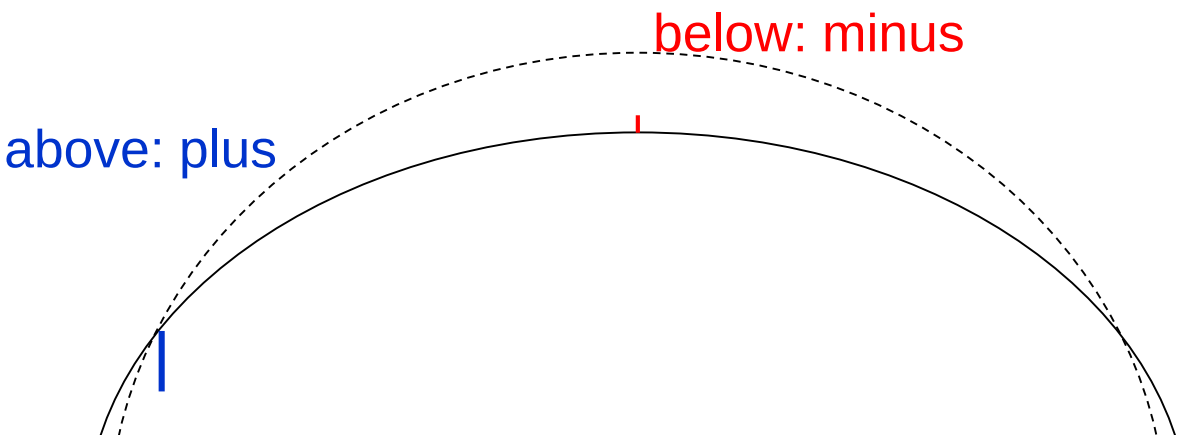


- Elevation requires a reference (plane, sphere, asphere,…). **GALILEI: BFS, BFA, BFTA**
- Example: Elevation of a mountain

Elevation



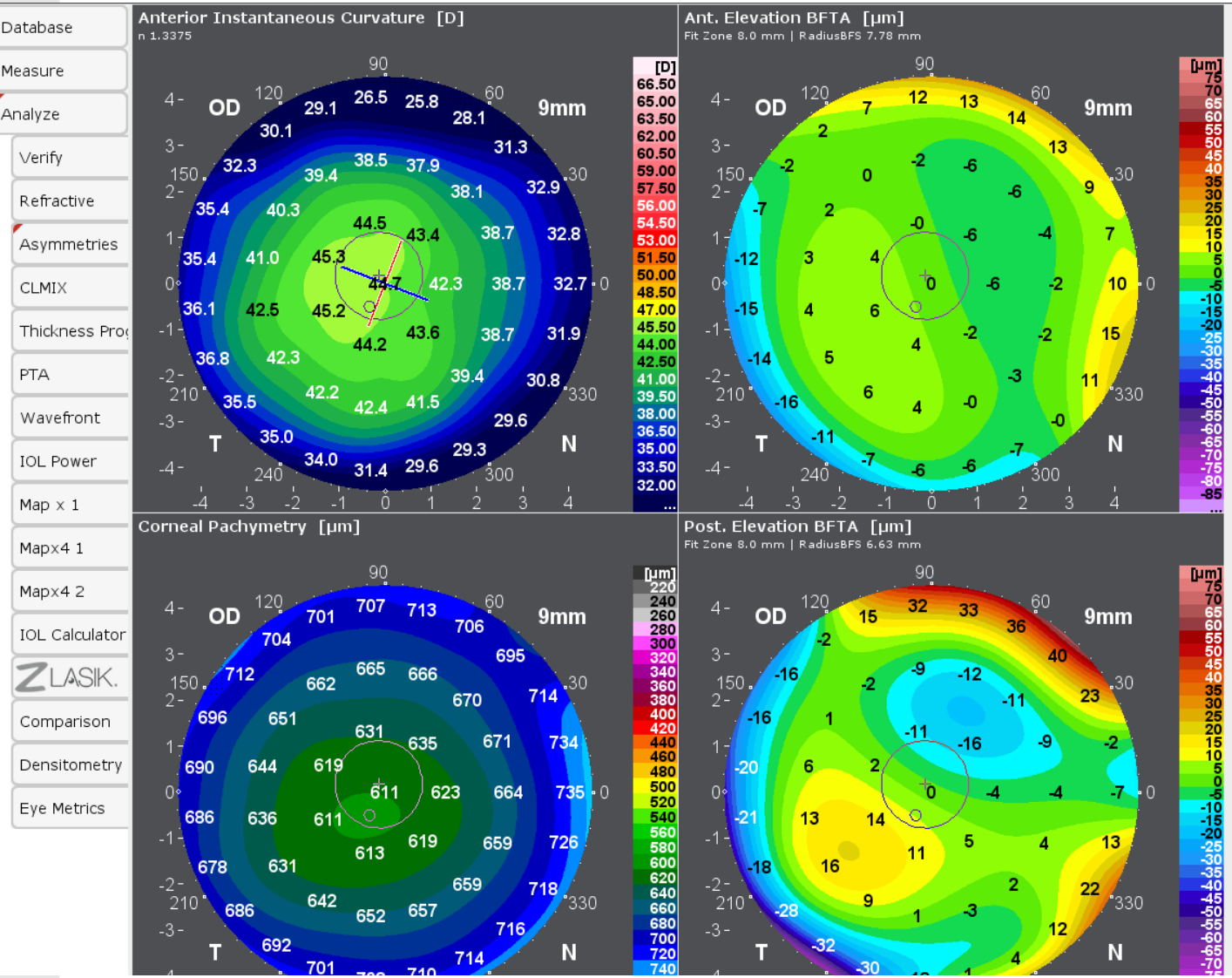




——: Cornea

- - - : Best-Fit-Sphere (BFS)

Corneal Shape Asymmetries



SimK				n 1.3375
SimK	44.73 D		R	7.55 mm
Flat SimK	44.41 D	158°	R1	7.60 mm
Steep SimK	45.05 D	68°	R2	7.49 mm
Astig	0.64 D	68°	e² (-Q)	0.53

Anterior Instantaneous Curvature (Tangential)				n 1.3375
Mean K	44.13 D		R	7.65 mm
Flat K	43.83 D	159°	R1	7.70 mm
Steep K	44.42 D	69°	R2	7.60 mm
Astig	0.59 D	69°	e² (-Q)	0.53

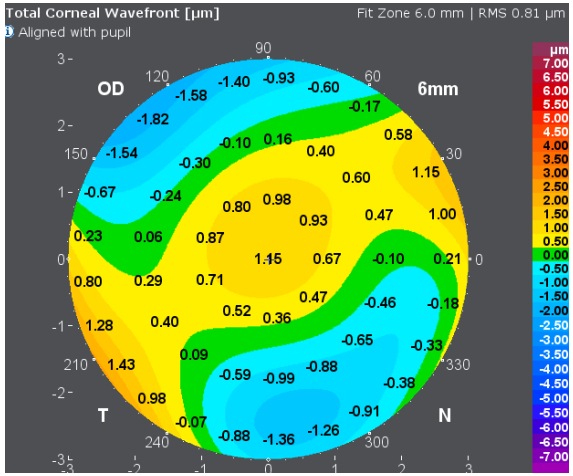
Total Corneal Power IOL (Ray Traced)				
Mean TCPIOL	43.86 D		Central	43.75 D
Flat TCPIOL	43.59 D	151°	Mid	43.66 D
Steep TCPIOL	44.13 D	61°	Periph	42.34 D
Astig	0.54 D	61°		

Anterior Chamber and Biometry				
WTW, N-T	12.42 mm		Mean Angle	24.8 °
ACV	81 mm³		Kappa Dist	0.25 mm
ACD	2.85 mm		ASL endo	n/a
+ Pupil Diam	1.90 mm		location x,y	-0.15 mm 0.20 mm

Pachymetry			
o Thinnest	608 µm	x,y	-0.34 mm -0.49 mm
Central	618 µm	CCT	611 µm
Mid	656 µm		
Periph	712 µm	Corneal Vol.	34.3 mm³

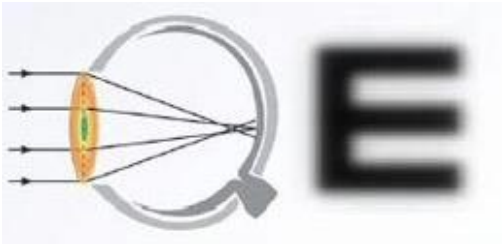
Corneal Shape Asymmetry & Indices			
KPI	28.1 %	Kprob	58.9 %
CLMIaa	1.33 D	PPK	2.6 %
I-S	0.83 D	DSI	2.48 D
SAI	1.39 D	OSI	2.31 D
SRI	1.02 D	CSI	0.88 D
IAI	0.50 D	ACP	44.83 D
AA	100.0 %	SDP	2.06 D

Total Corneal Wavefront



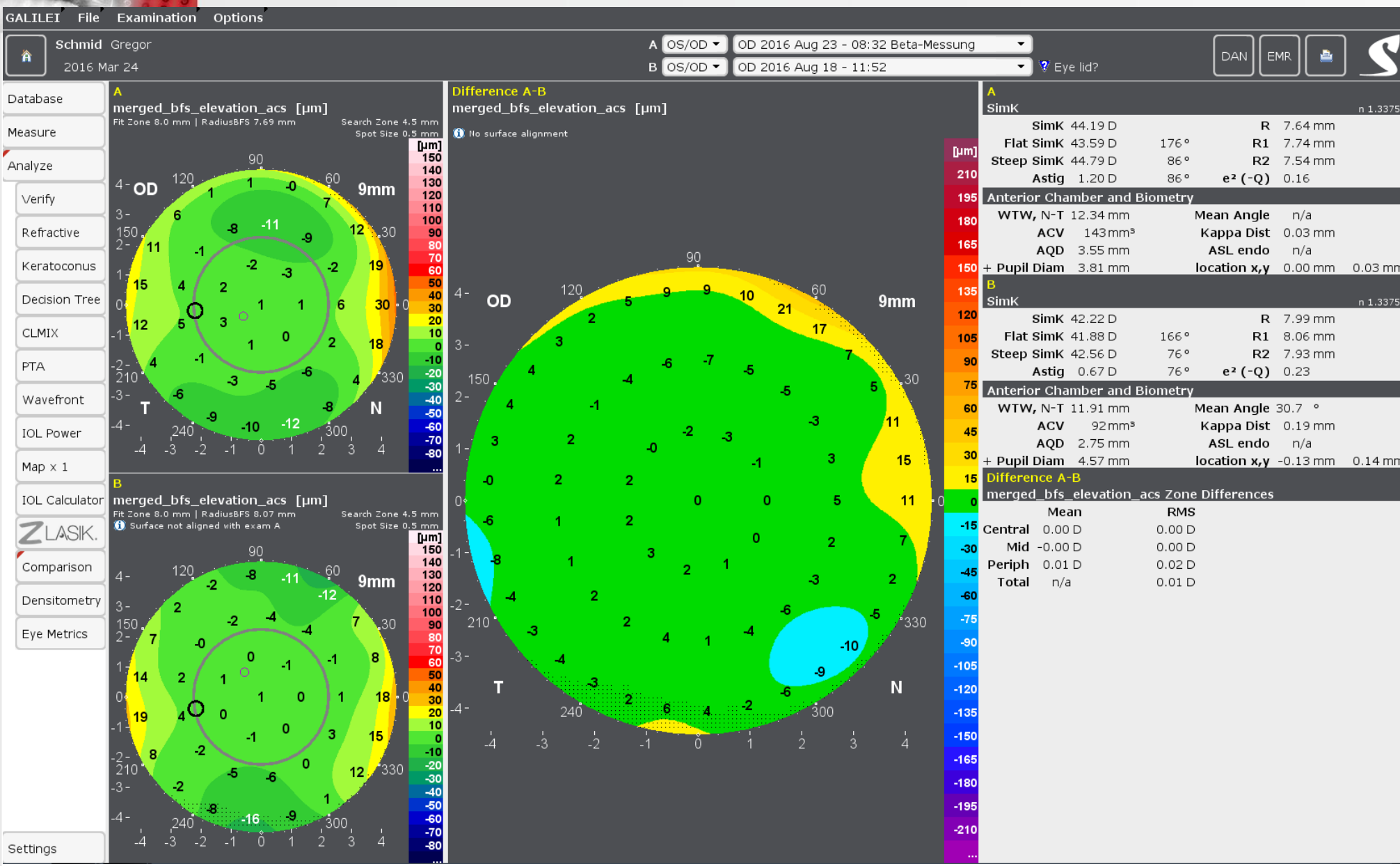
Corneal Wavefront Aberrations:

- Path length differences between the actual wavefront and a plane wavefront at the entrance pupil, normally expressed in µm
- Most common aberrations:
  spherical aberration, astigmatism, coma, defocus



- **Spherical Aberration:** occurs when light experience stronger refractive power at the periphery of the cornea, resulting in a region of defocused light and decreased image quality.

Comparison


GALILEI File Examination Options
Schmid Gregor
2016 Mar 24
A OS/OD OD 2016 Aug 23 - 08:32 Beta-Messung
B OS/OD OD 2016 Aug 18 - 11:52
Eye lid?
DAN EMR
Database
Measure
Analyze
Verify
Refractive
Keratoconus
Decision Tree
CLMIX
PTA
Wavefront
IOL Power
Map x 1
IOL Calculator
ZLASIK
Comparison
Densitometry
Eye Metrics
Settings
A
merged_bfs_elevation_acs [µm]
Fit Zone 8.0 mm | RadiusBFS 7.69 mm
Search Zone 4.5 mm
Spot Size 0.5 mm
OD
9mm
T
N
B
merged_bfs_elevation_acs [µm]
Fit Zone 8.0 mm | RadiusBFS 8.07 mm
Search Zone 4.5 mm
Spot Size 0.5 mm
Surface not aligned with exam A
Difference A-B
merged_bfs_elevation_acs [µm]
No surface alignment
A
SimK n 1.3375
SimK 44.19 D R 7.64 mm
Flat SimK 43.59 D 176° R1 7.74 mm
Steep SimK 44.79 D 86° R2 7.54 mm
Astig 1.20 D 86° e² (-Q) 0.16
Anterior Chamber and Biometry
WTW, N-T 12.34 mm Mean Angle n/a
ACV 143 mm³ Kappa Dist 0.03 mm
AQD 3.55 mm ASL endo n/a
+ Pupil Diam 3.81 mm location x,y 0.00 mm 0.03 mm
B
SimK n 1.3375
SimK 42.22 D R 7.99 mm
Flat SimK 41.88 D 166° R1 8.06 mm
Steep SimK 42.56 D 76° R2 7.93 mm
Astig 0.67 D 76° e² (-Q) 0.23
Anterior Chamber and Biometry
WTW, N-T 11.91 mm Mean Angle 30.7 °
ACV 92 mm³ Kappa Dist 0.19 mm
AQD 2.75 mm ASL endo n/a
+ Pupil Diam 4.57 mm location x,y -0.13 mm 0.14 mm
Difference A-B
merged_bfs_elevation_acs Zone Differences
Mean RMS
Central 0.00 D 0.00 D
Mid -0.00 D 0.00 D
Periph 0.01 D 0.02 D
Total n/a 0.01 D

Eye Metrics

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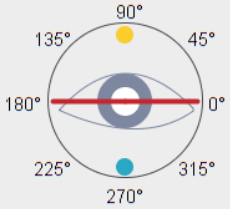
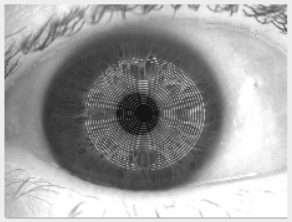
Database
Measure
Analyze
Verify
Refractive
Keratoconus
Decision Tree
CLMIX
PTA
Wavefront
IOL Power
Map x 1
IOL Calculator
ZLASIK
Comparison
Densitometry
Eye Metrics

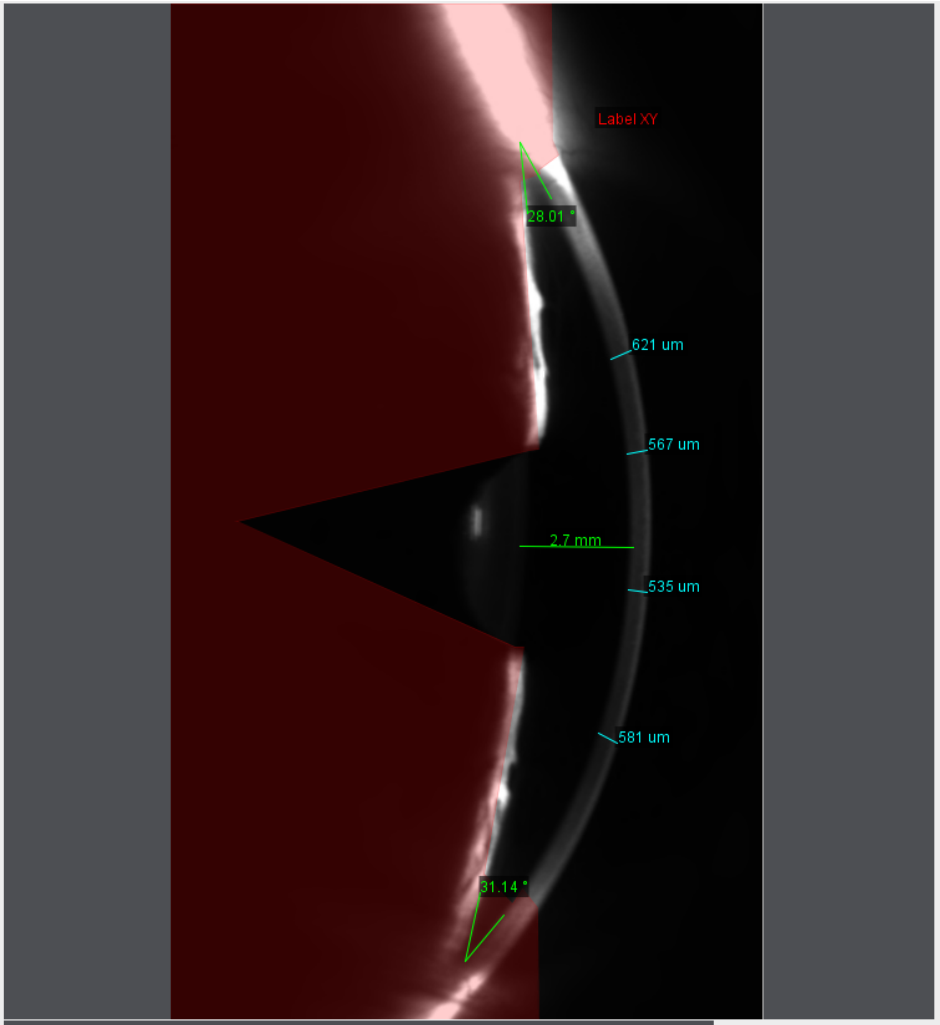
Viewing Angle



OD OS

1 / 17



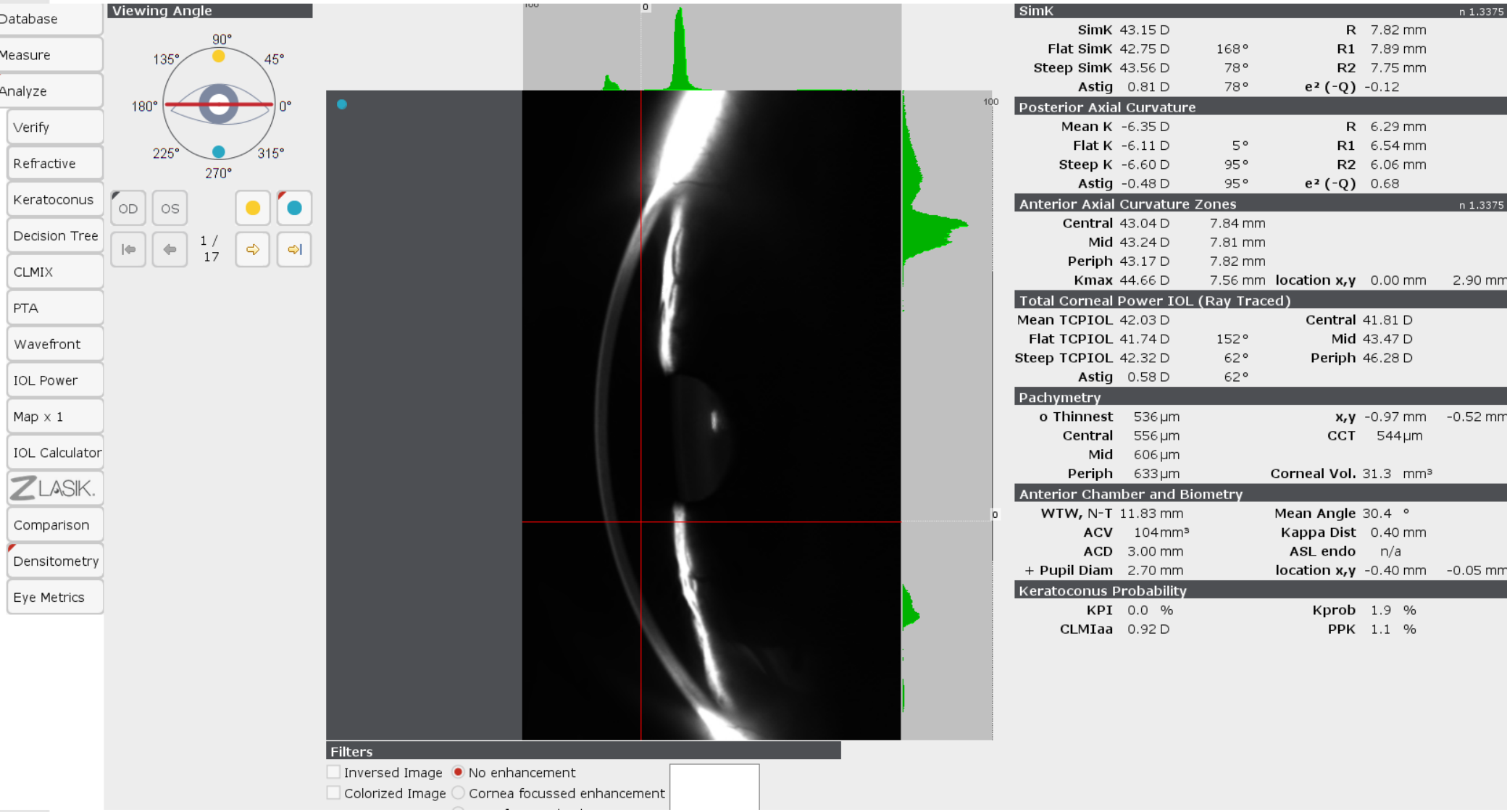


Filters

Inversed Image | No enhancement
Colorized Image | Cornea focussed enhancement

SimK					n 1.3375
SimK	43.15 D		R	7.82 mm	
Flat SimK	42.75 D	168°	R1	7.89 mm	
Steep SimK	43.56 D	78°	R2	7.75 mm	
Astig	0.81 D	78°	e² (-Q)	-0.12	
Posterior Axial Curvature					
Mean K	-6.35 D		R	6.29 mm	
Flat K	-6.11 D	5°	R1	6.54 mm	
Steep K	-6.60 D	95°	R2	6.06 mm	
Astig	-0.48 D	95°	e² (-Q)	0.68	
Anterior Axial Curvature Zones					n 1.3375
Central	43.04 D	7.84 mm			
Mid	43.24 D	7.81 mm			
Periph	43.17 D	7.82 mm			
Kmax	44.66 D	7.56 mm	location x,y	0.00 mm	2.90 mm
Total Corneal Power IOL (Ray Traced)					
Mean TCPIOL	42.03 D		Central	41.81 D	
Flat TCPIOL	41.74 D	152°	Mid	43.47 D	
Steep TCPIOL	42.32 D	62°	Periph	46.28 D	
Astig	0.58 D	62°			
Pachymetry					
o Thinnest	536 µm		x,y	-0.97 mm	-0.52 mm
Central	556 µm		CCT	544 µm	
Mid	606 µm				
Periph	633 µm		Corneal Vol.	31.3 mm³	
Anterior Chamber and Biometry					
WTW, N-T	11.83 mm		Mean Angle	30.4 °	
ACV	104 mm³		Kappa Dist	0.40 mm	
ACD	3.00 mm		ASL endo	n/a	
+ Pupil Diam	2.70 mm		location x,y	-0.40 mm	-0.05 mm
Keratoconus Probability					
KPI	0.0 %		Kprob	1.9 %	
CLMIaa	0.92 D		PPK	1.1 %	

Densitometry



Clinical Benefits GALILEI

- Reliable and fast topography and tomography screening
- Highly accurate anterior and posterior curvature assessment for sensitive keratoconus screening
- Maps and data aligned to the same reference – the visual axis
- Spherical and aspherical aberrations for wave front guided treatments and toric IOL selection

GALILEI G4

Dual Scheimpflug Analyzer

GALILEI G6

Lens Professional