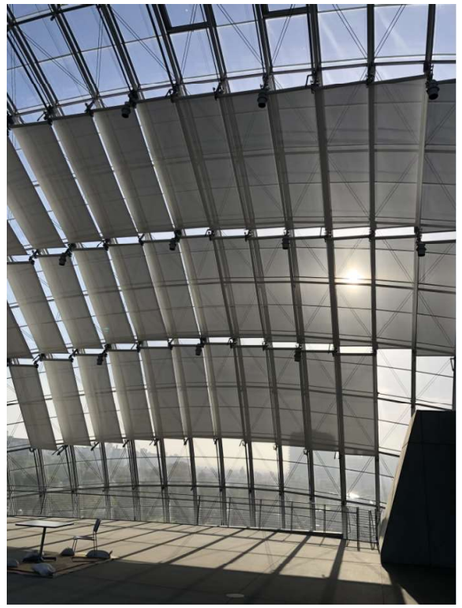
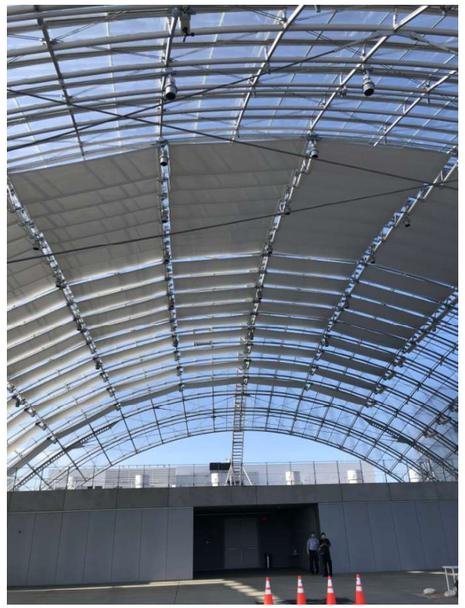
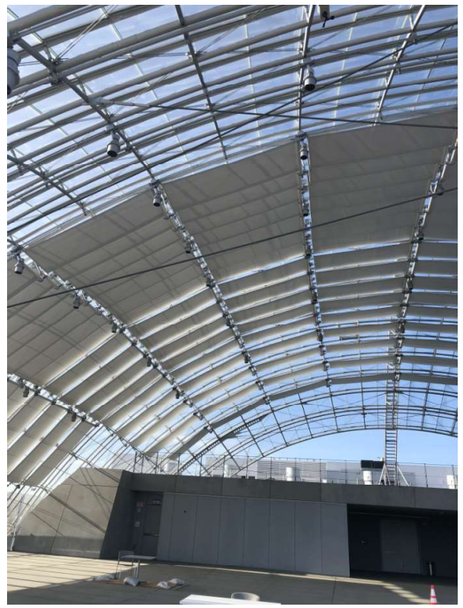


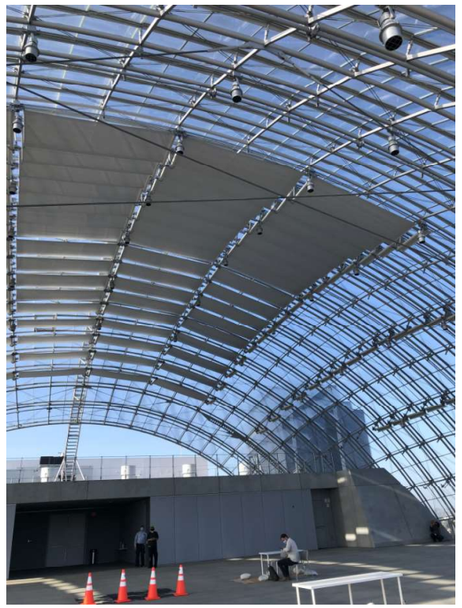
March 21: 8a



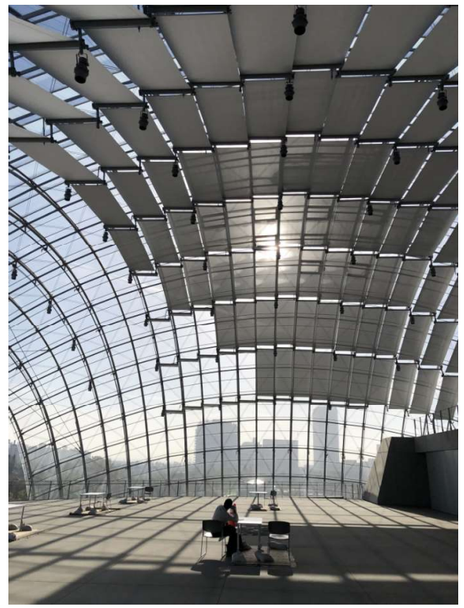
March 21: 1115a



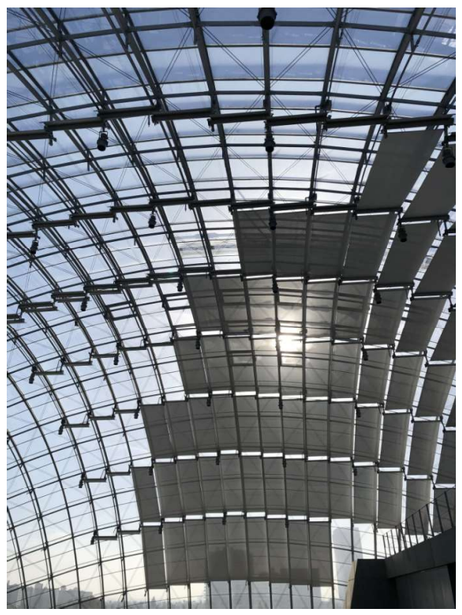
March 21: 1115a



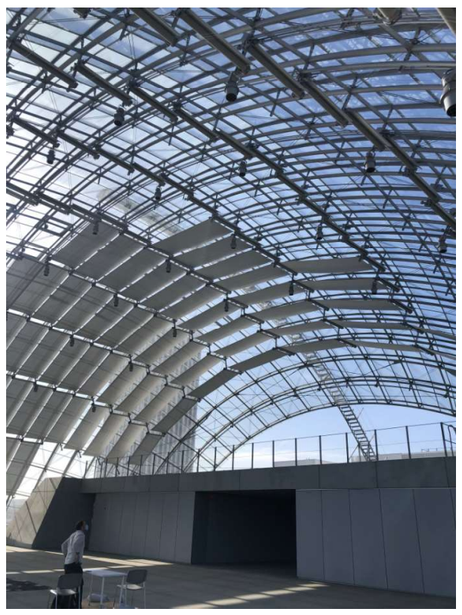
March 21: 1115a



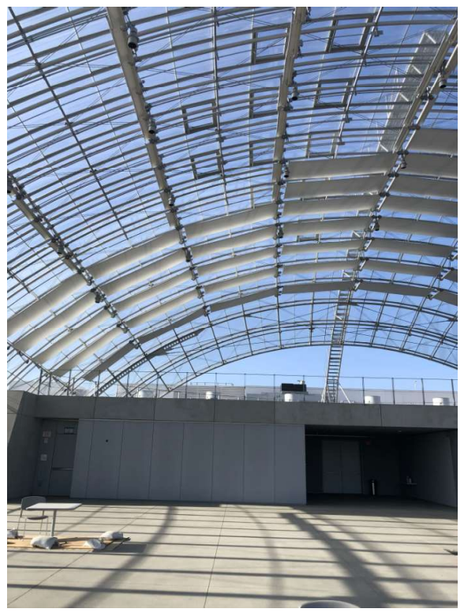
March 21: 3p



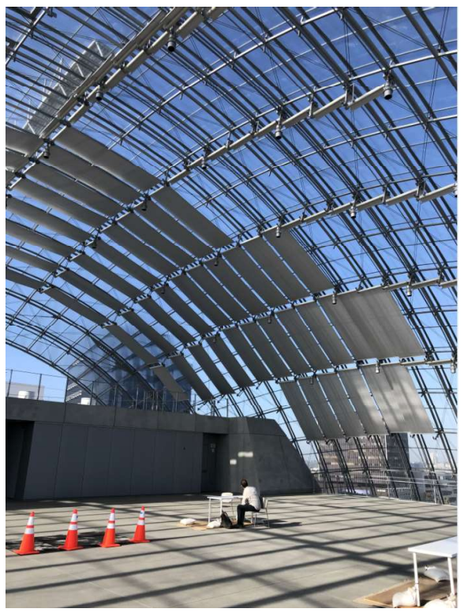
Dec 21: 11a



Dec 21: 11a



Dec 21: 1p



Dec 21: 1p

AMMP
Dome
Shades
Demo

8 April 2021

Los Angeles – Academy Museum of Motion Pictures

Renzo Piano Building Workshop

Shading activation patterns

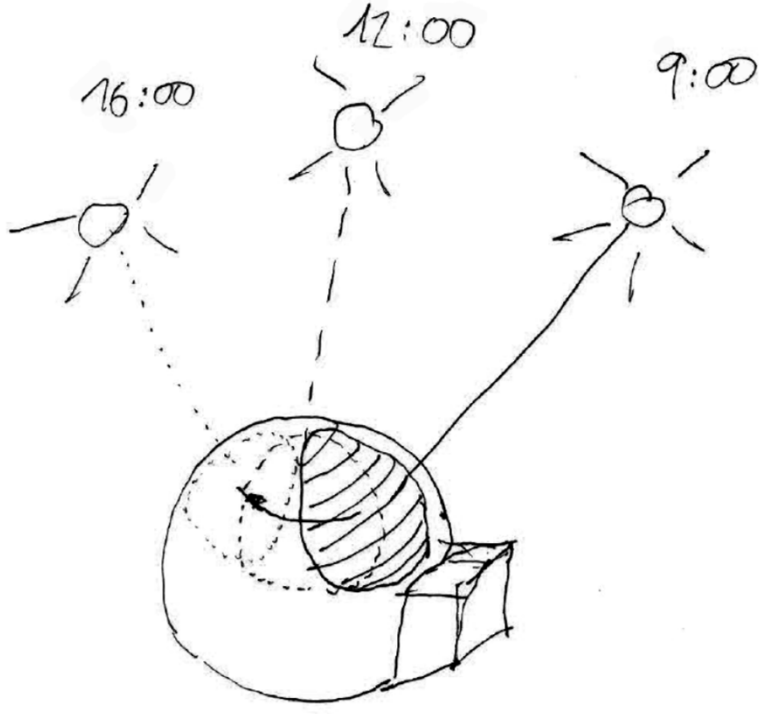
Matthias Schuler, Matthias Rammig, Guowei Wu
11.10.2017
Transsolar GmbH
http//:www.transsolar.com

http://www.oscars.org/academymuseum/

Shading control strategy

To maximize the transparency of the dome and the view to the outside, the time when the shading elements are active should be minimized.

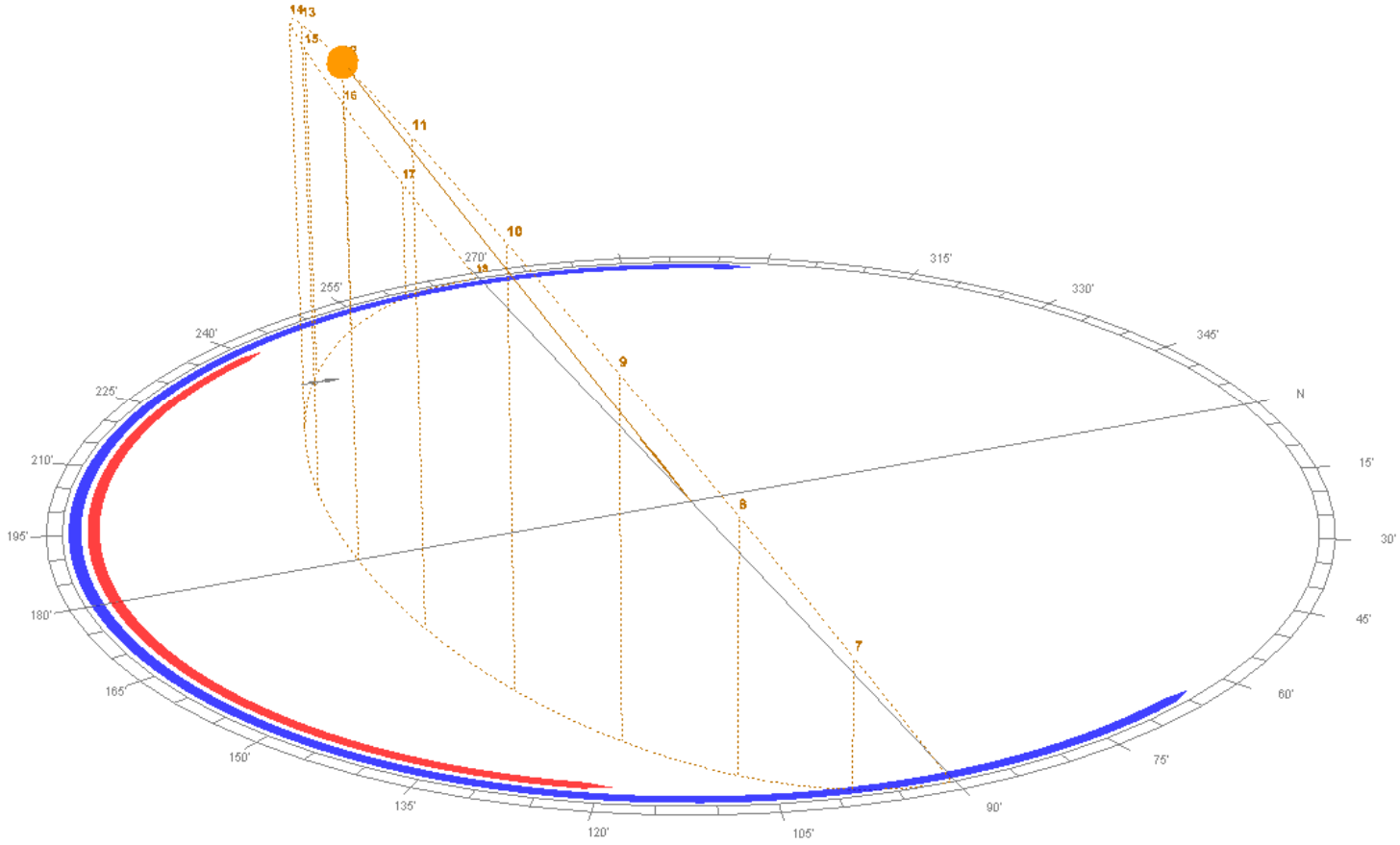
Therefore, the shading elements will only be activated when they cast a shadow on the terrace. This will create a moving shading pattern over the course of the day, with different screens active at different hours. This allows on the one hand the maximum possible shading effect and on the other hand maximizing the transparency of the dome.

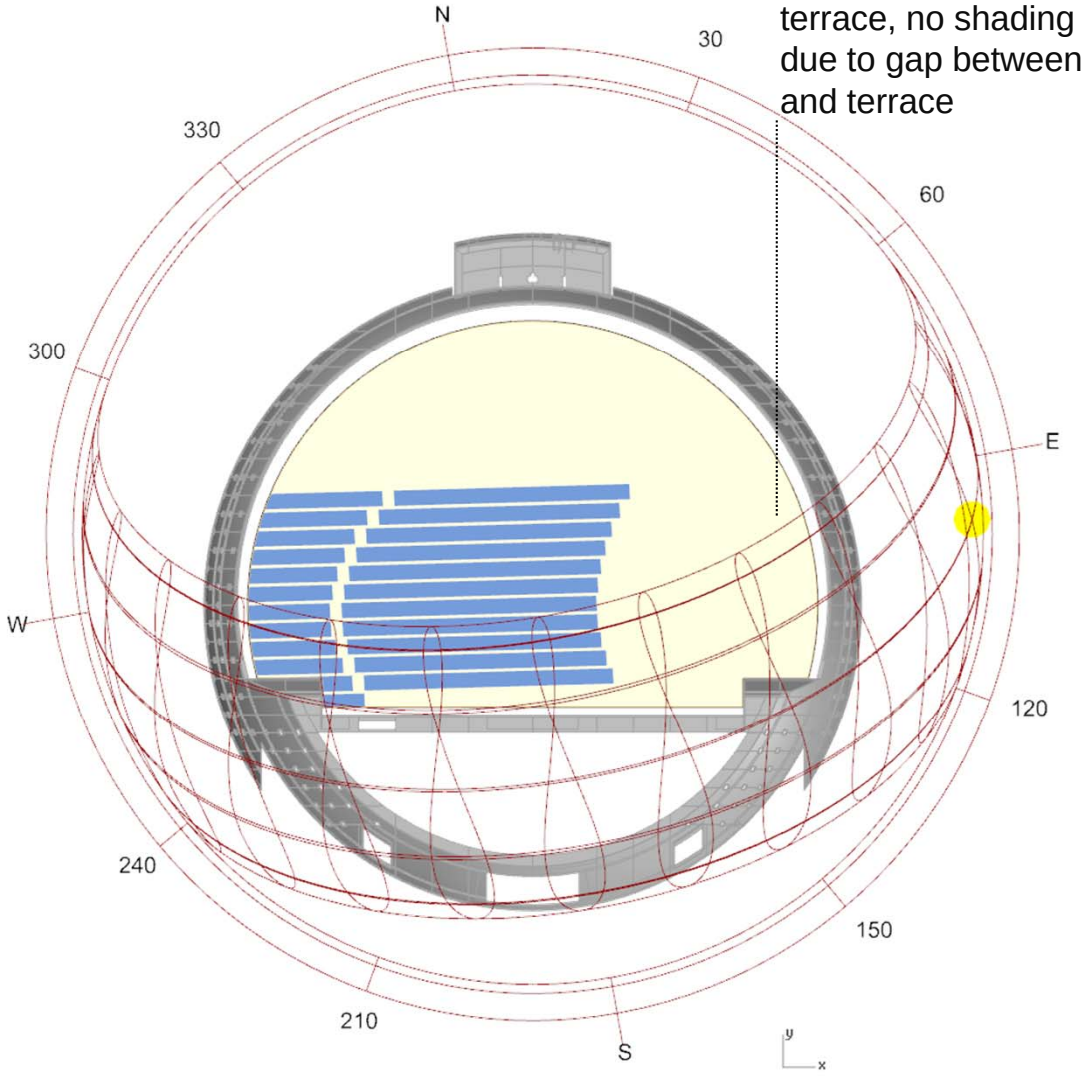


Solar equinox 21st of March

Average sun path of the year.

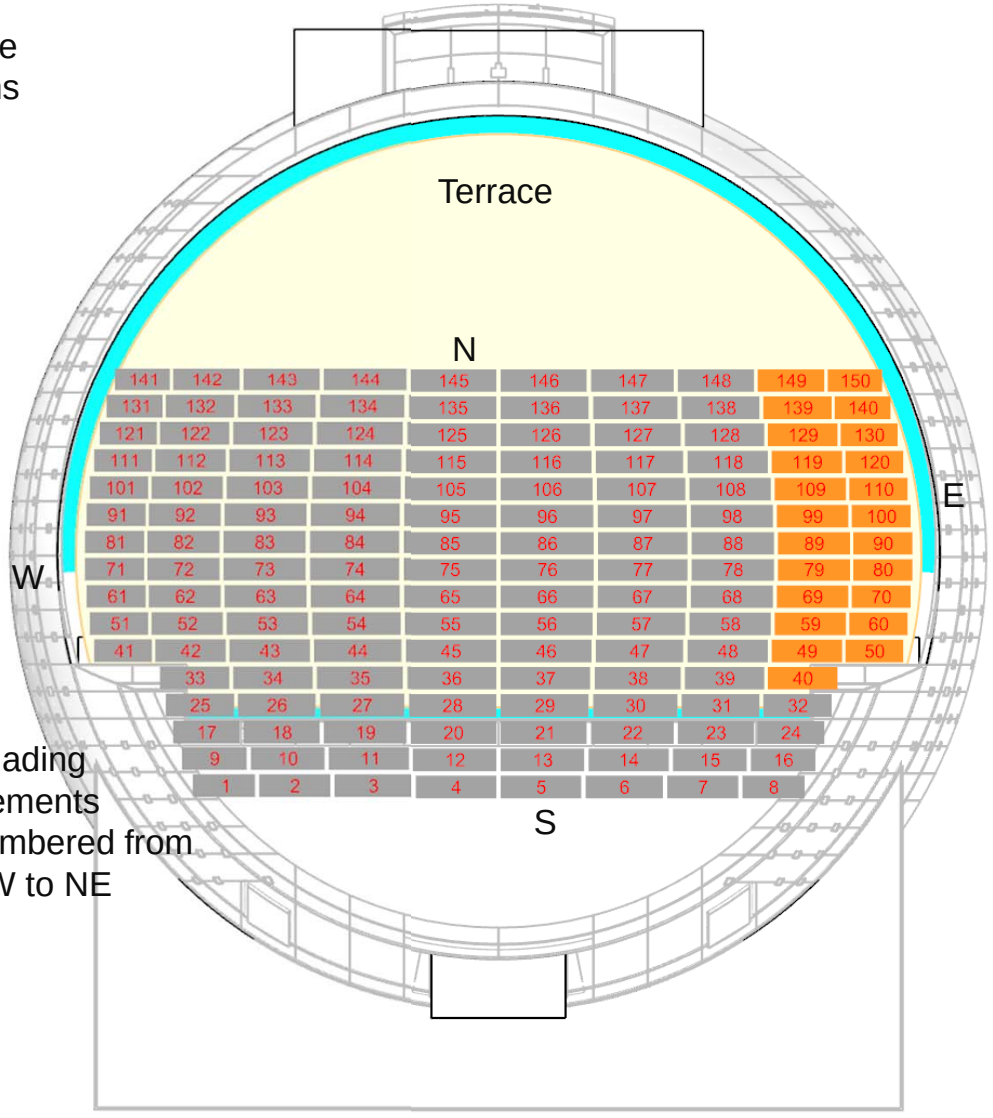
Sunrise 6:54
Sunset 19:04
Max. Sun altitude 55.8°





Low angle sun hits the terrace, no shading possible due to gap between screens and terrace

Shaded terrace area from active shading elements



Shading elements numbered from SW to NE

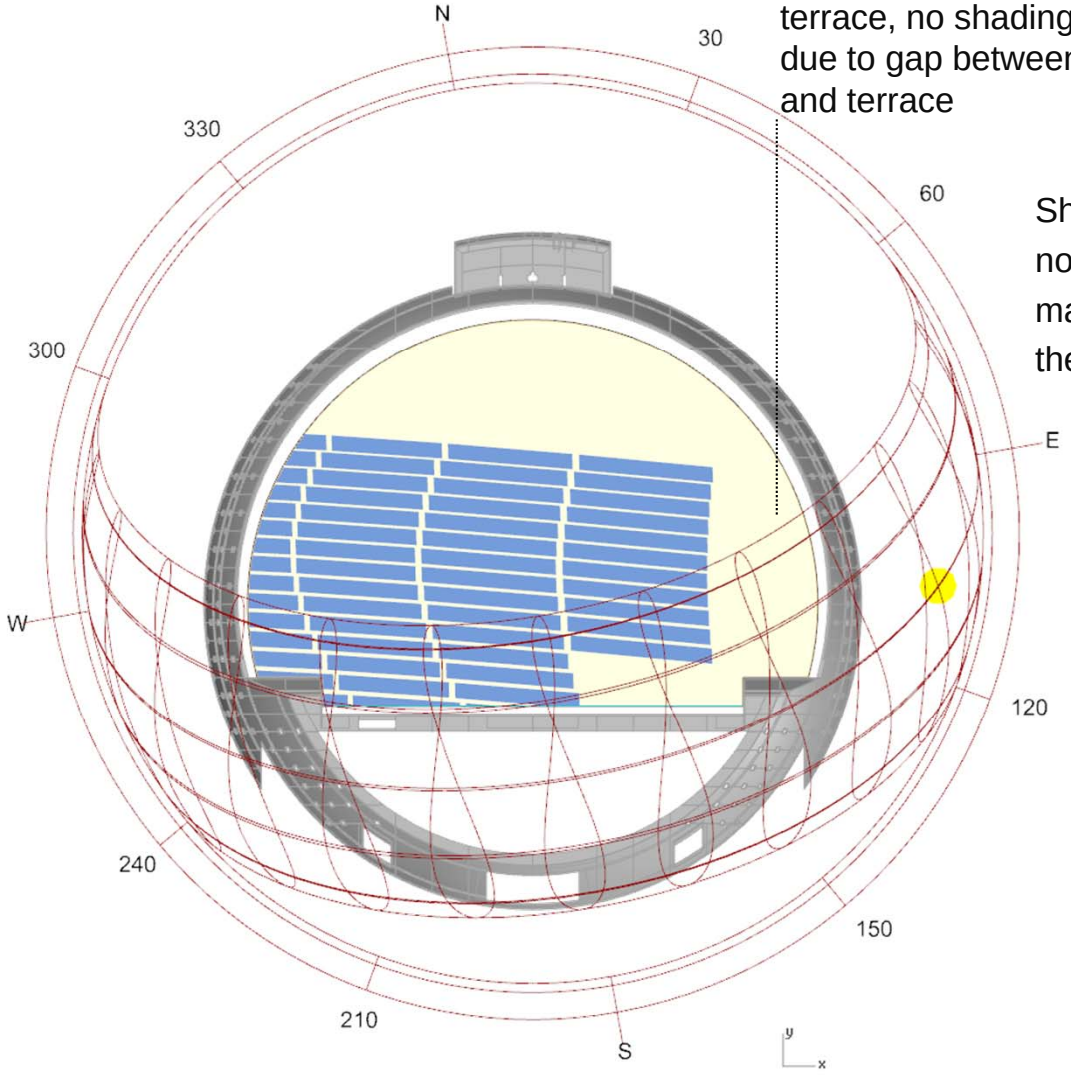
Pattern of activated shading elements

Activated shading elements

Not activated shading elements

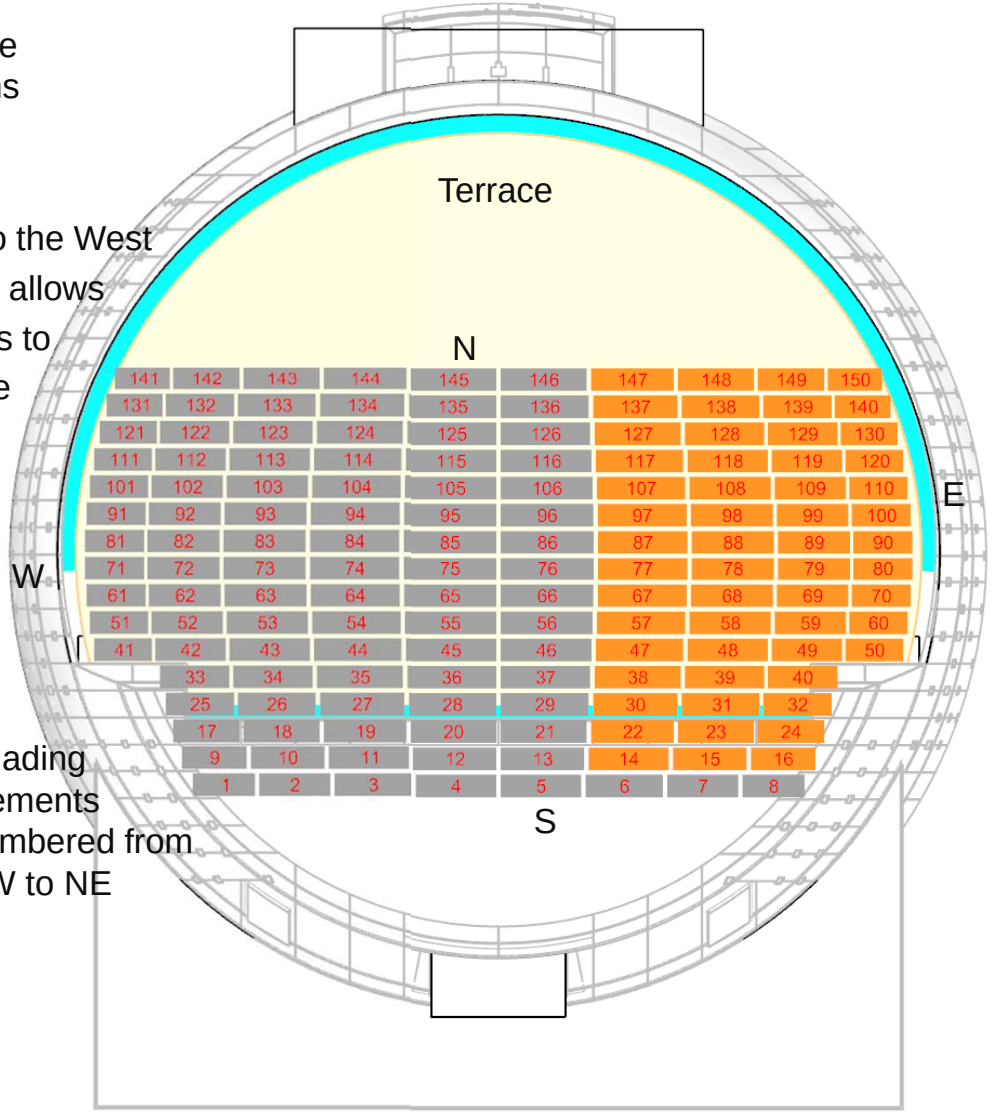
21st March 8:00 a.m.

Low angle sun hits the terrace, no shading possible due to gap between screens and terrace



Shaded terrace area from active shading elements

Shading to the West not active, allows max. views to the outside



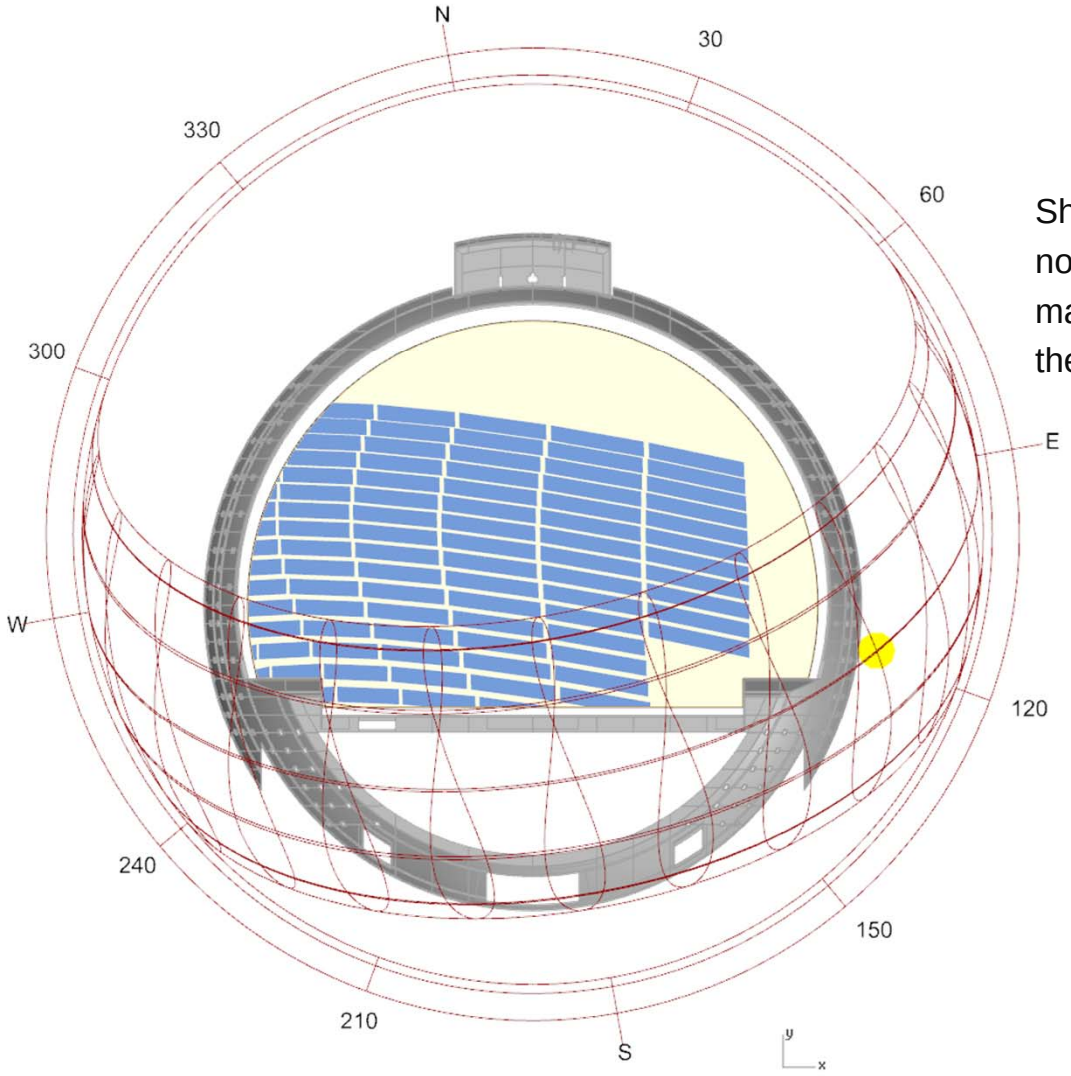
Shading elements numbered from SW to NE

Pattern of activated shading elements

Activated shading elements

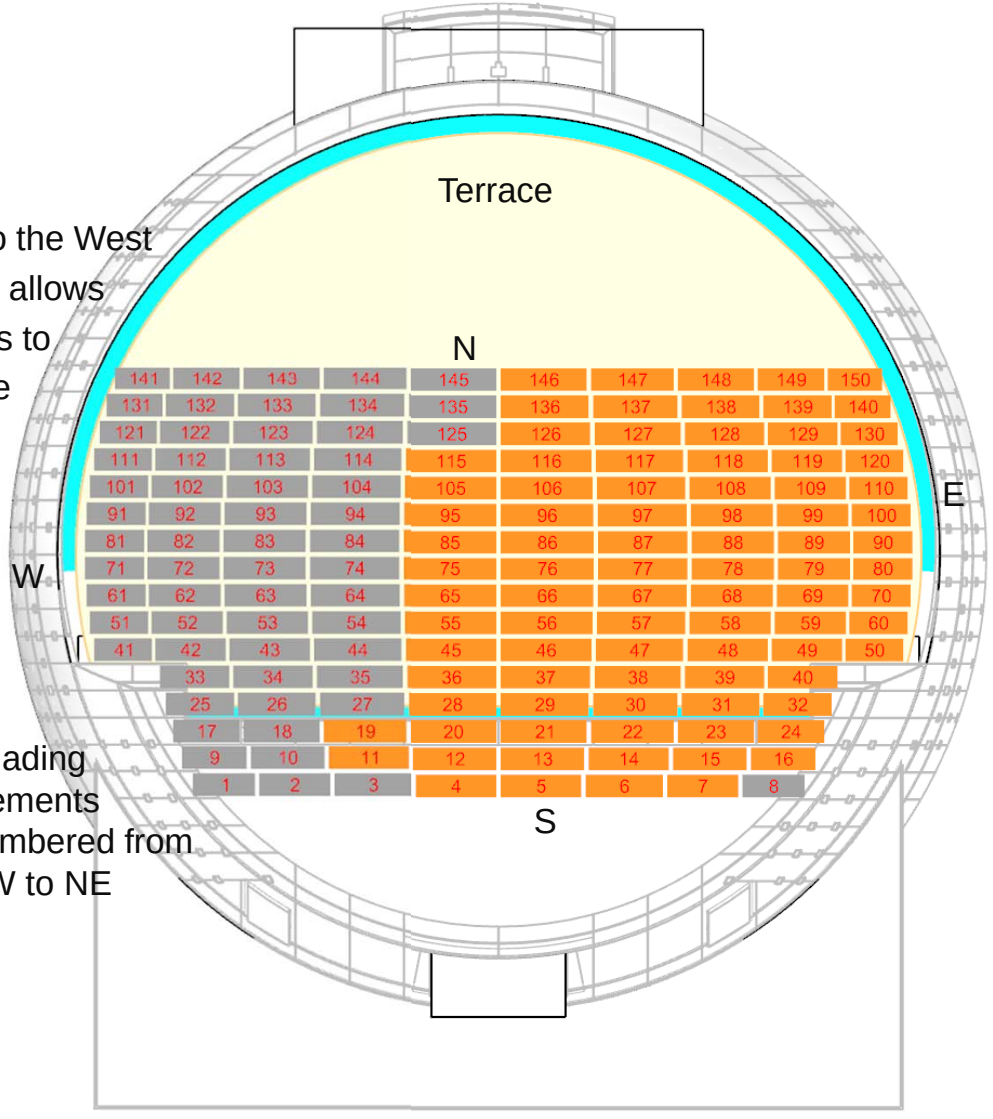
Not activated shading elements

21st March 9:00 a.m.



Shaded terrace area from active shading elements

Shading to the West not active, allows max. views to the outside



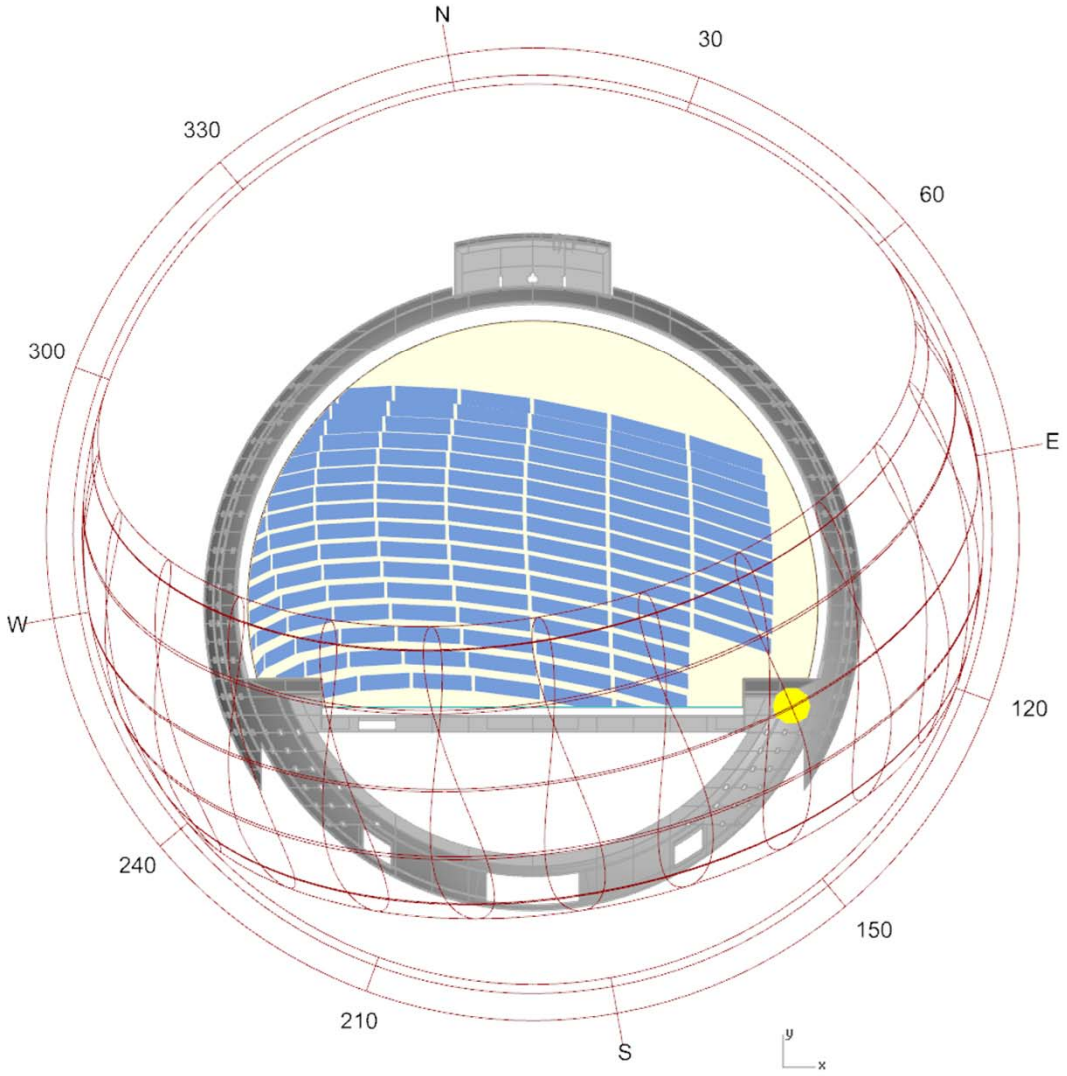
Shading elements numbered from SW to NE

Pattern of activated shading elements

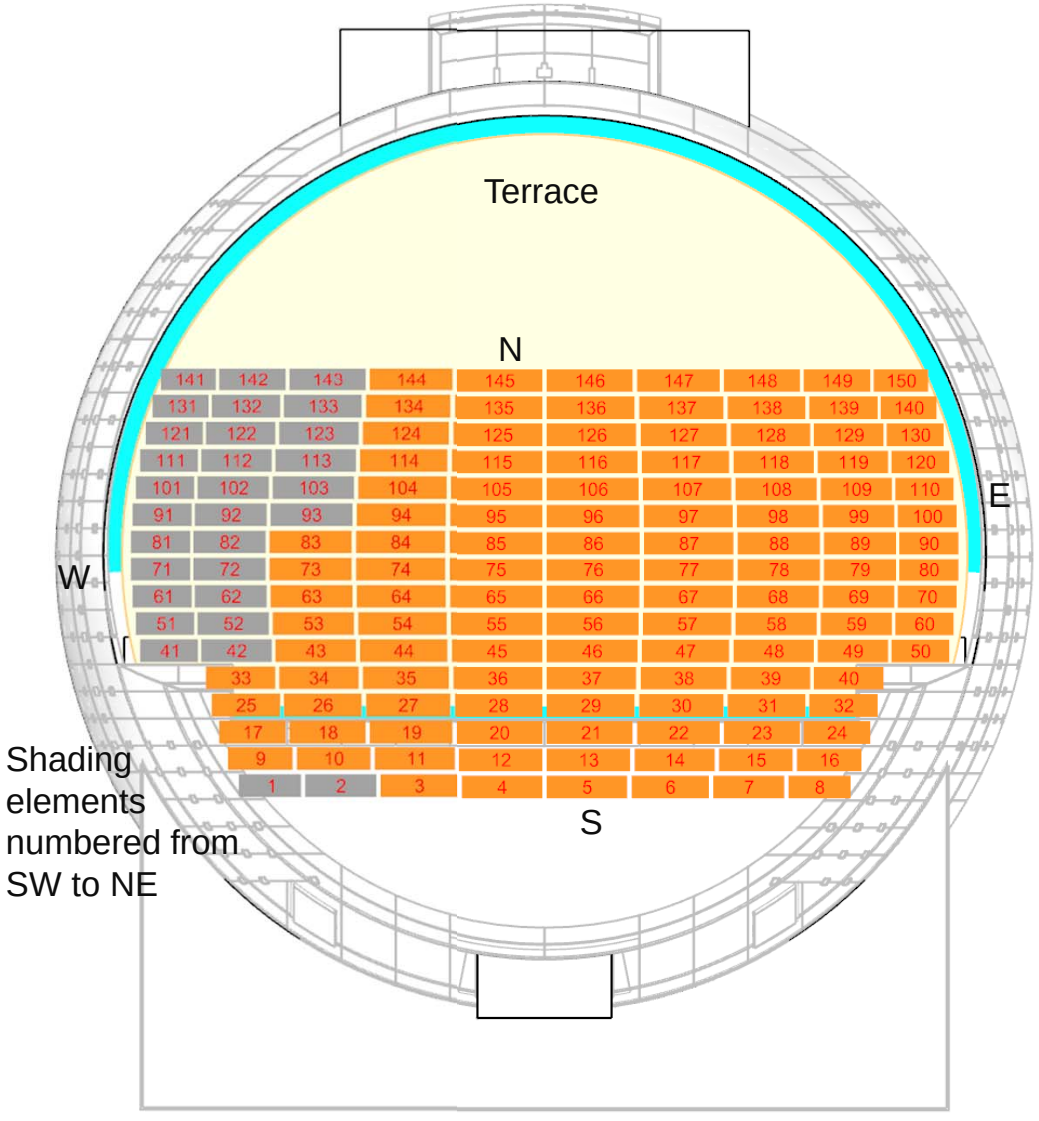
Activated shading elements

Not activated shading elements

21st March 10:00 a.m.



Shaded terrace area from active shading elements



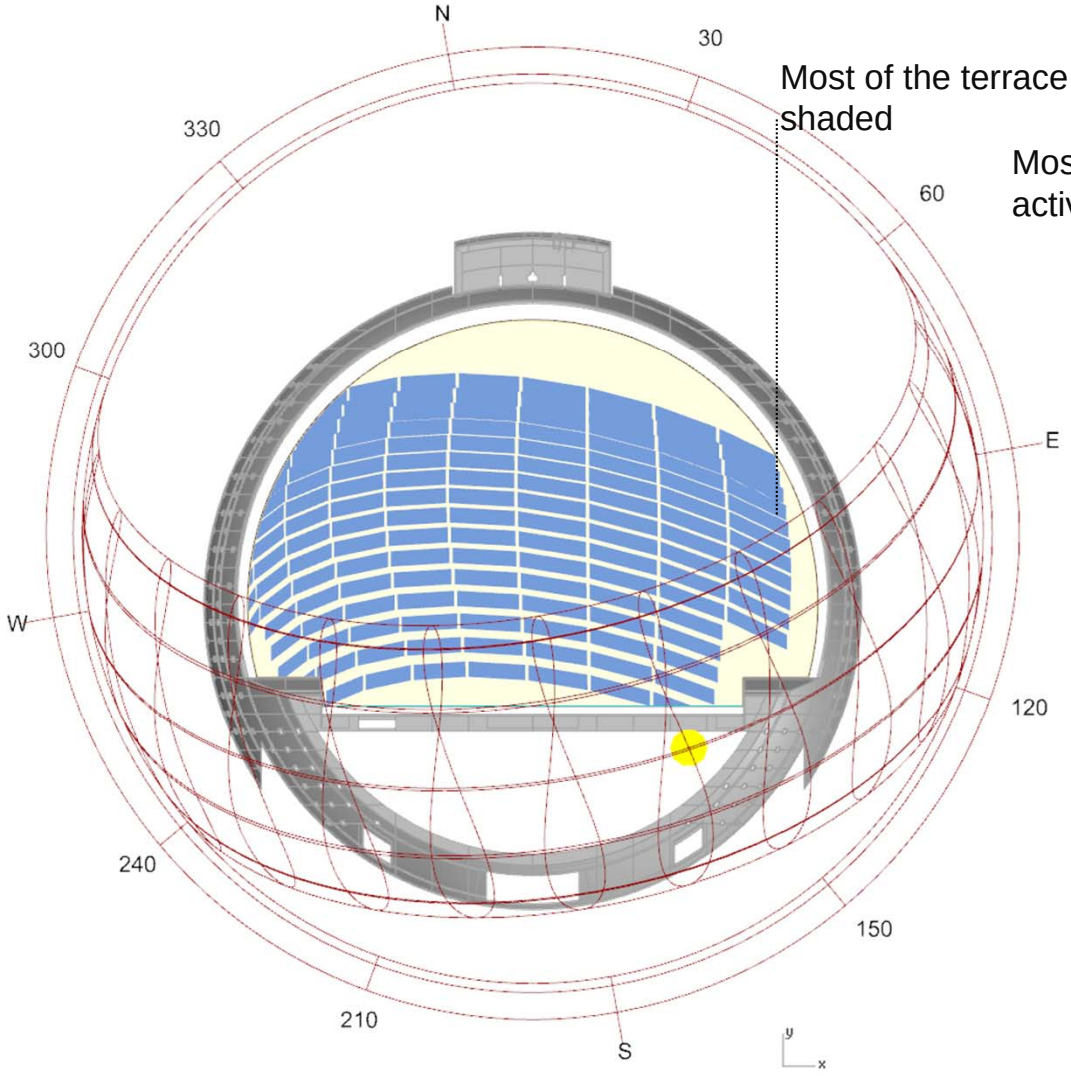
Shading elements numbered from SW to NE

Pattern of activated shading elements

Activated shading elements

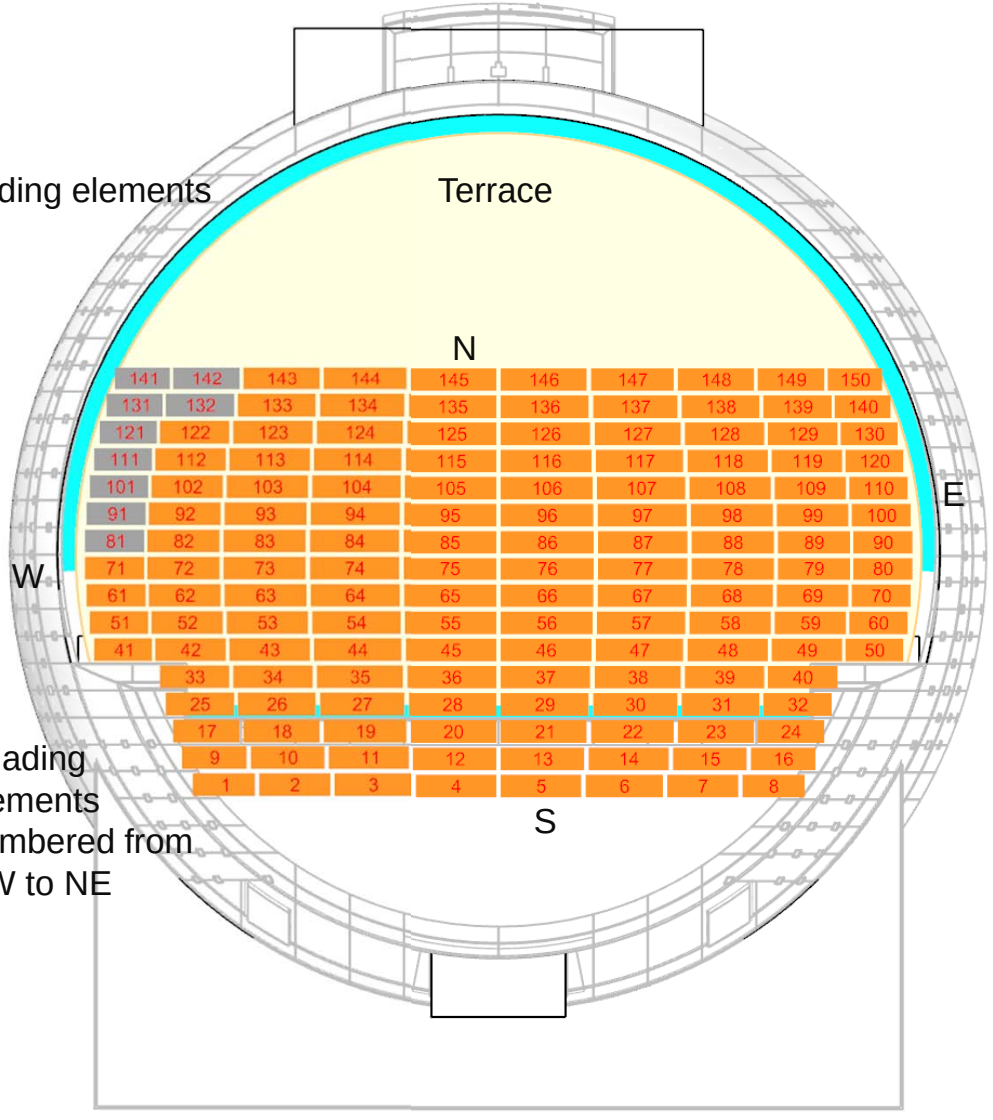
Not activated shading elements

21st March 11:00 a.m.



Most of the terrace area shaded

Most of shading elements active



Shading elements numbered from SW to NE

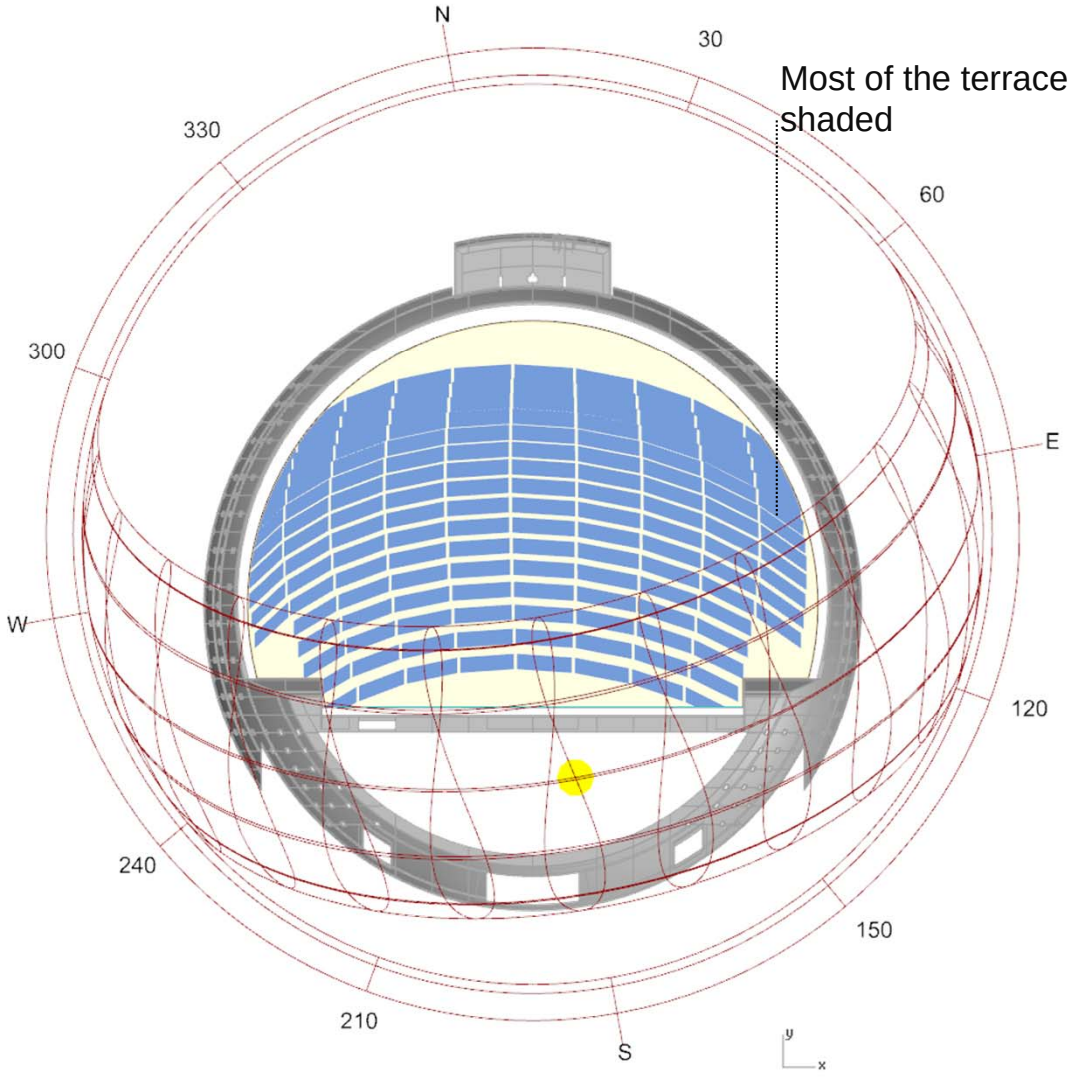
Shaded terrace area from active shading elements

Pattern of activated shading elements

Activated shading elements

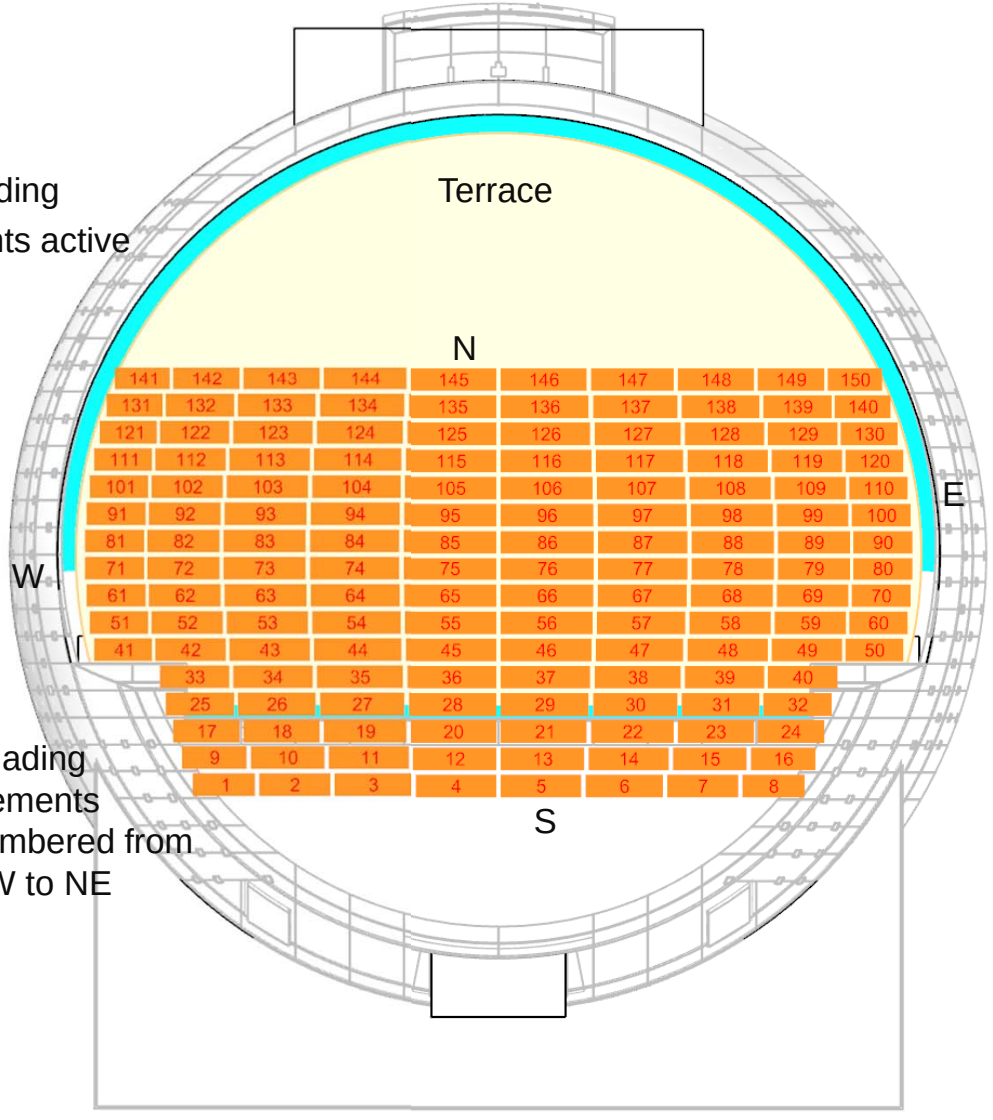
Not activated shading elements

21st March 12:00 p.m.



Most of the terrace area shaded

All shading elements active



Shading elements numbered from SW to NE

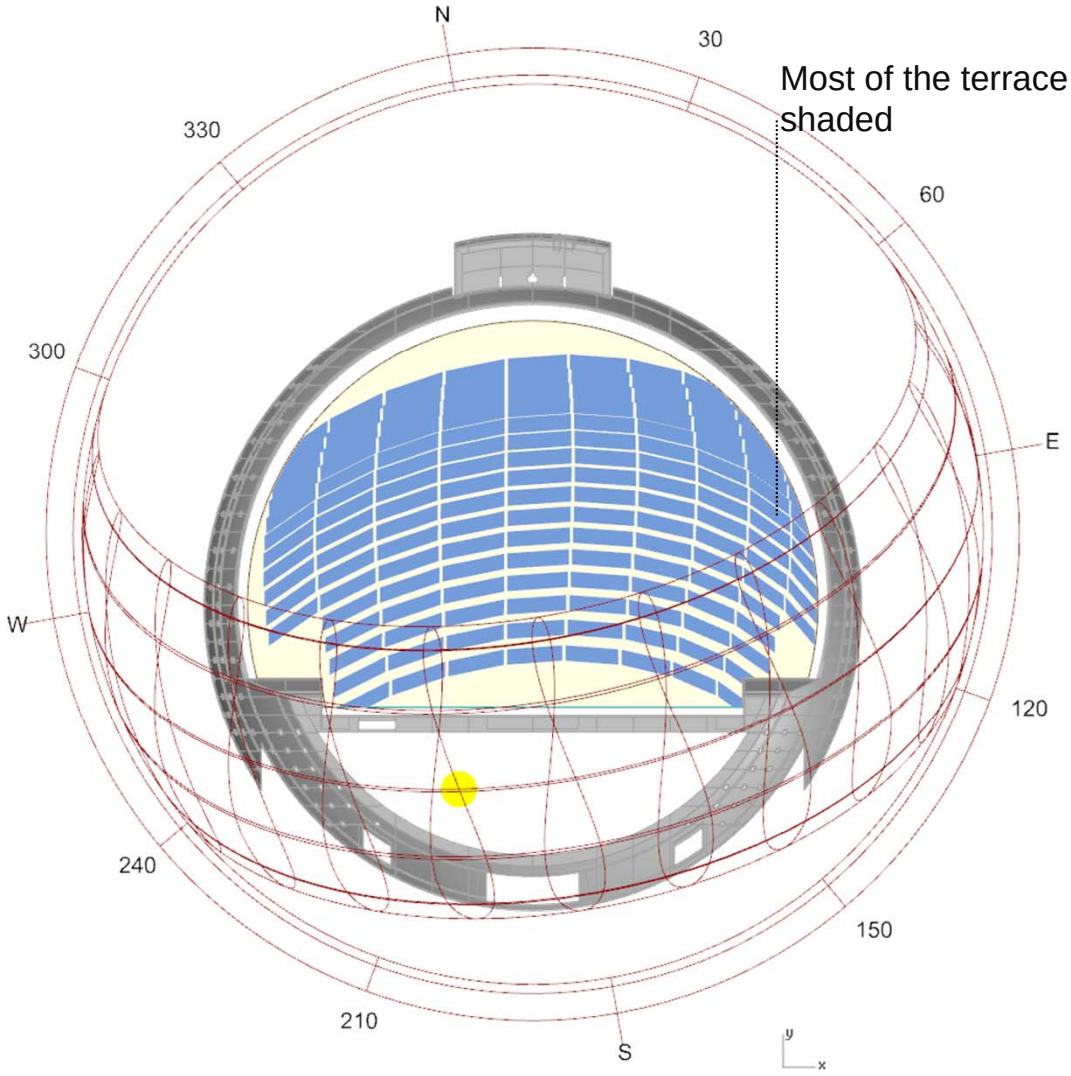
Shaded terrace area from active shading elements

Pattern of activated shading elements

Activated shading elements

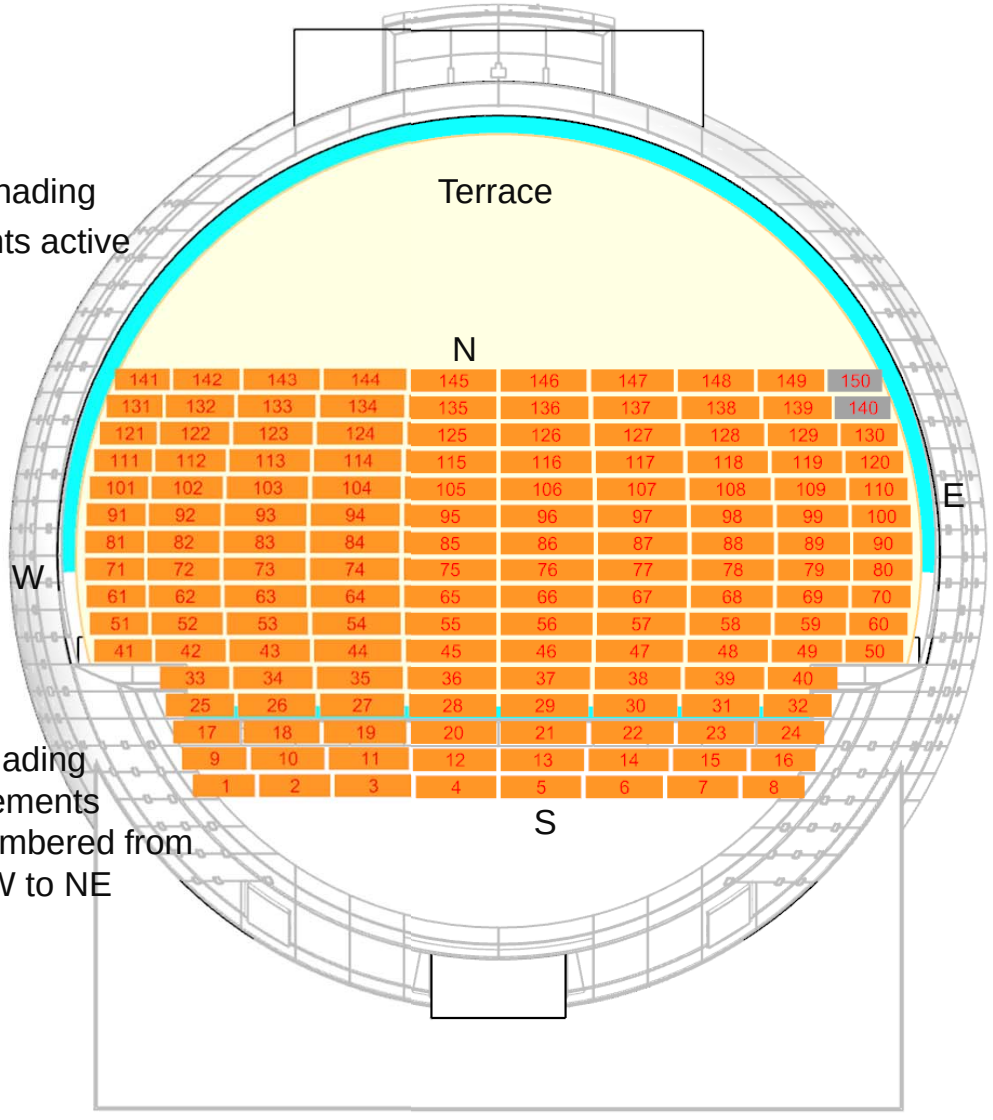
Not activated shading elements

21st March 1:00 p.m.



Most of the terrace area shaded

Most shading elements active



Shading elements numbered from SW to NE

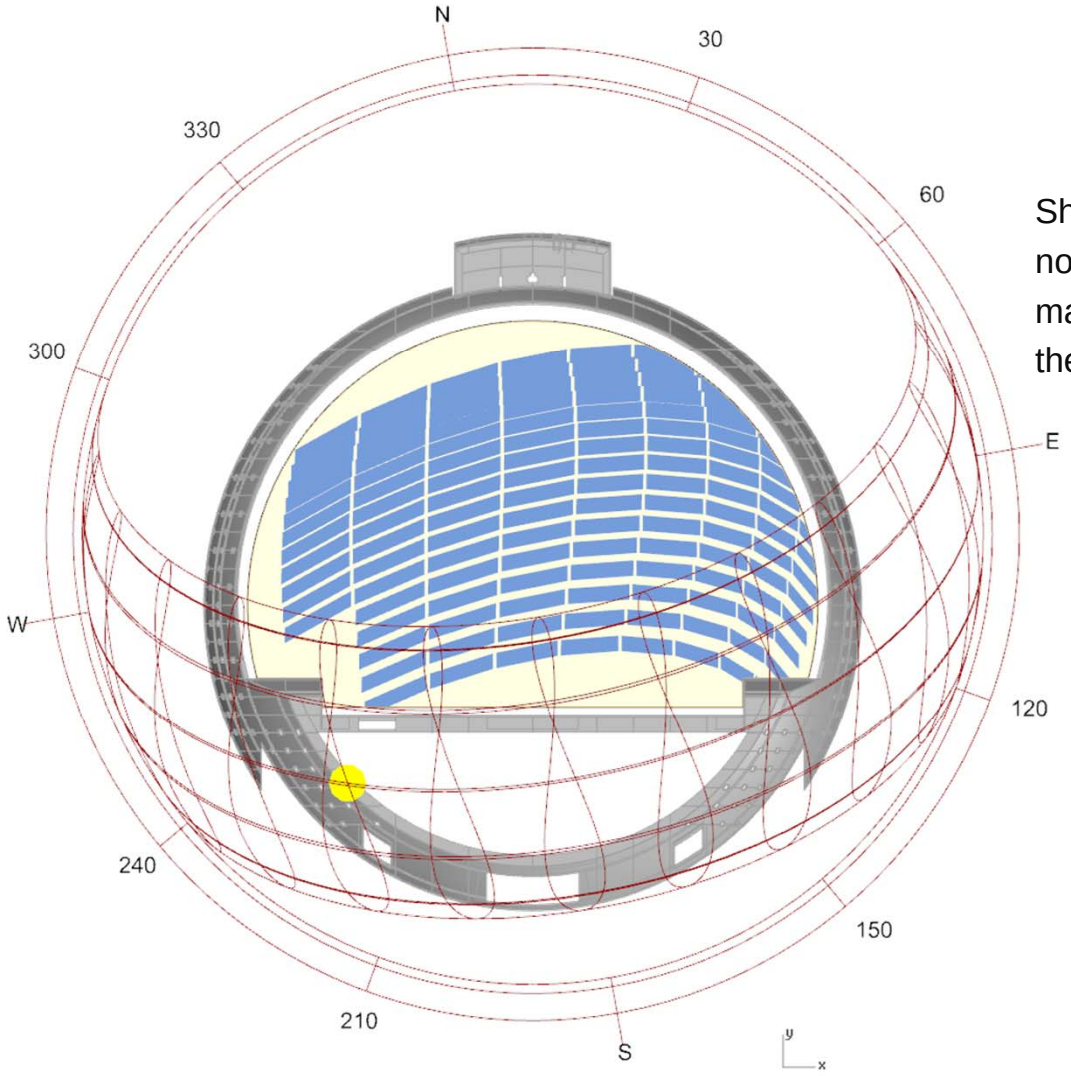
Shaded terrace area from active shading elements

Pattern of activated shading elements

Activated shading elements

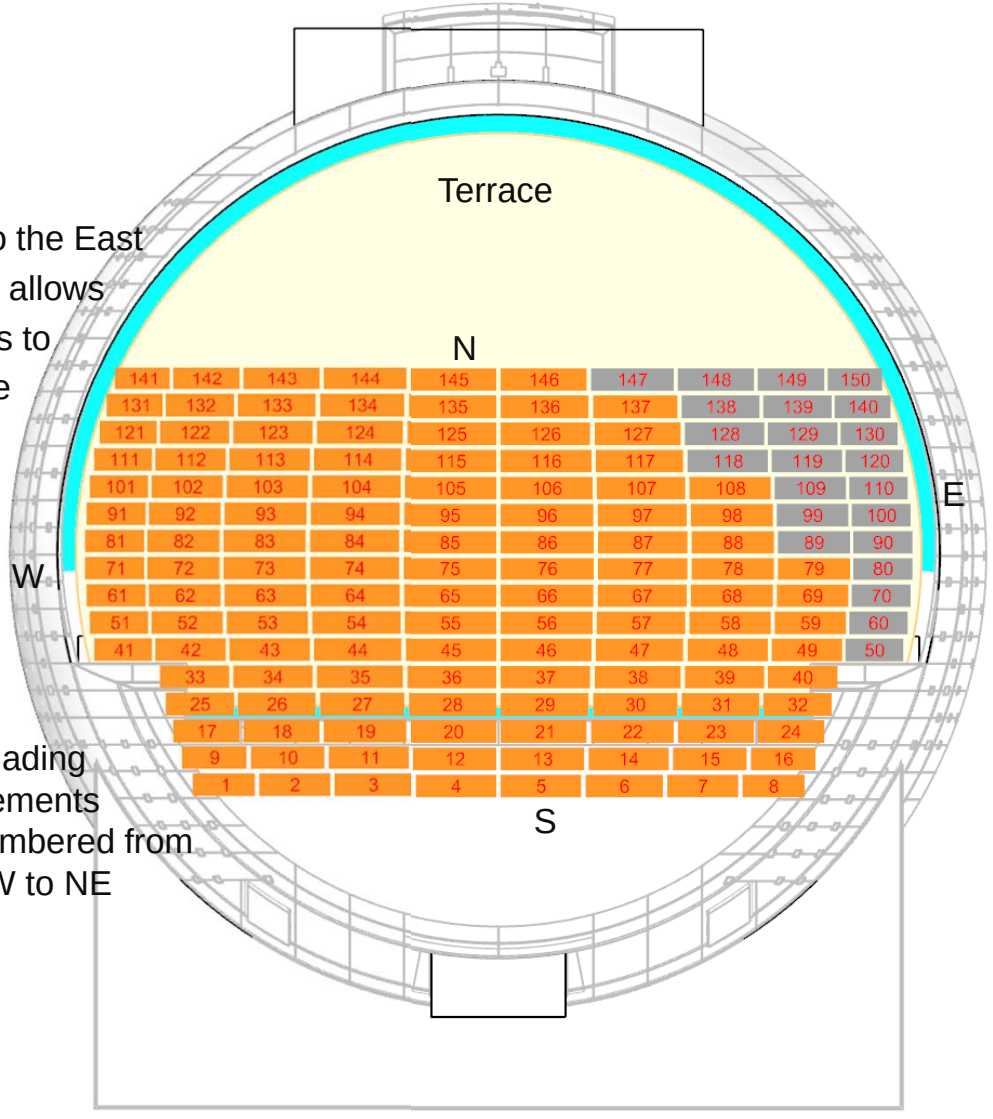
Not activated shading elements

21st March 2:00 p.m.



Shaded terrace area from active shading elements

Shading to the East not active, allows max. views to the outside



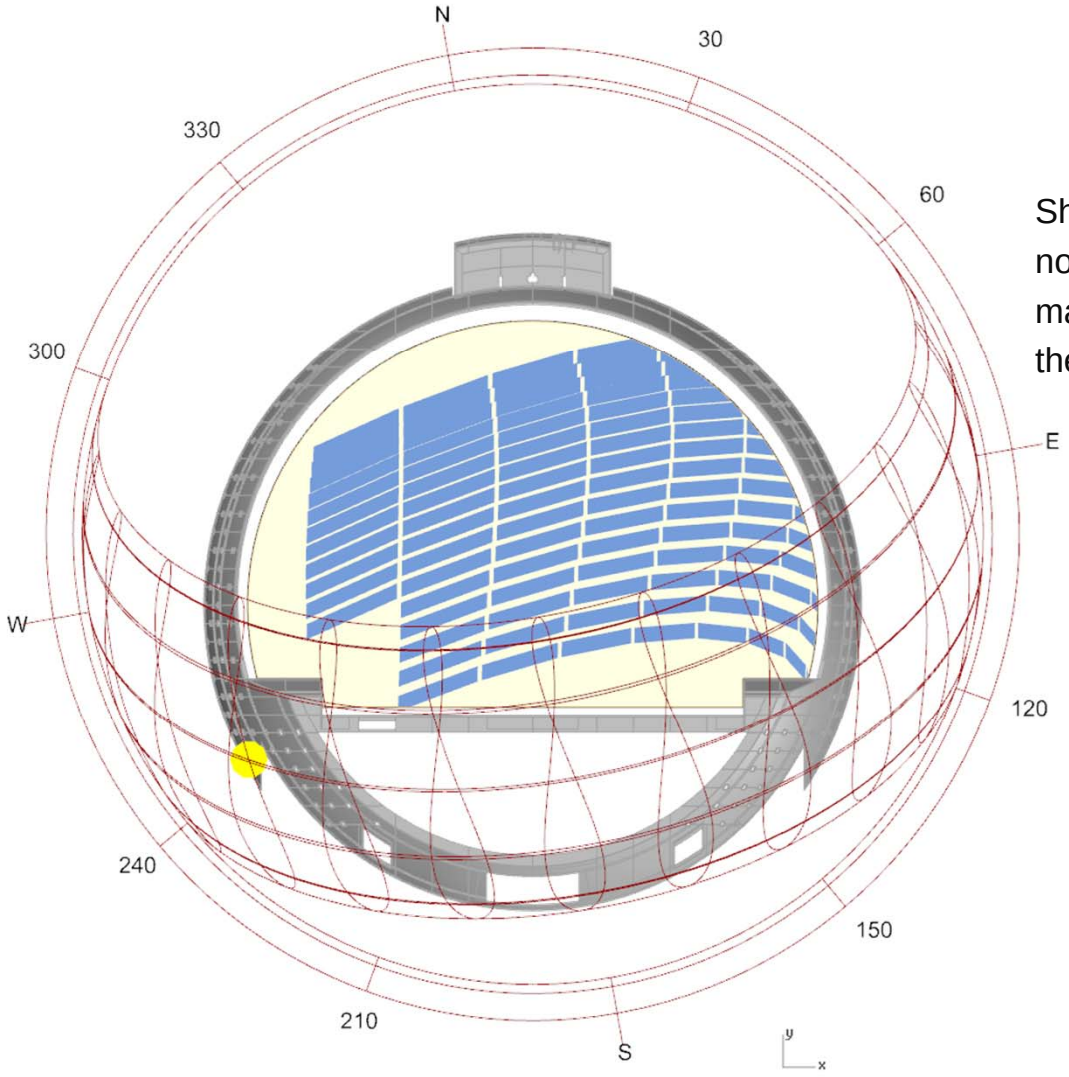
Shading elements numbered from SW to NE

Pattern of activated shading elements

Activated shading elements

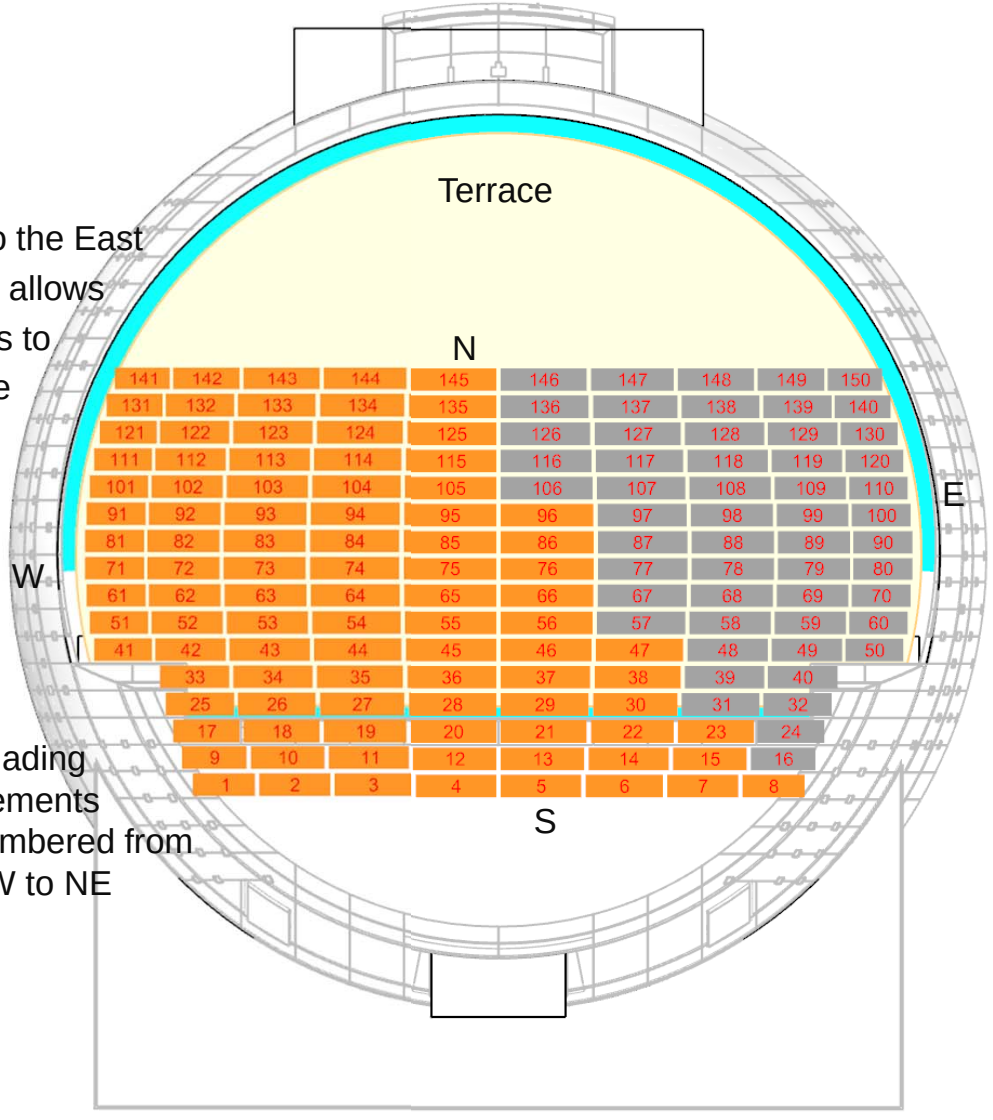
Not activated shading elements

21st March 3:00 p.m.



Shaded terrace area from active shading elements

Shading to the East not active, allows max. views to the outside



Shading elements numbered from SW to NE

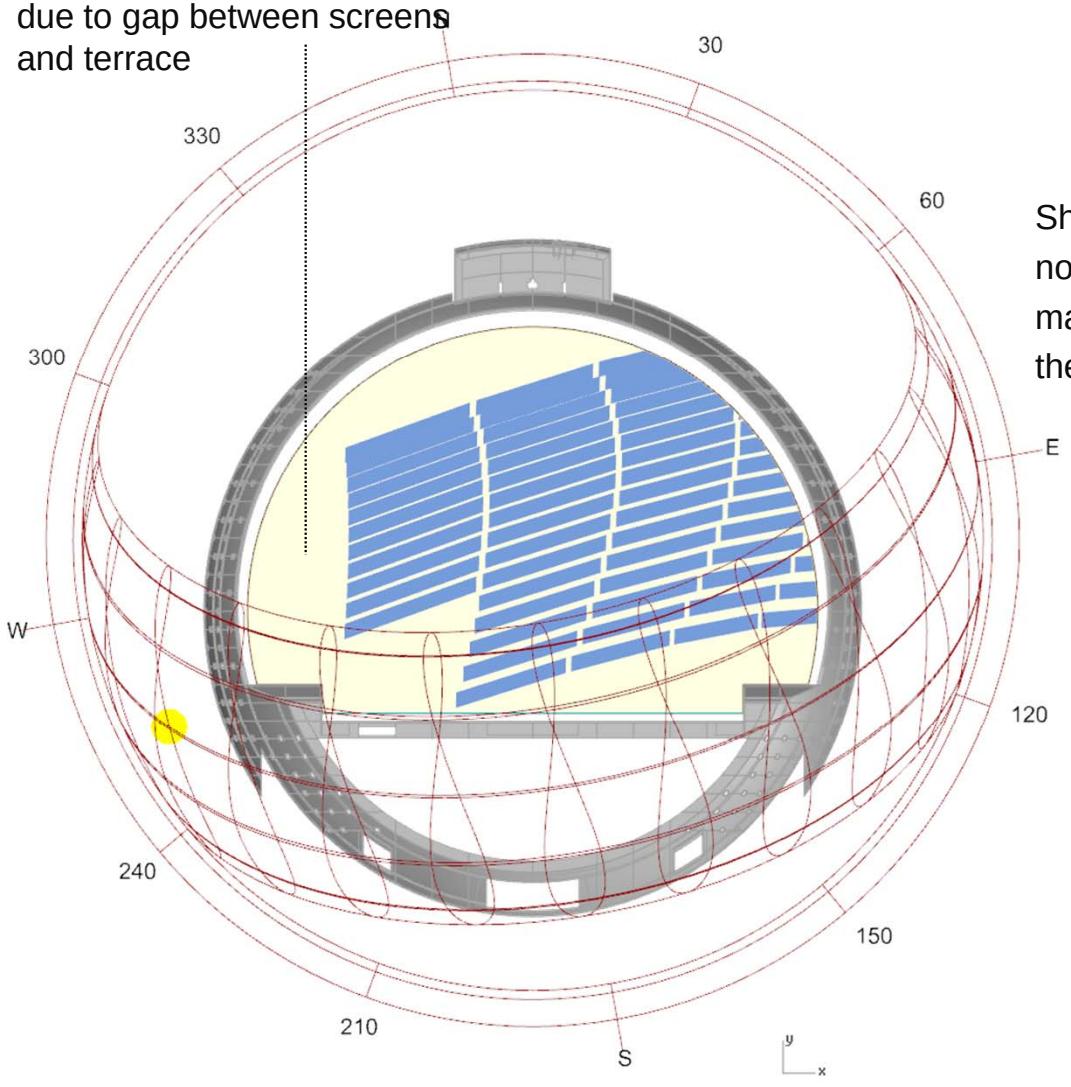
Pattern of activated shading elements

Activated shading elements

Not activated shading elements

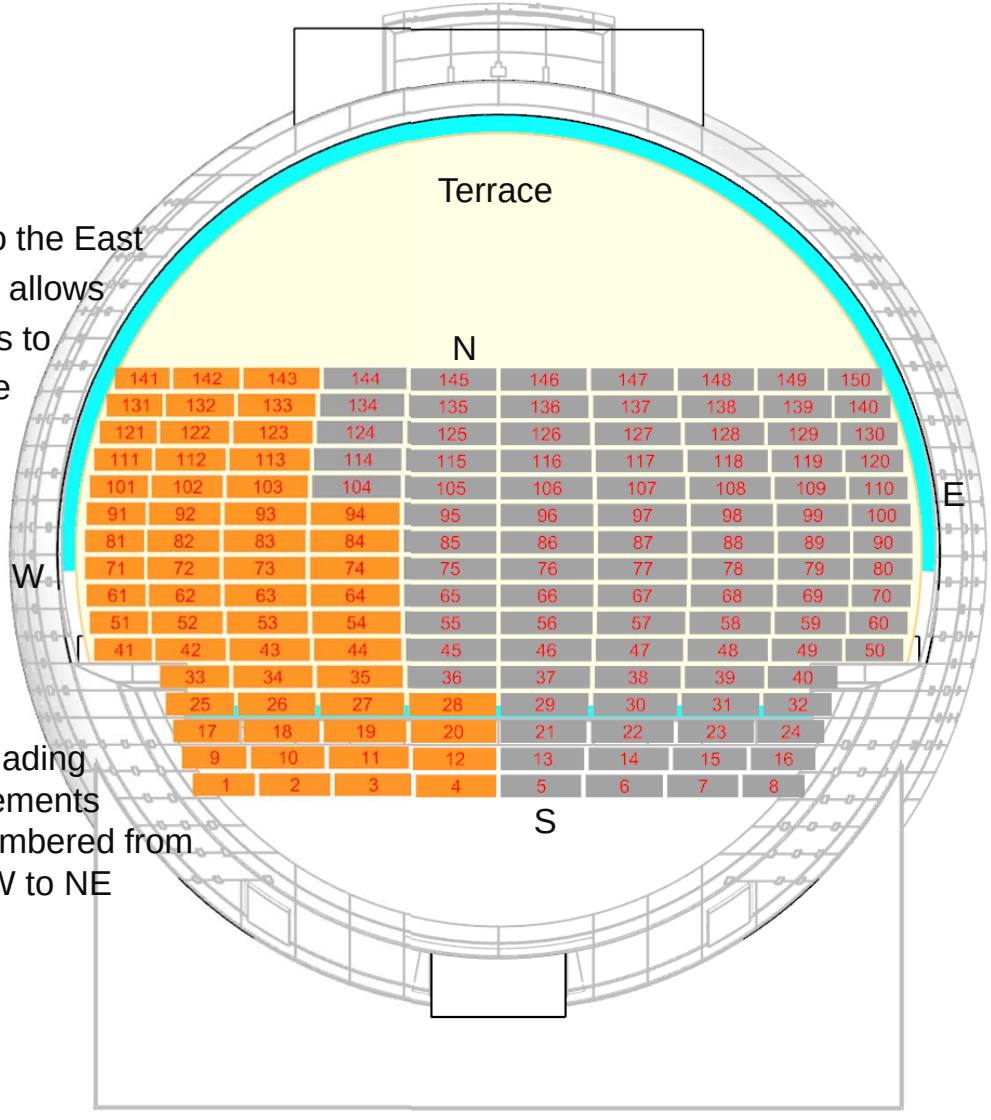
21st March 4:00 p.m.

Low angle sun hits the terrace, no shading possible due to gap between screens and terrace



Shaded terrace area from active shading elements

Shading to the East not active, allows max. views to the outside



Shading elements numbered from SW to NE

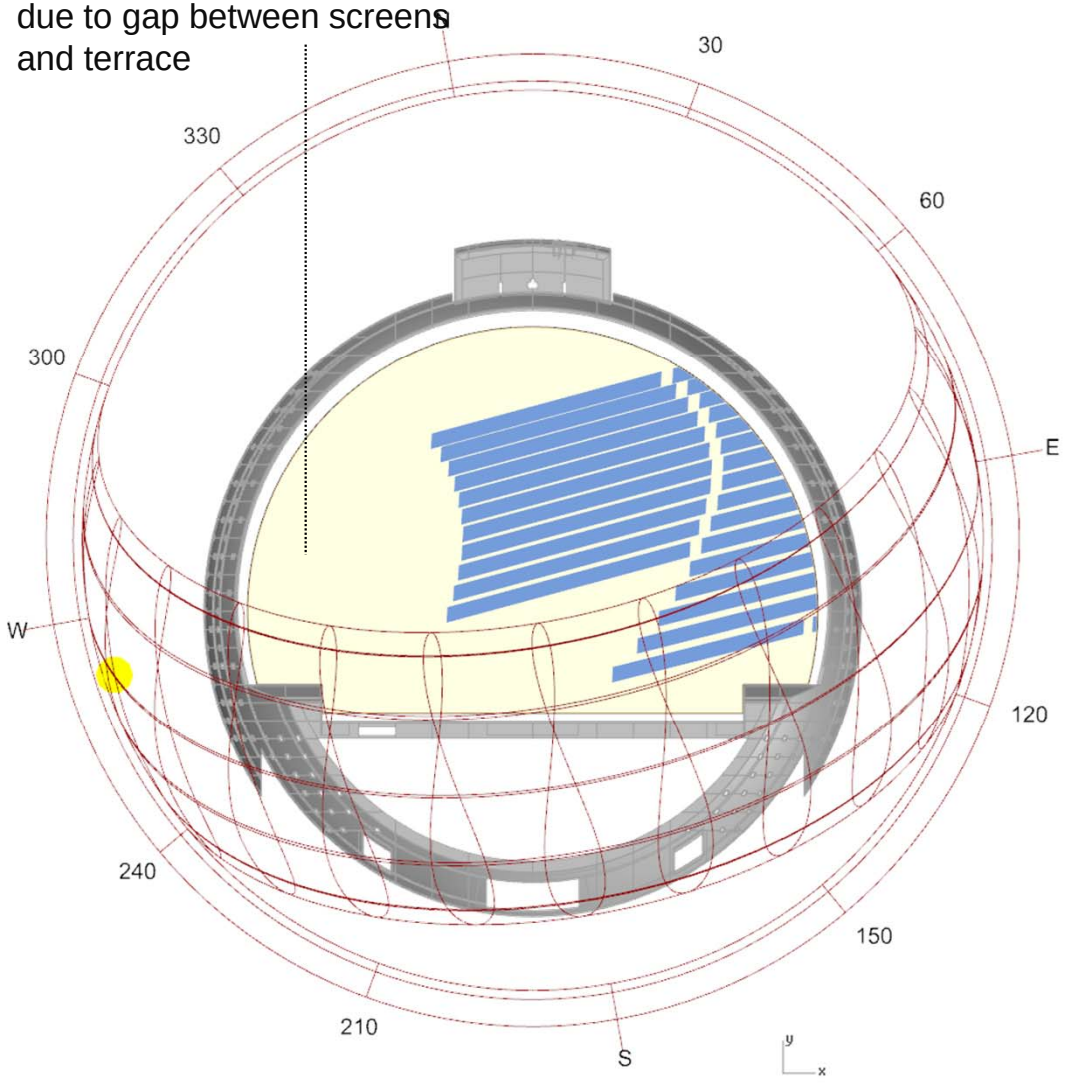
Pattern of activated shading elements

Activated shading elements

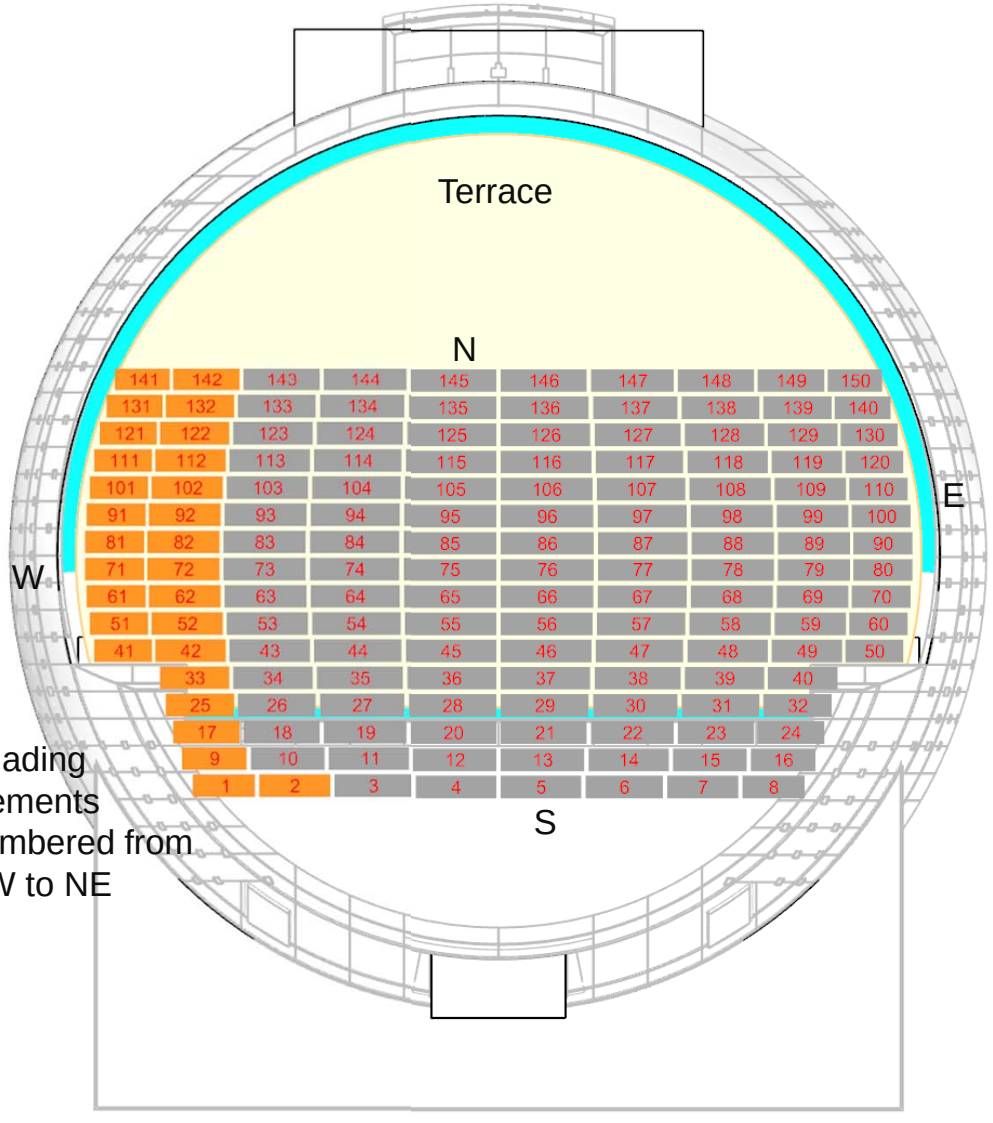
Not activated shading elements

21st March 5:00 p.m.

Low angle sun hits the terrace, no shading possible due to gap between screens and terrace



Shaded terrace area from active shading elements



Shading elements numbered from SW to NE

Pattern of activated shading elements

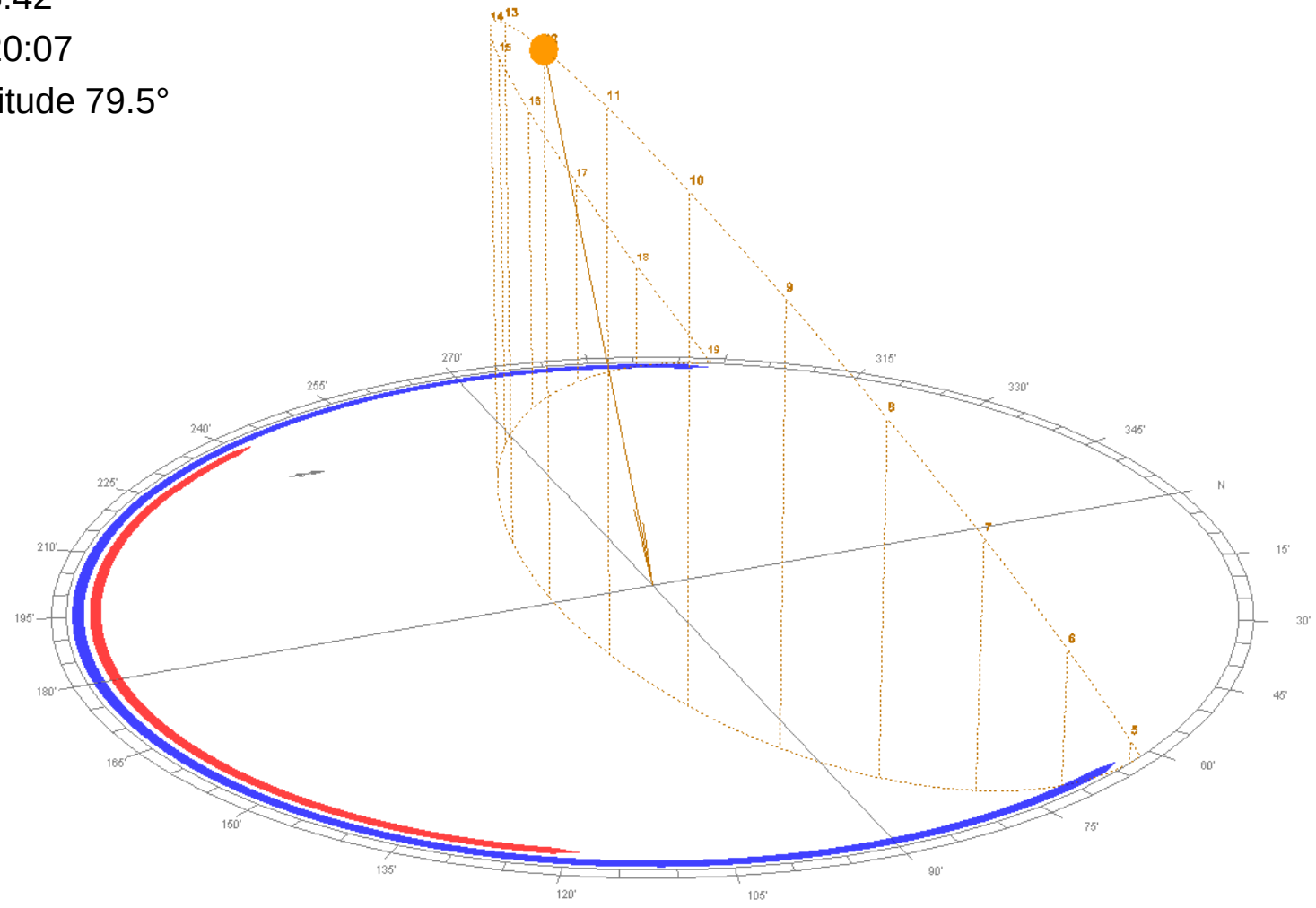
- Activated shading elements
- Not activated shading elements

21st March 6:00 p.m.

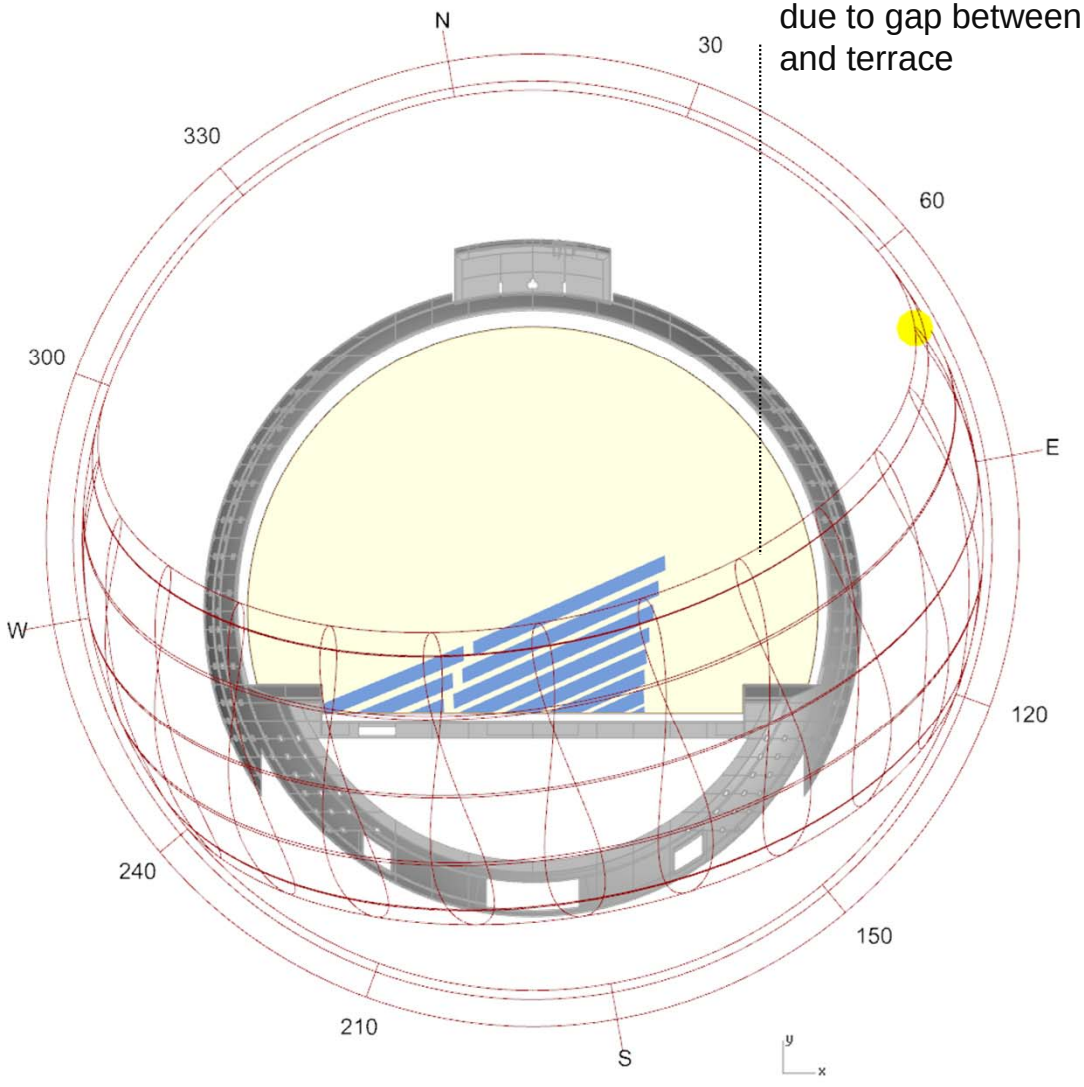
Summer solstice 21st of June

Highest possible sun path of the year.

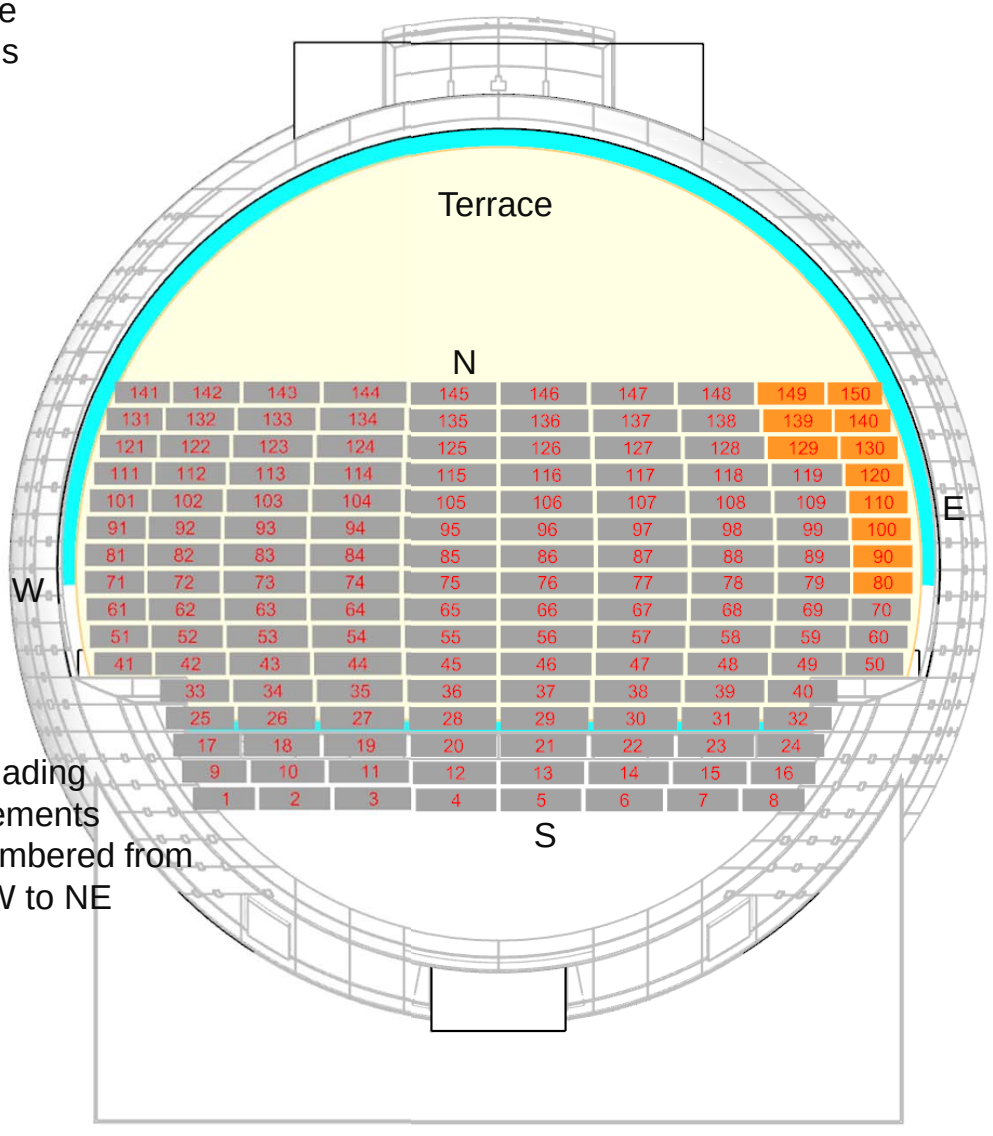
Sunrise 5:42
Sunset 20:07
Max. Sun altitude 79.5°



Low angle sun hits the terrace, no shading possible due to gap between screens and terrace



Shaded terrace area from active shading elements



Shading elements numbered from SW to NE

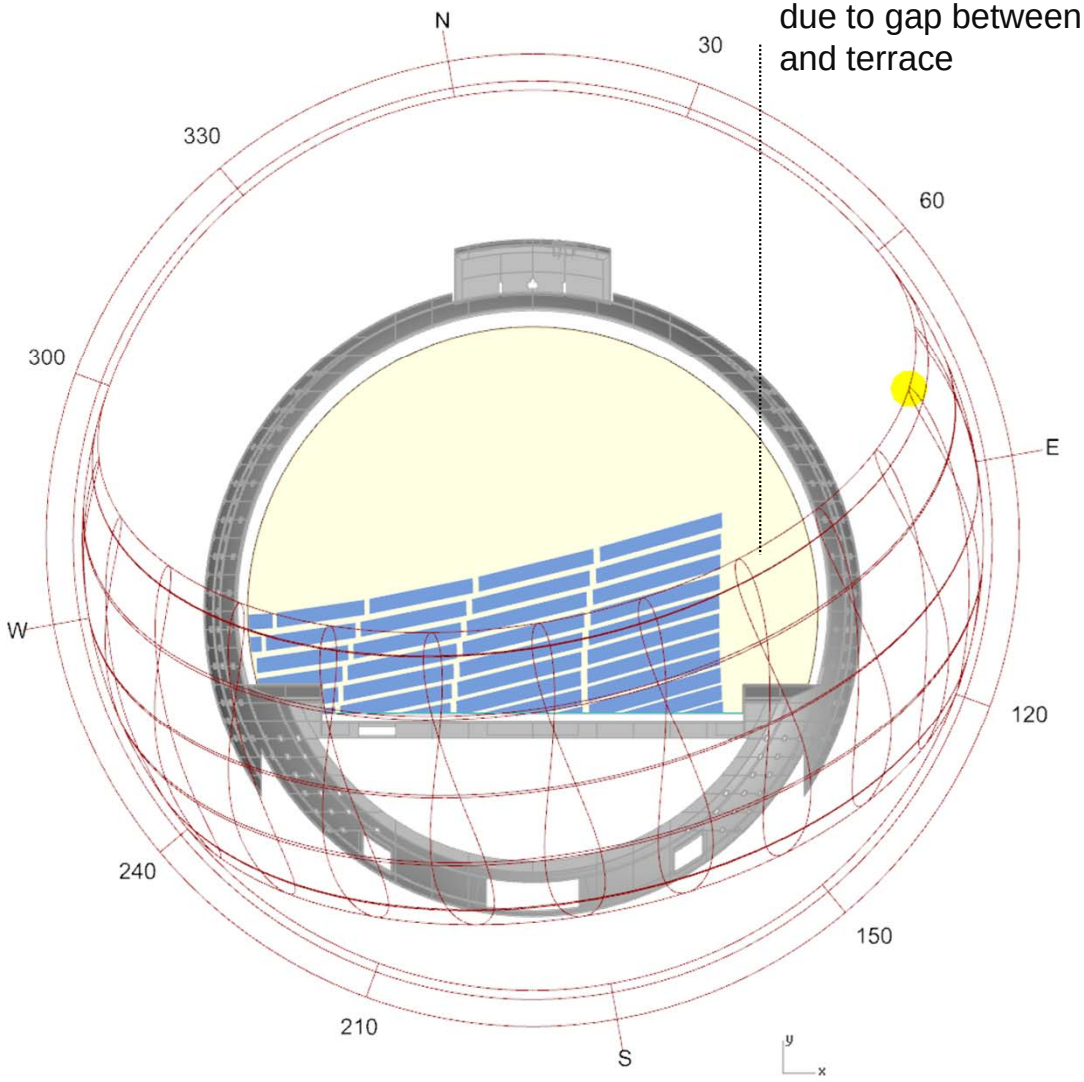
Pattern of activated shading elements

Activated shading elements

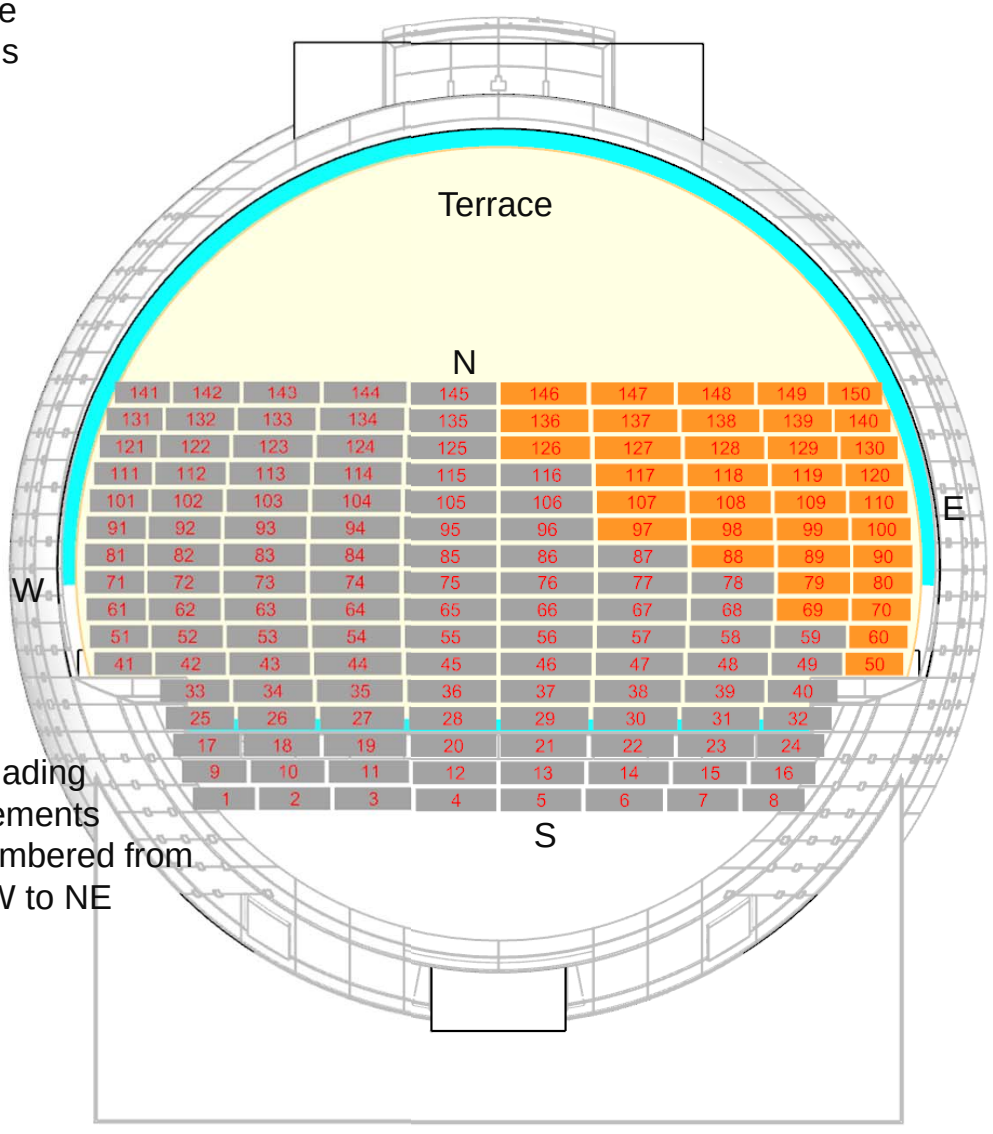
Not activated shading elements

21st June 7:00 a.m.

Low angle sun hits the terrace, no shading possible due to gap between screens and terrace



Shaded terrace area from active shading elements



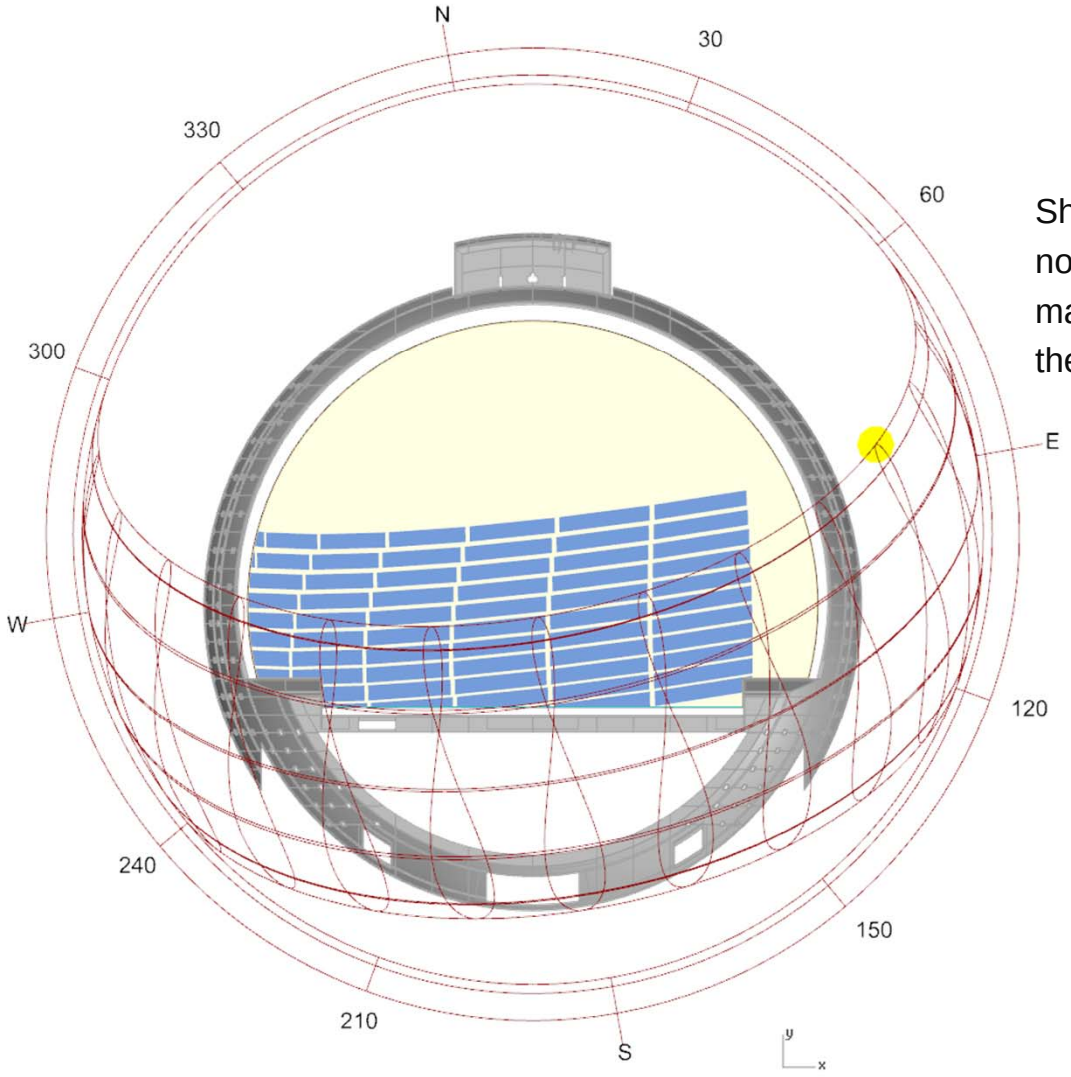
Shading elements numbered from SW to NE

Pattern of activated shading elements

Activated shading elements

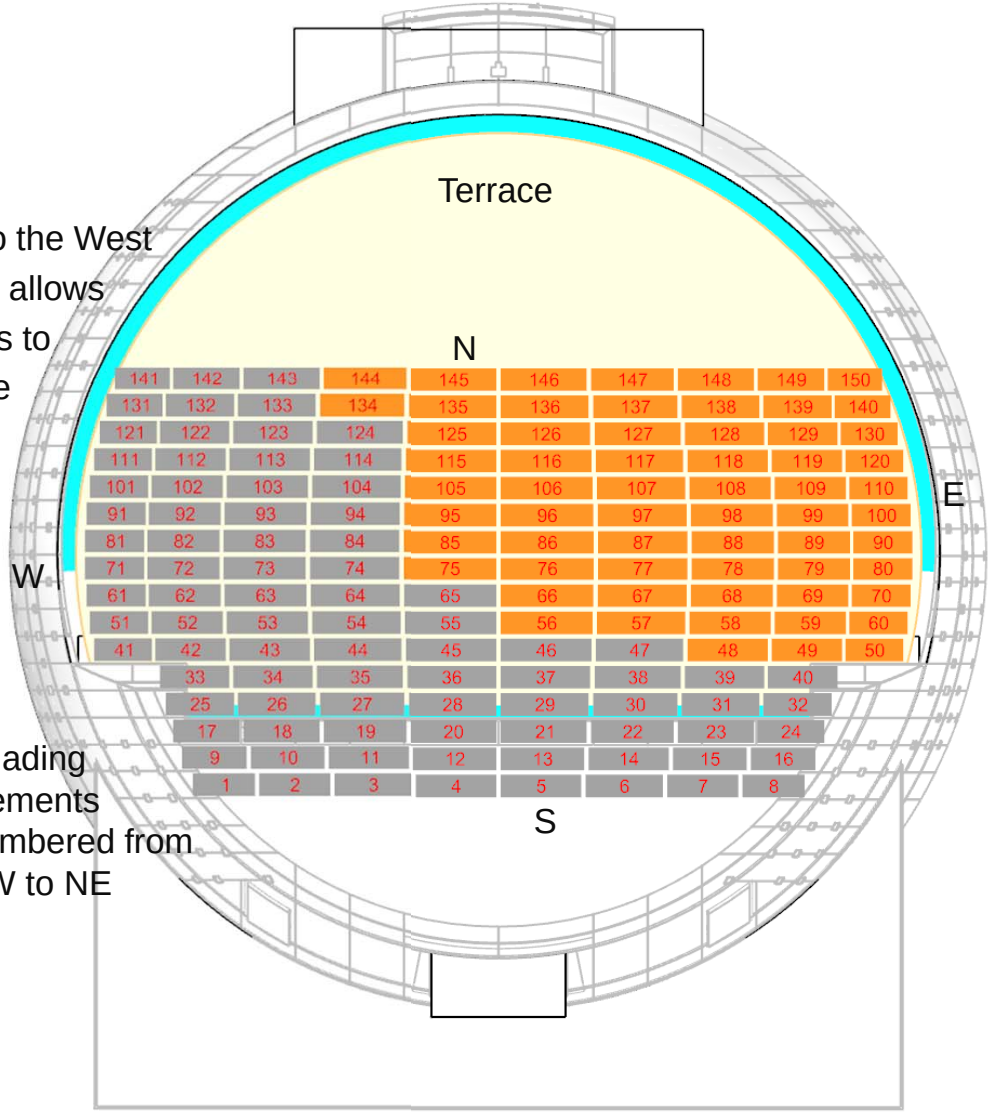
Not activated shading elements

21st June 8:00 a.m.



Shaded terrace area from active shading elements

Shading to the West not active, allows max. views to the outside



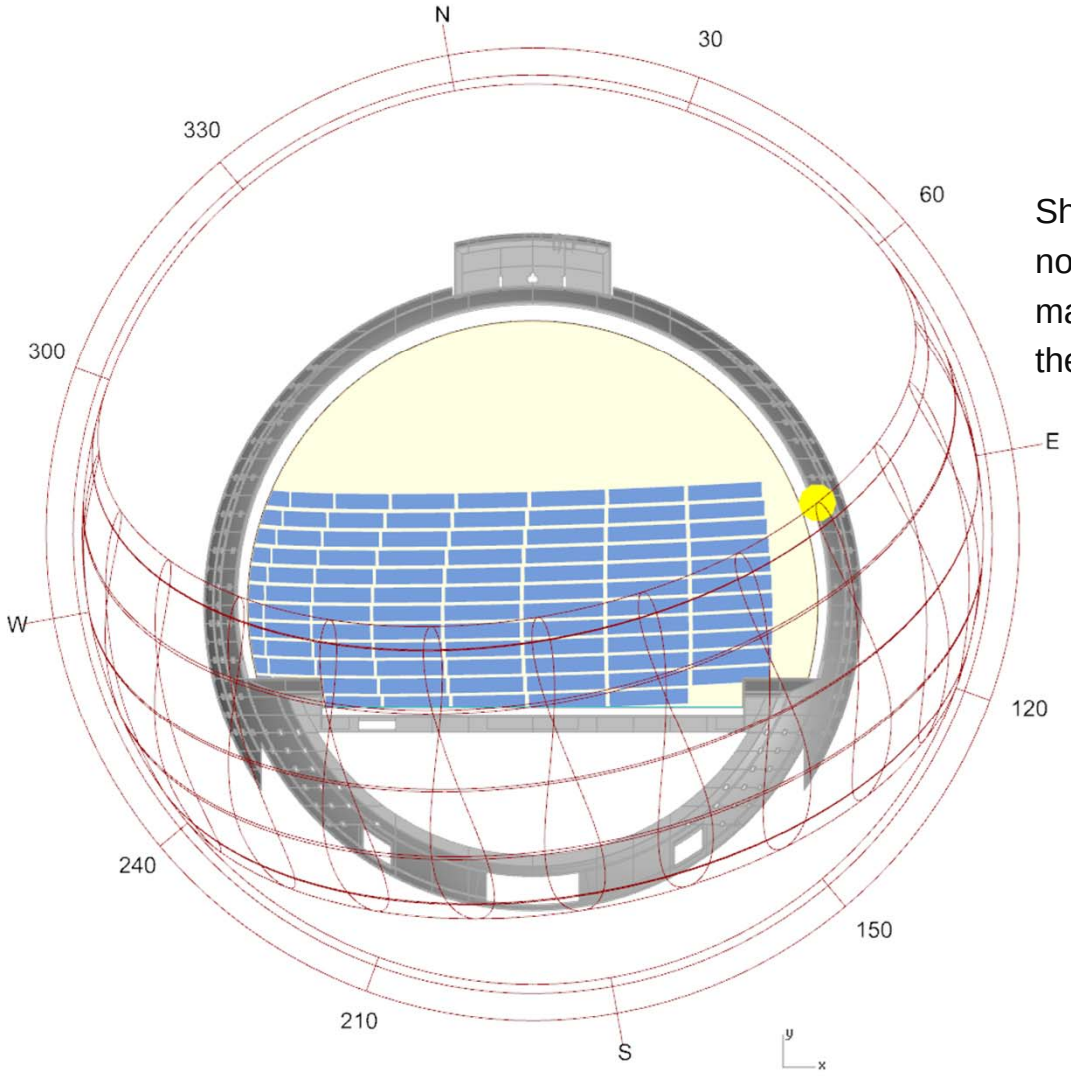
Shading elements numbered from SW to NE

Pattern of activated shading elements

Activated shading elements

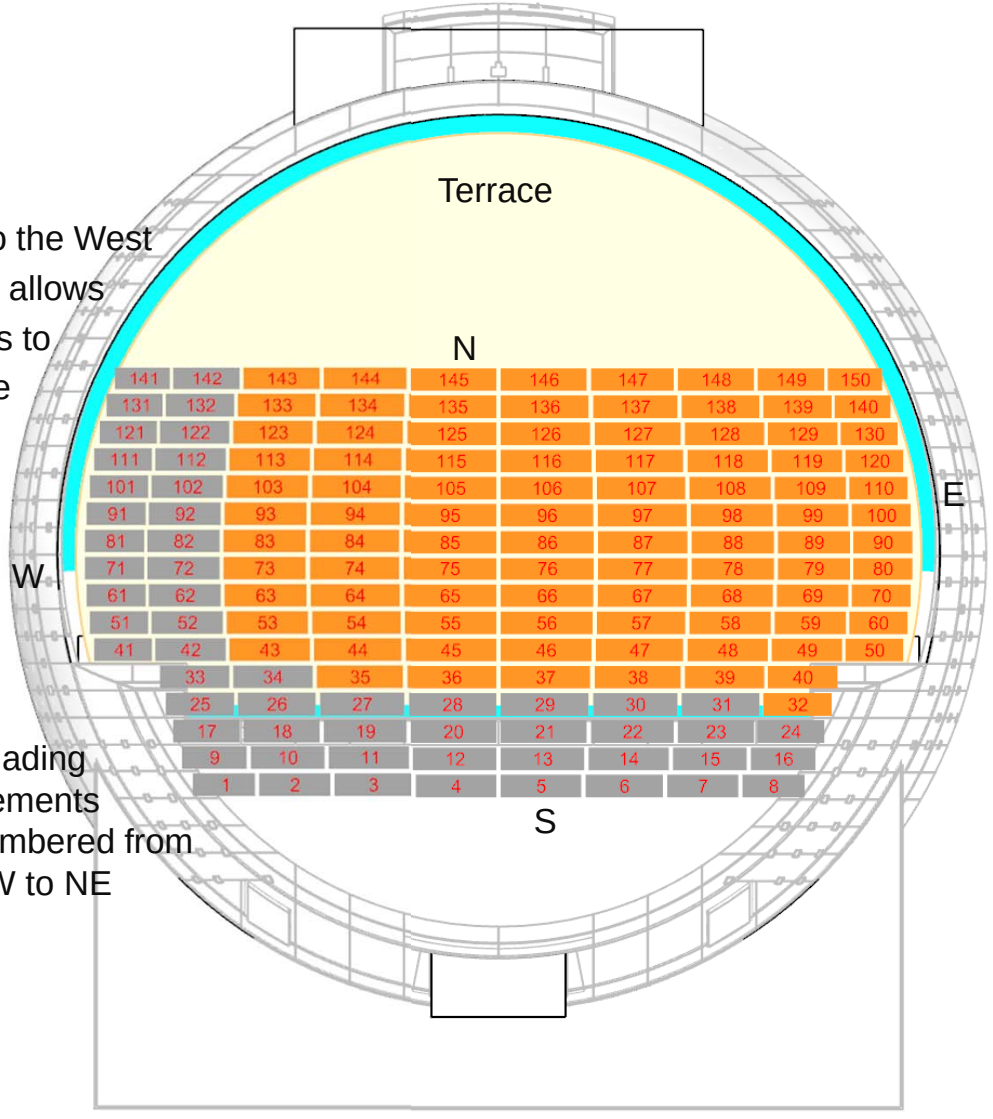
Not activated shading elements

21st June 9:00 a.m.



Shaded terrace area from active shading elements

Shading to the West not active, allows max. views to the outside



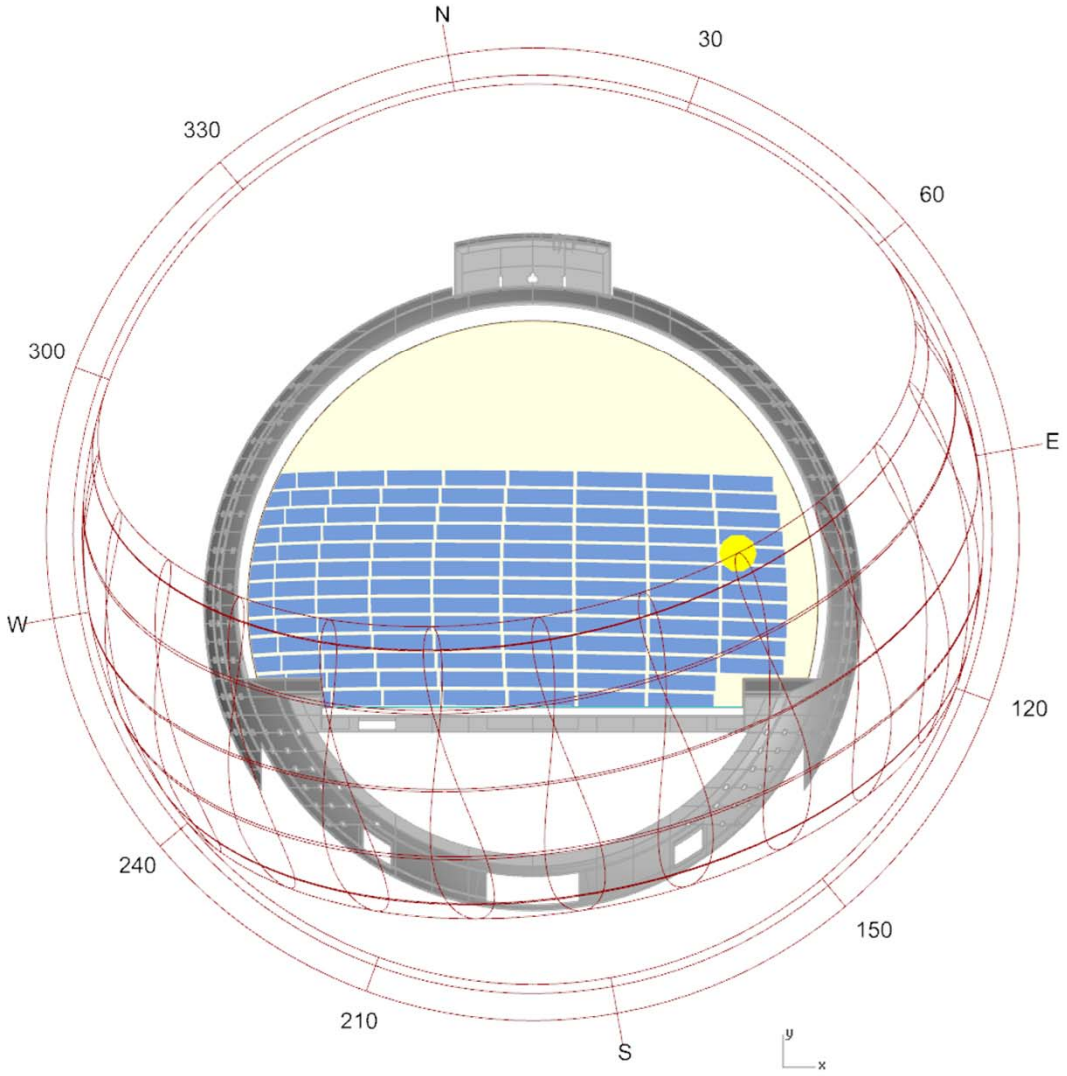
Shading elements numbered from SW to NE

Pattern of activated shading elements

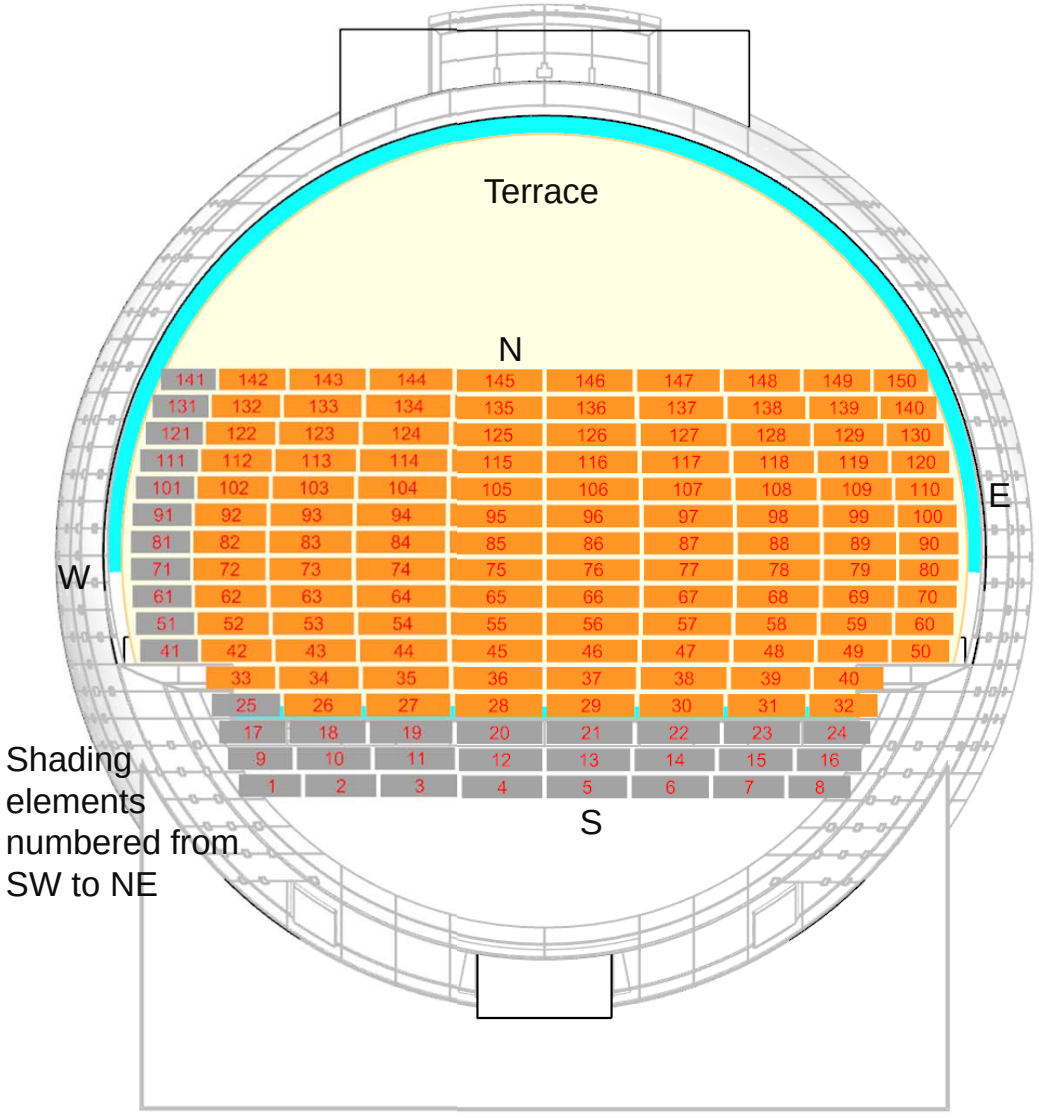
Activated shading elements

Not activated shading elements

21st June 10:00 a.m.



Shaded terrace area from active shading elements



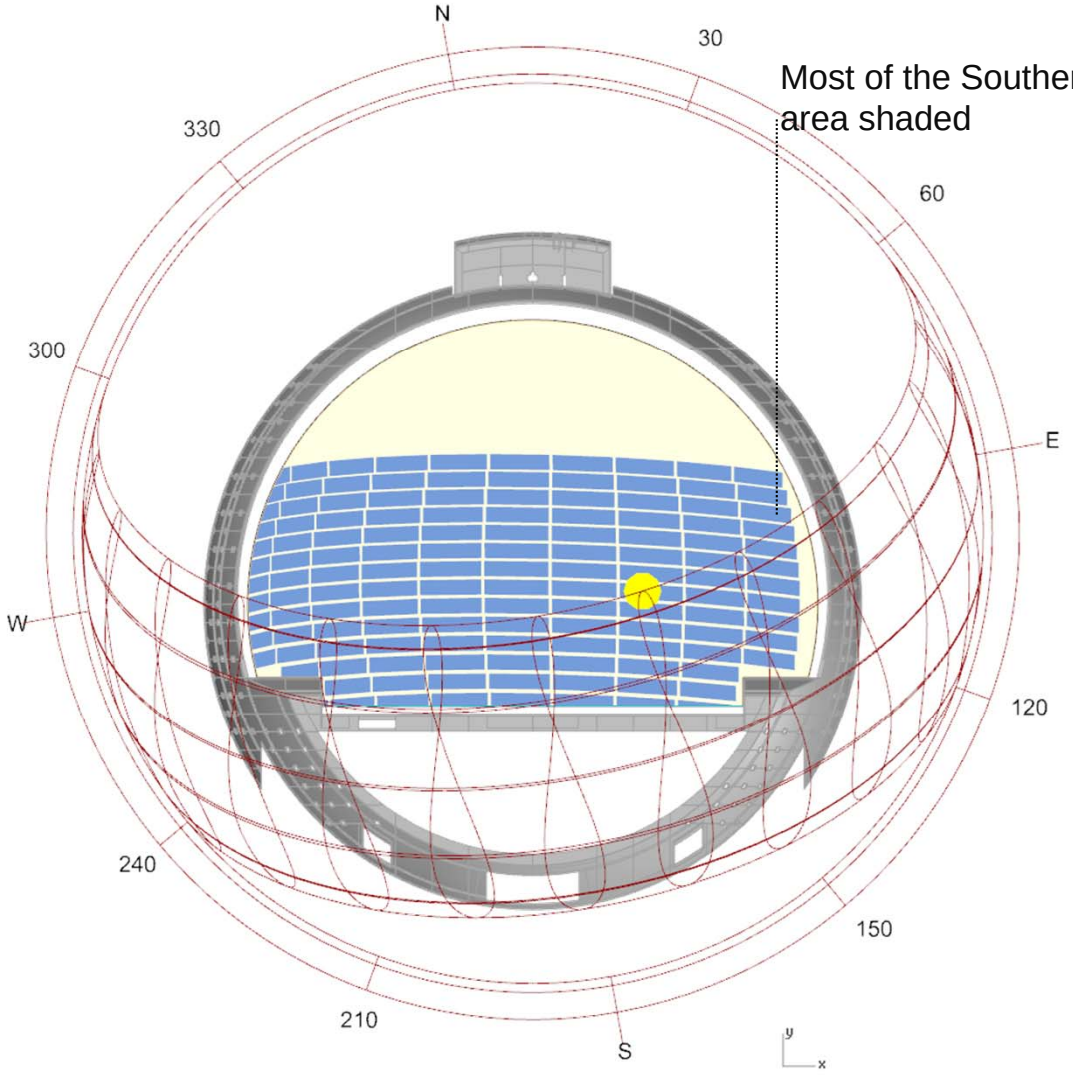
Shading elements numbered from SW to NE

Pattern of activated shading elements

Activated shading elements

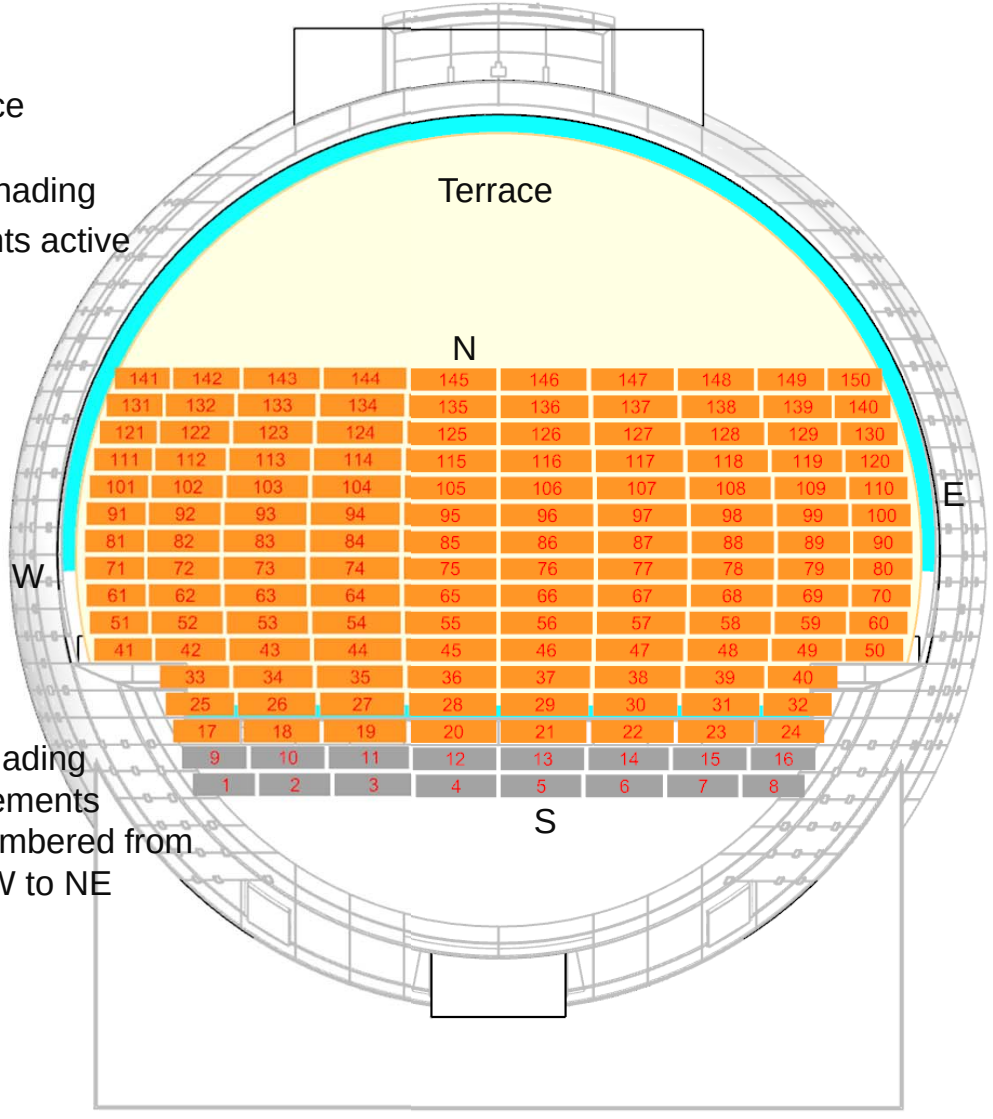
Not activated shading elements

21st June 11:00 a.m.



Most of the Southern terrace area shaded

Most shading elements active



Shading elements numbered from SW to NE

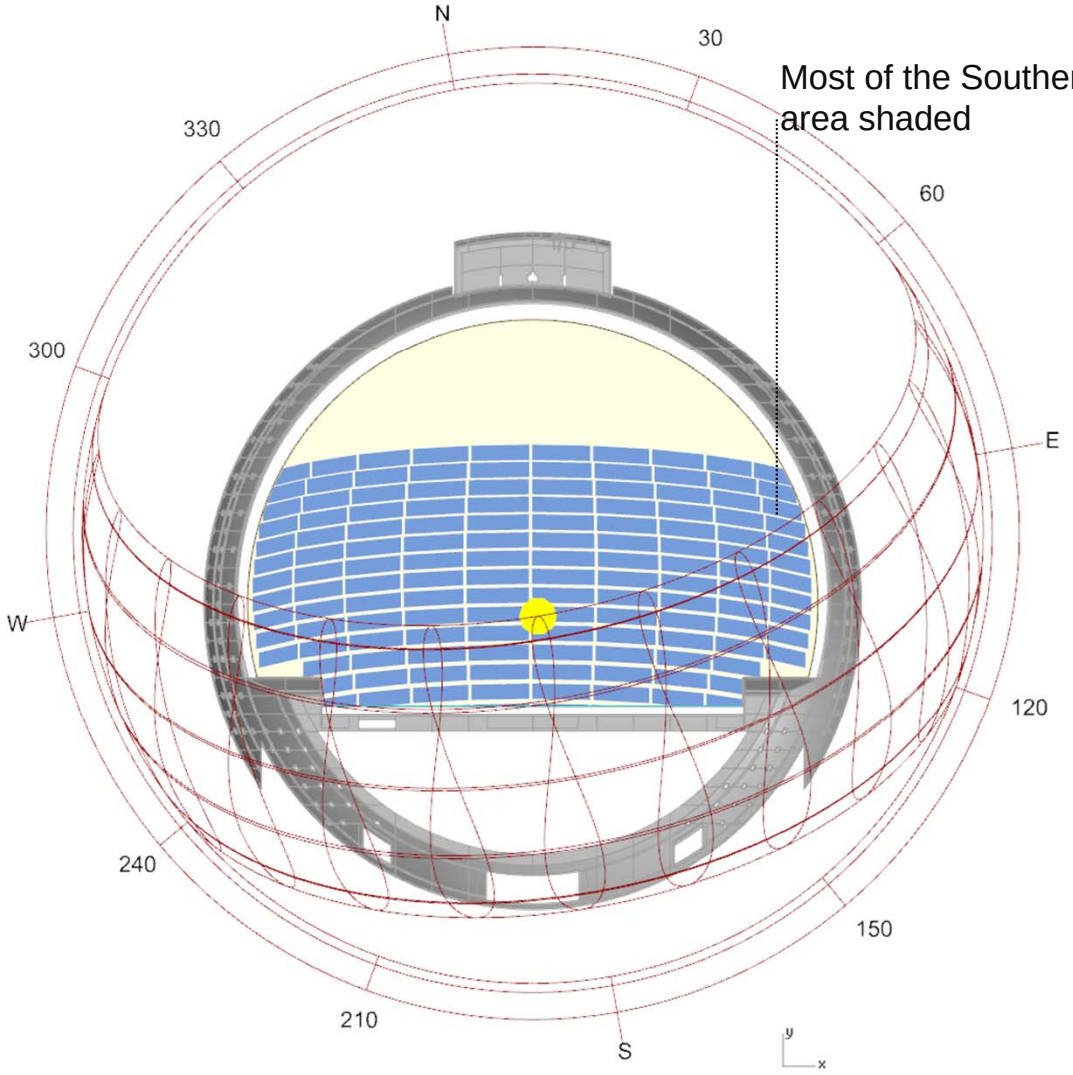
Shaded terrace area from active shading elements

Pattern of activated shading elements

Activated shading elements

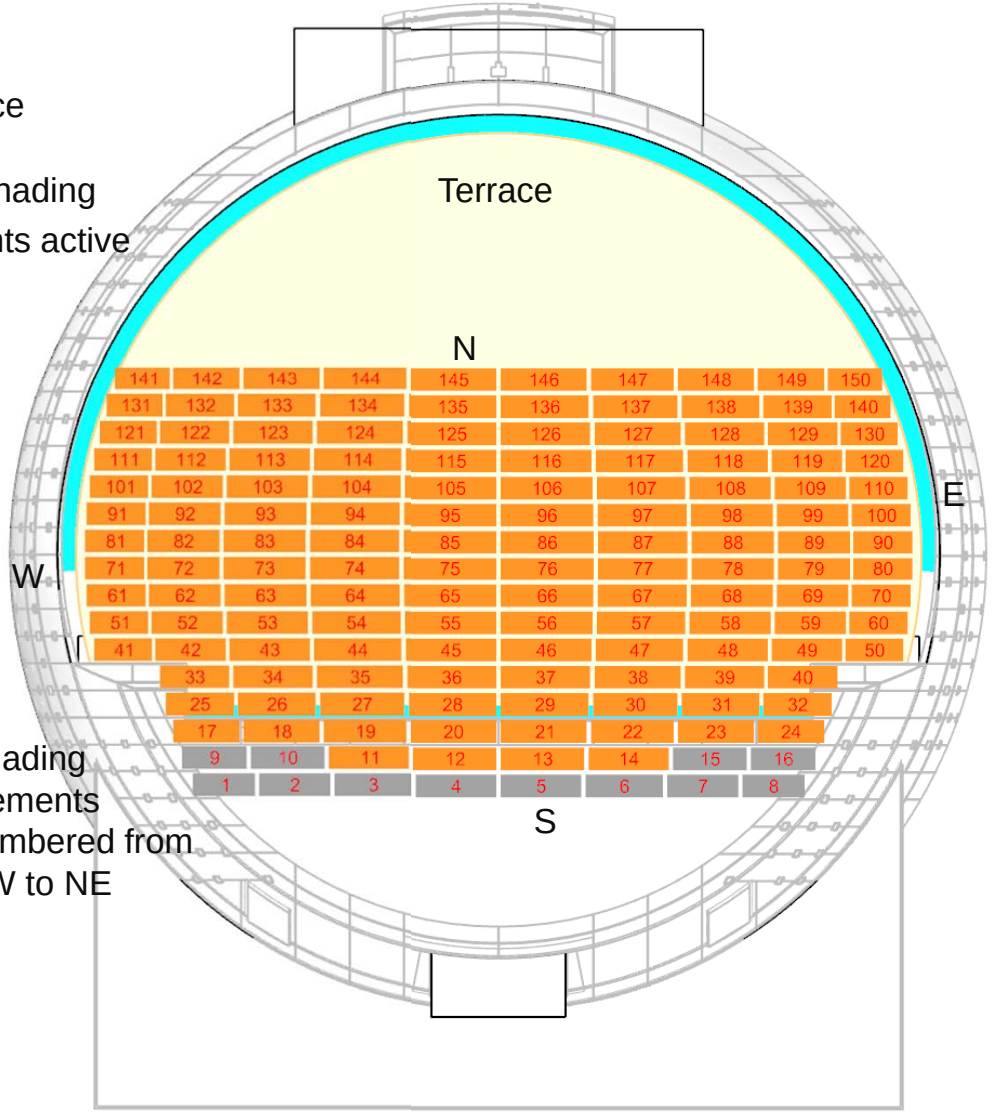
Not activated shading elements

21st June 12:00 p.m.



Most of the Southern terrace area shaded

Most shading elements active



Shading elements numbered from SW to NE

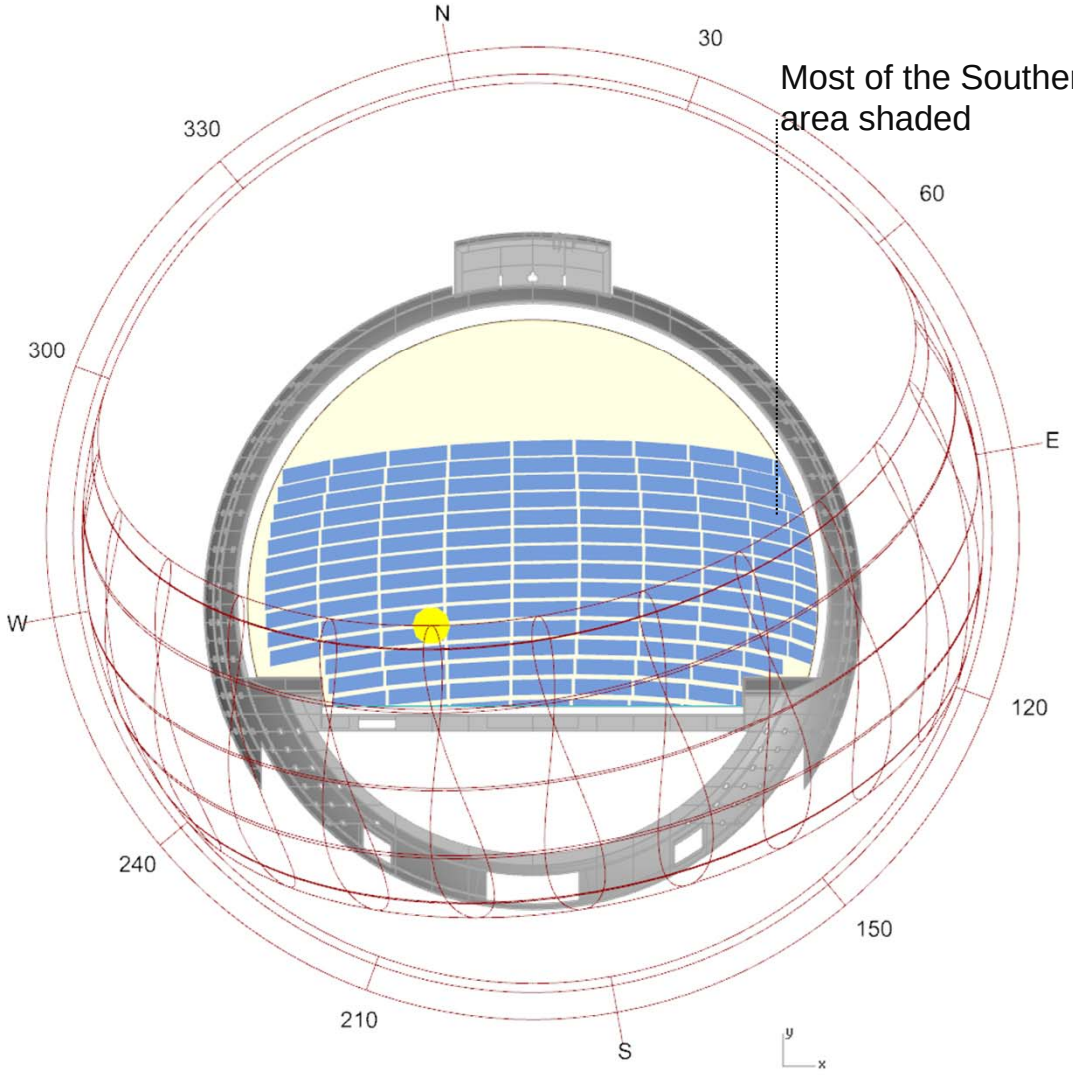
Shaded terrace area from active shading elements

Pattern of activated shading elements

Activated shading elements

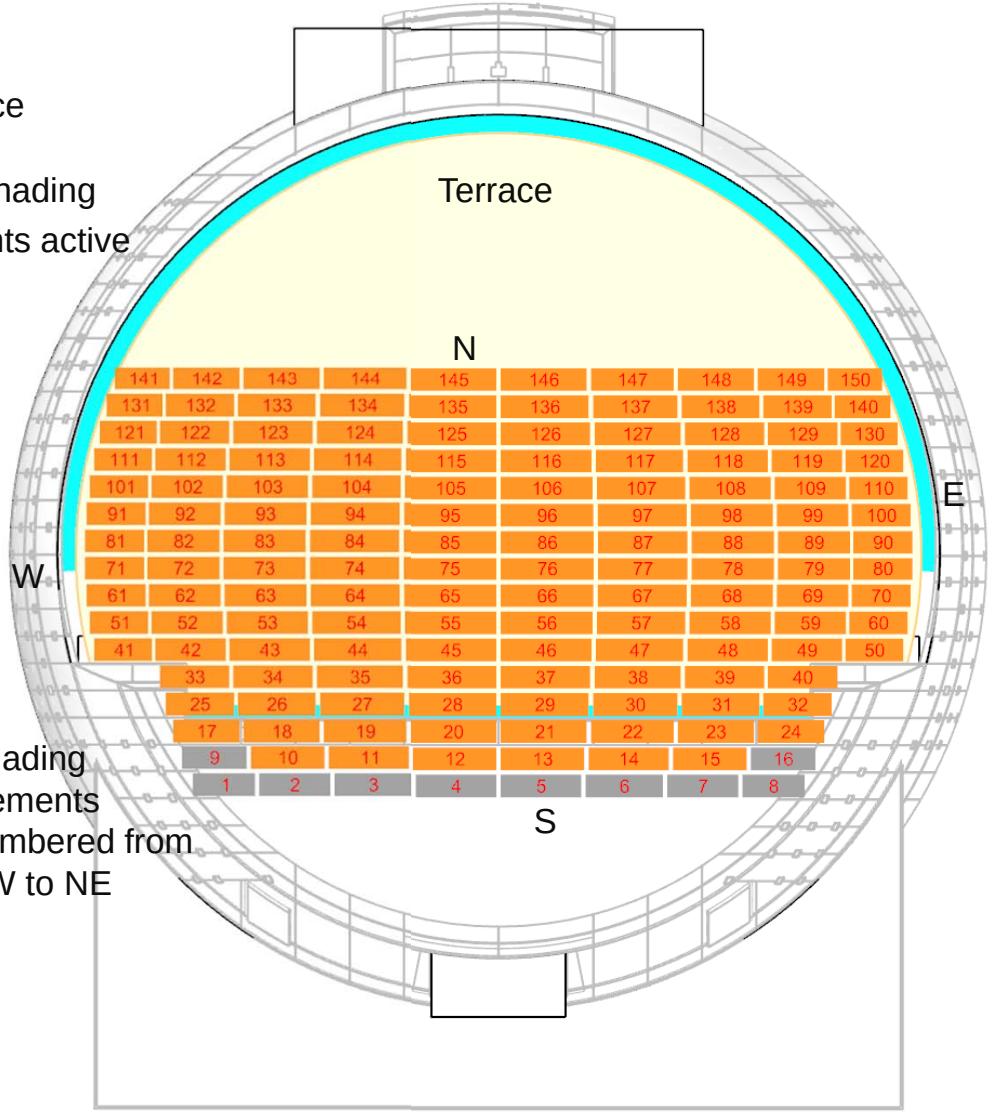
Not activated shading elements

21st June 1:00 p.m.



Most of the Southern terrace area shaded

Most shading elements active



Shading elements numbered from SW to NE

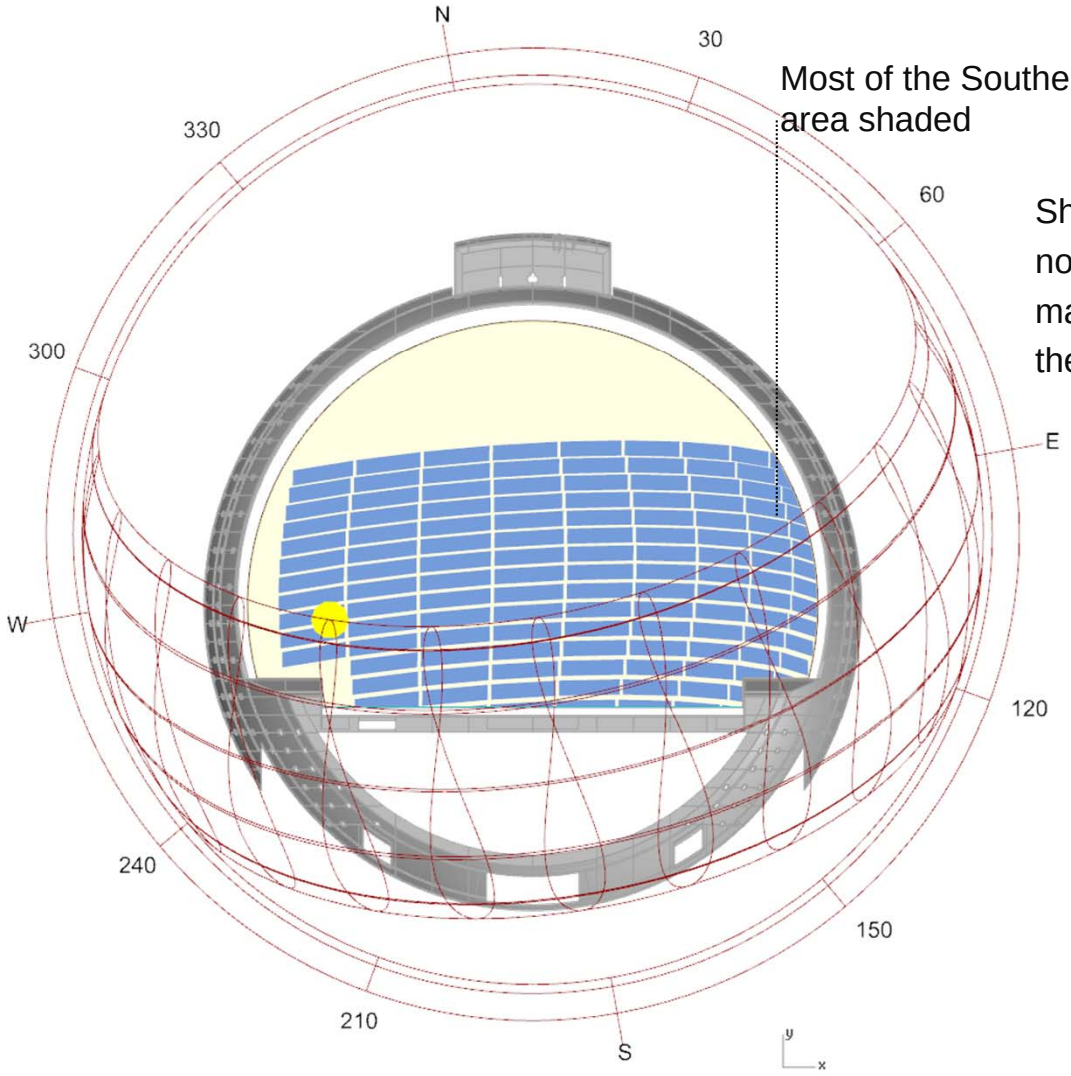
Shaded terrace area from active shading elements

Pattern of activated shading elements

Activated shading elements

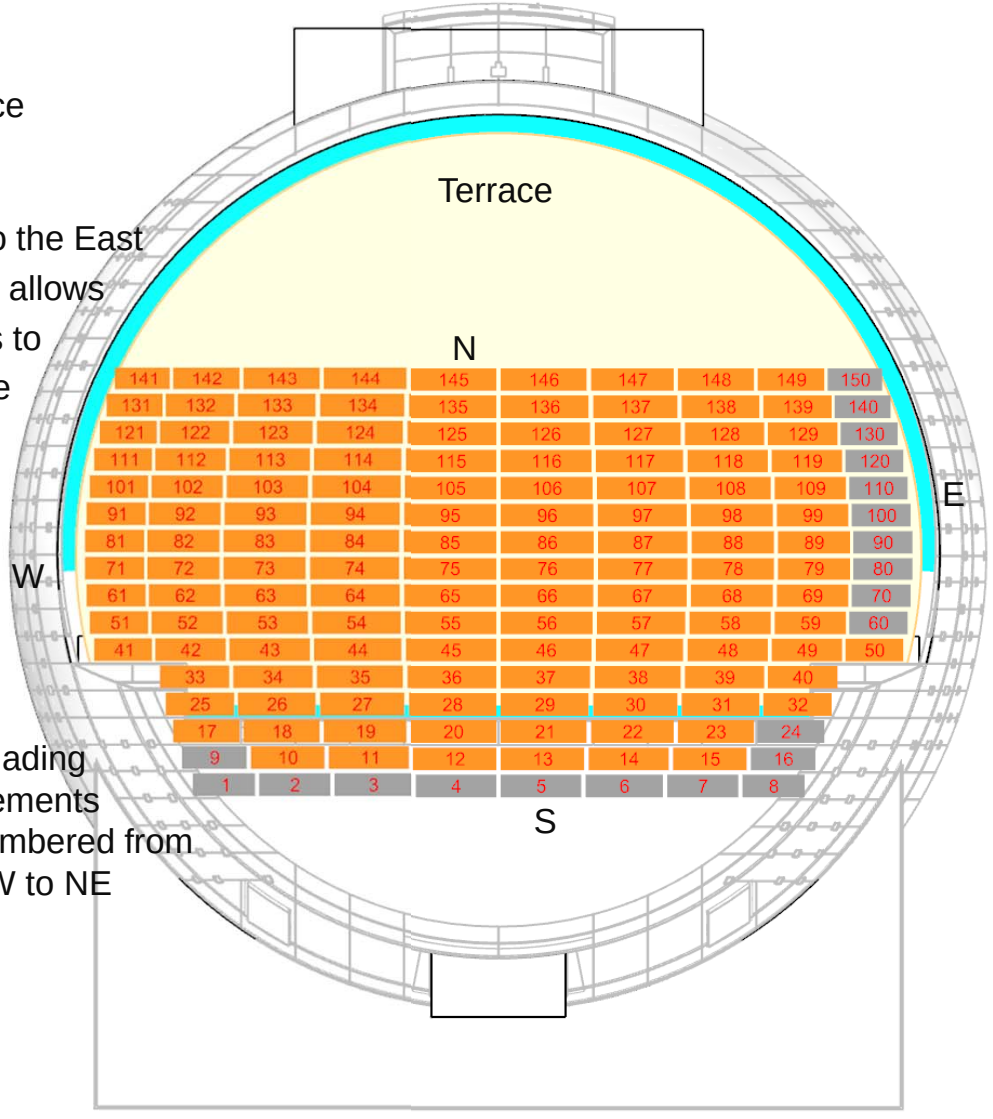
Not activated shading elements

21st June 2:00 p.m.



Most of the Southern terrace area shaded

Shading to the East not active, allows max.views to the outside



Shading elements numbered from SW to NE

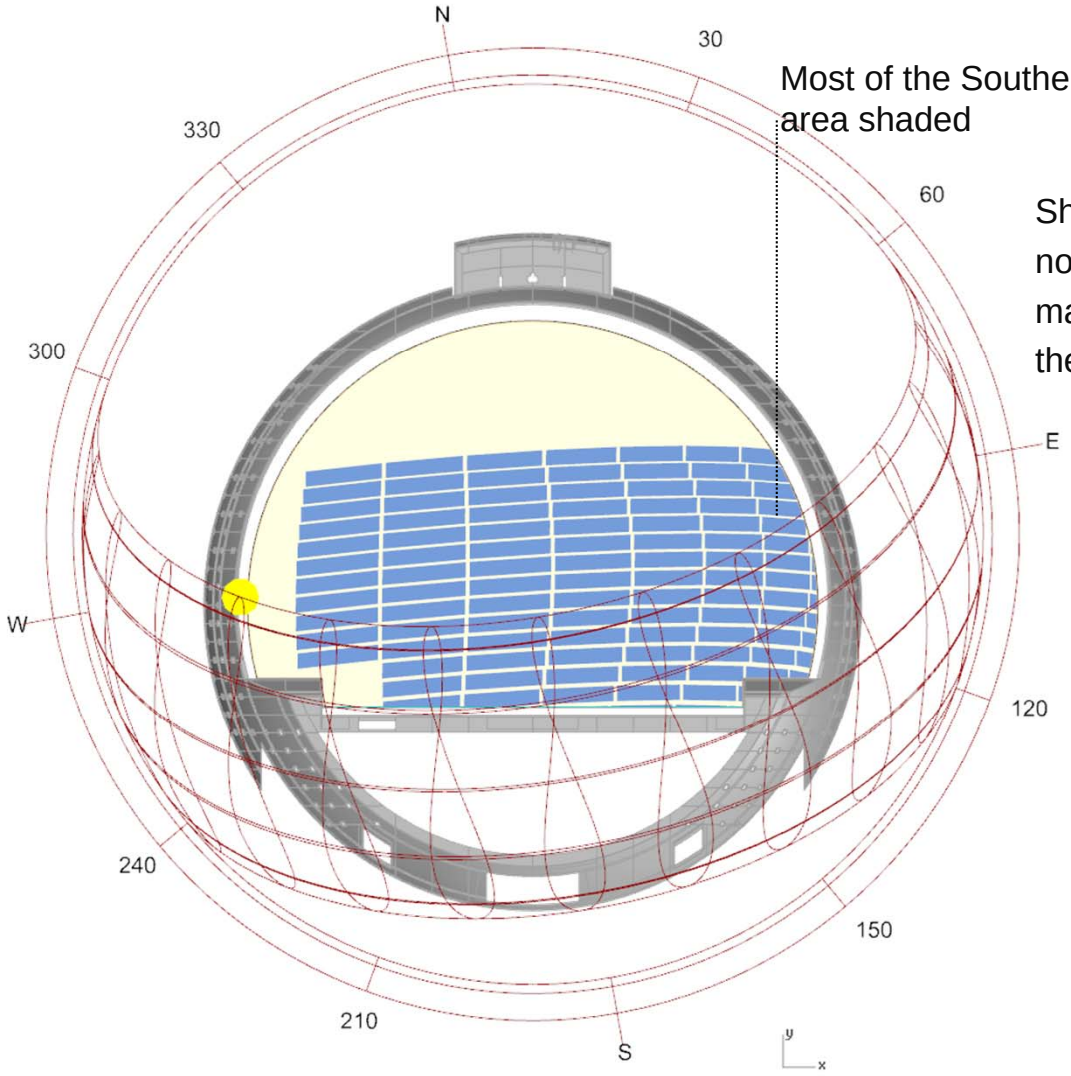
Shaded terrace area from active shading elements

Pattern of activated shading elements

Activated shading elements

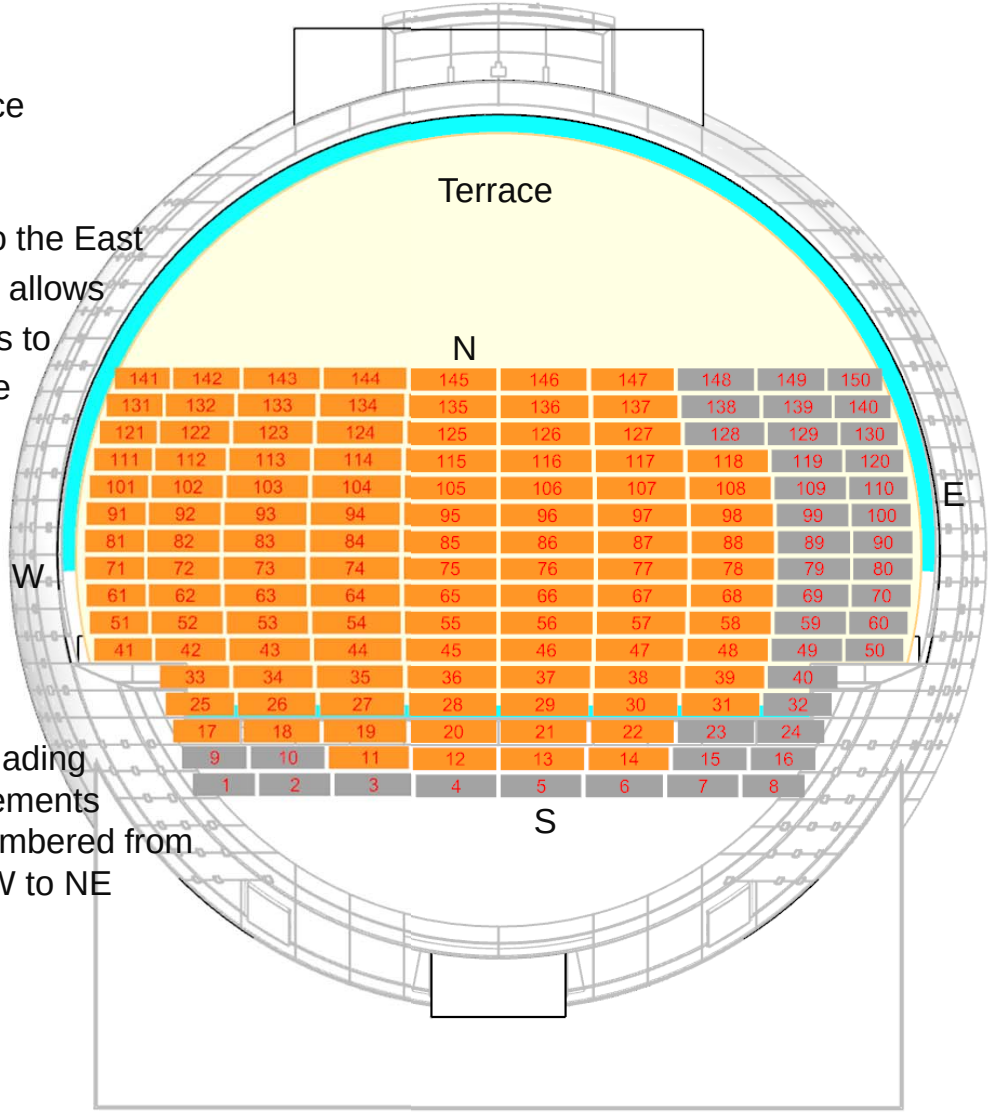
Not activated shading elements

21st June 3:00 p.m.



Most of the Southern terrace area shaded

Shading to the East not active, allows max. views to the outside



Shading elements numbered from SW to NE

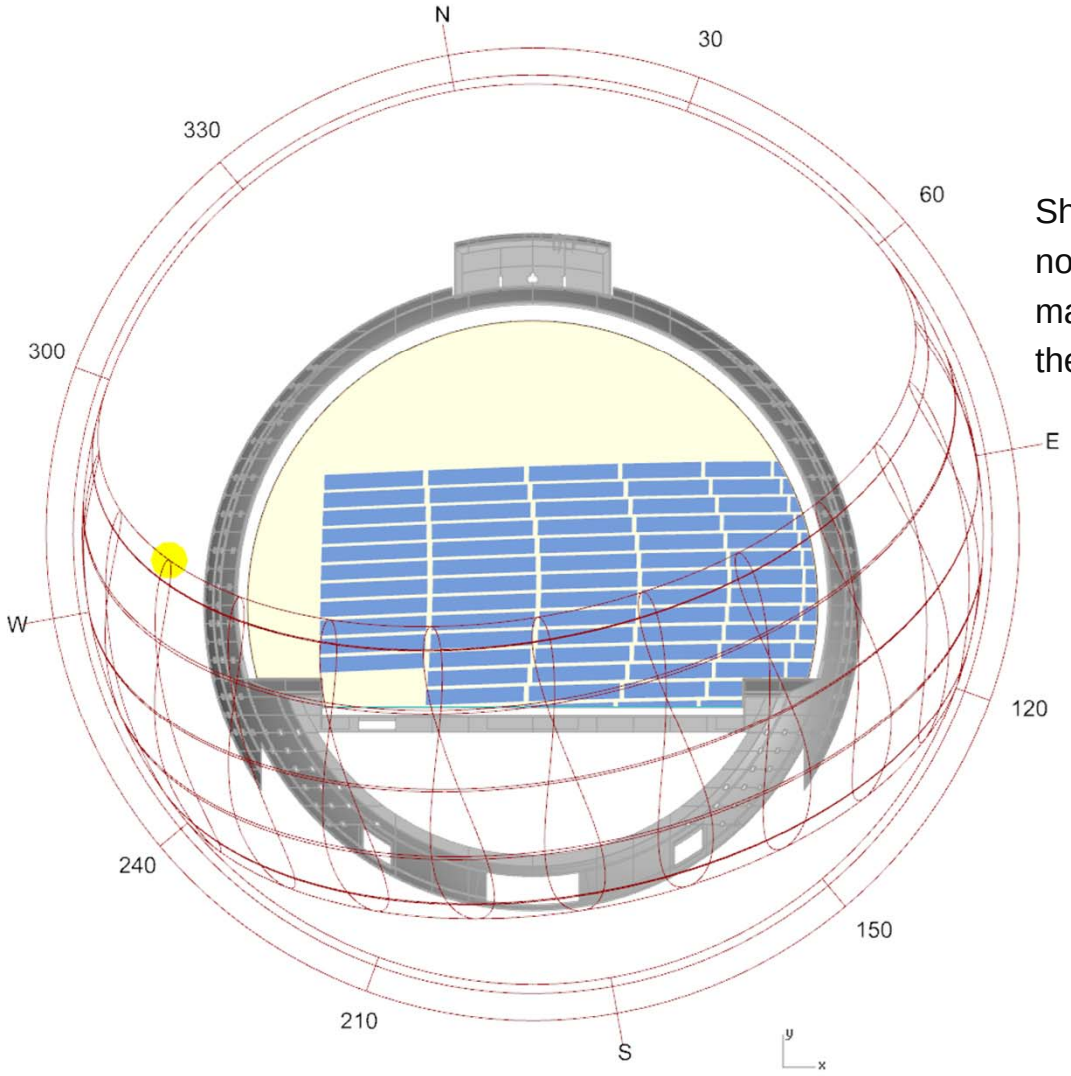
Shaded terrace area from active shading elements

Pattern of activated shading elements

Activated shading elements

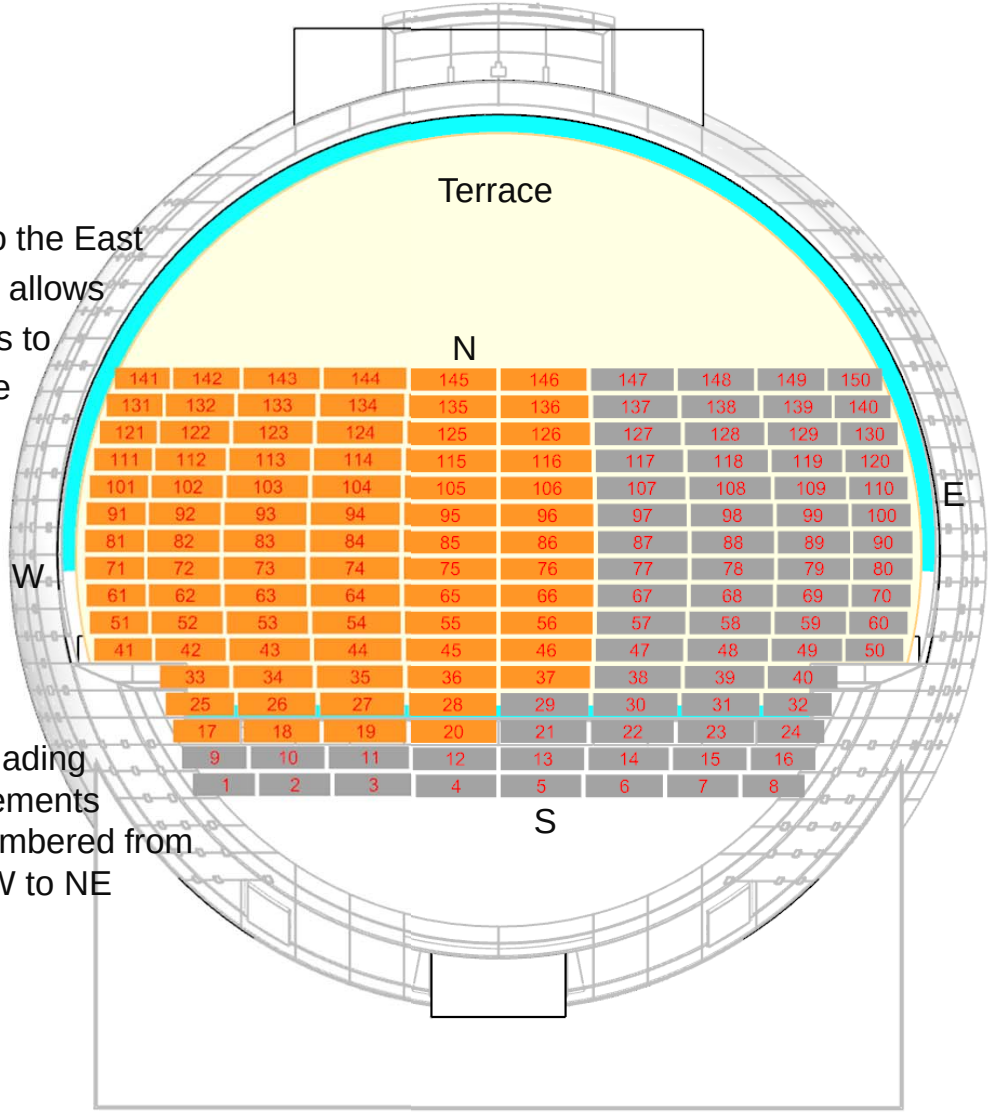
Not activated shading elements

21st June 4:00 p.m.



Shaded terrace area from active shading elements

Shading to the East not active, allows max. views to the outside



Shading elements numbered from SW to NE

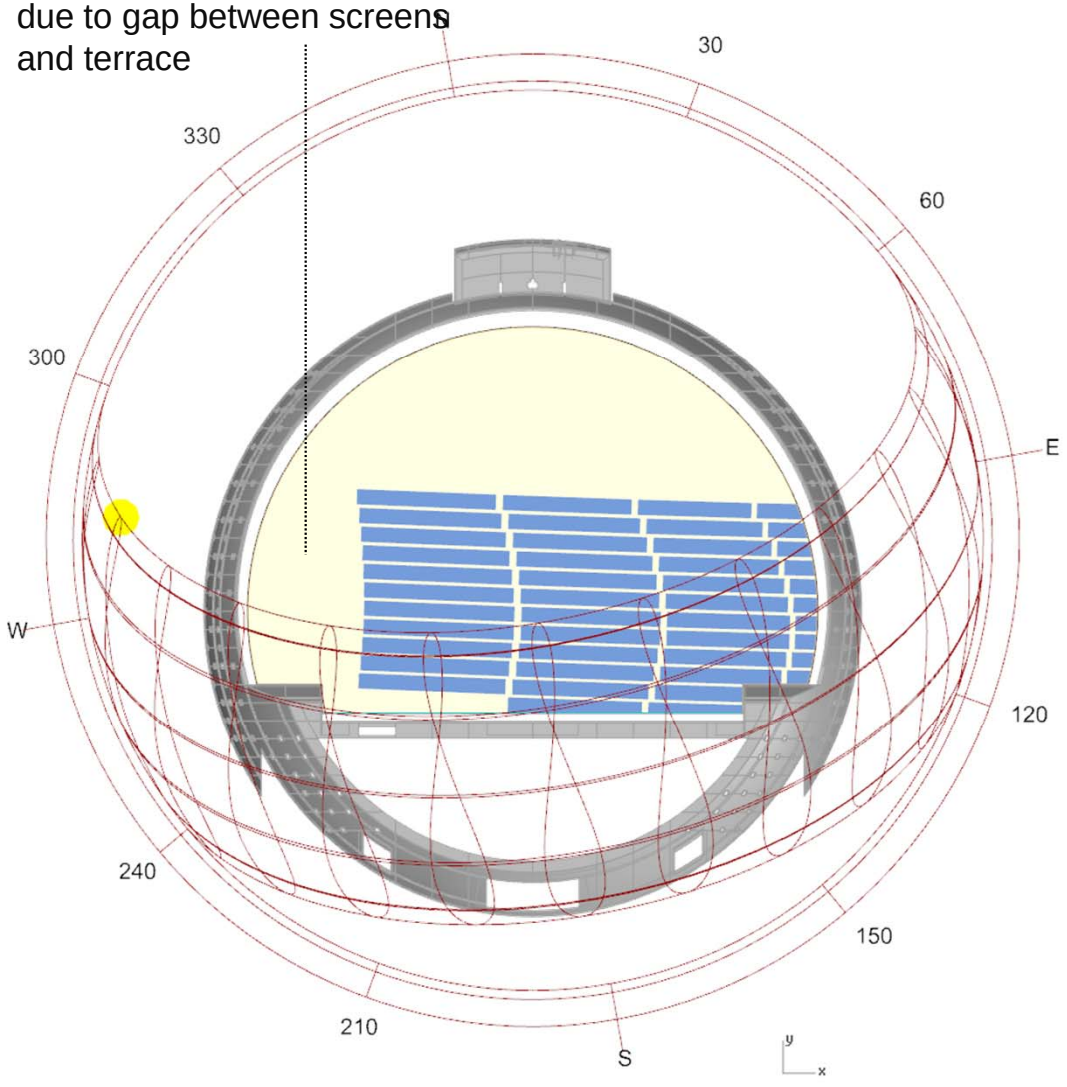
Pattern of activated shading elements

Activated shading elements

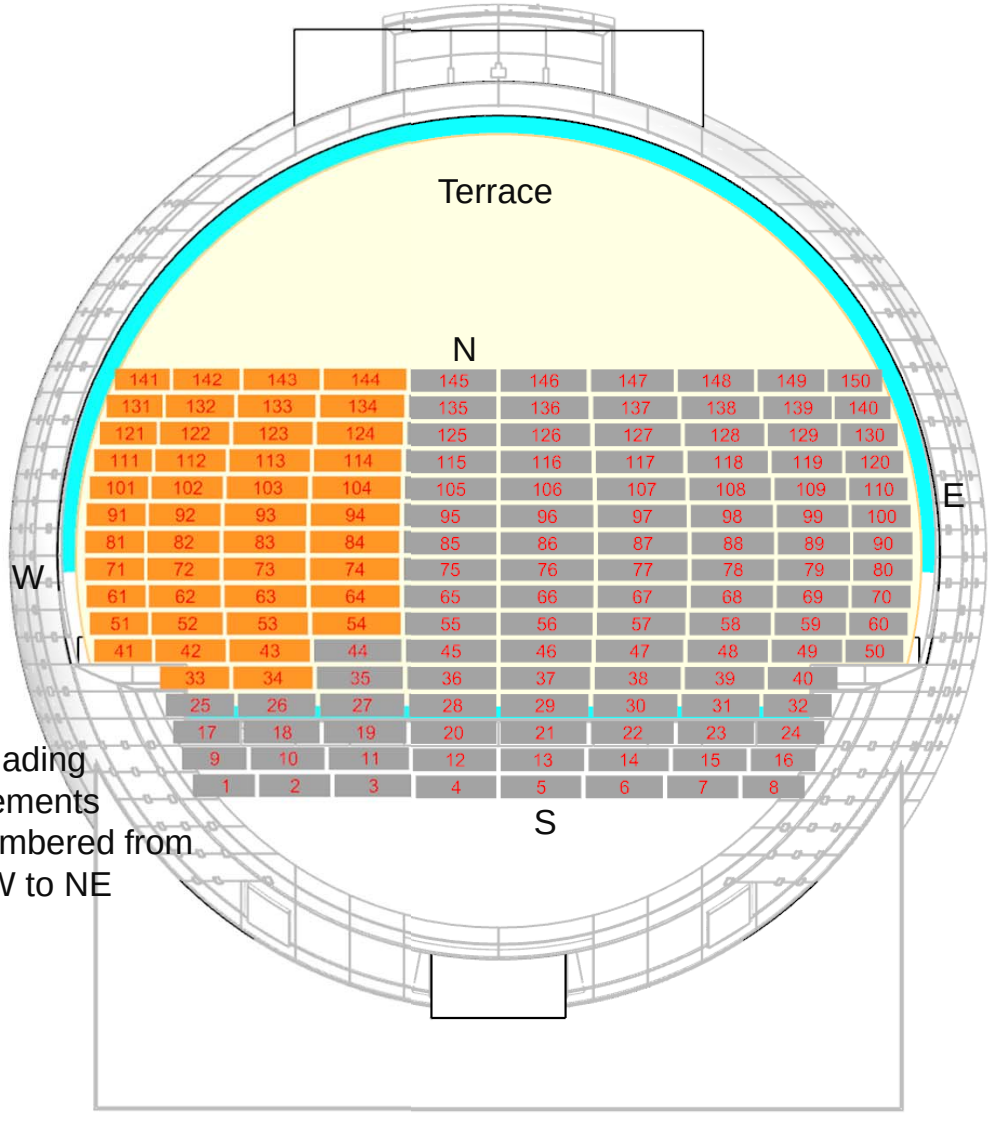
Not activated shading elements

21st June 5:00 p.m.

Low angle sun hits the terrace, no shading possible due to gap between screens and terrace



Shaded terrace area from active shading elements



Shading elements numbered from SW to NE

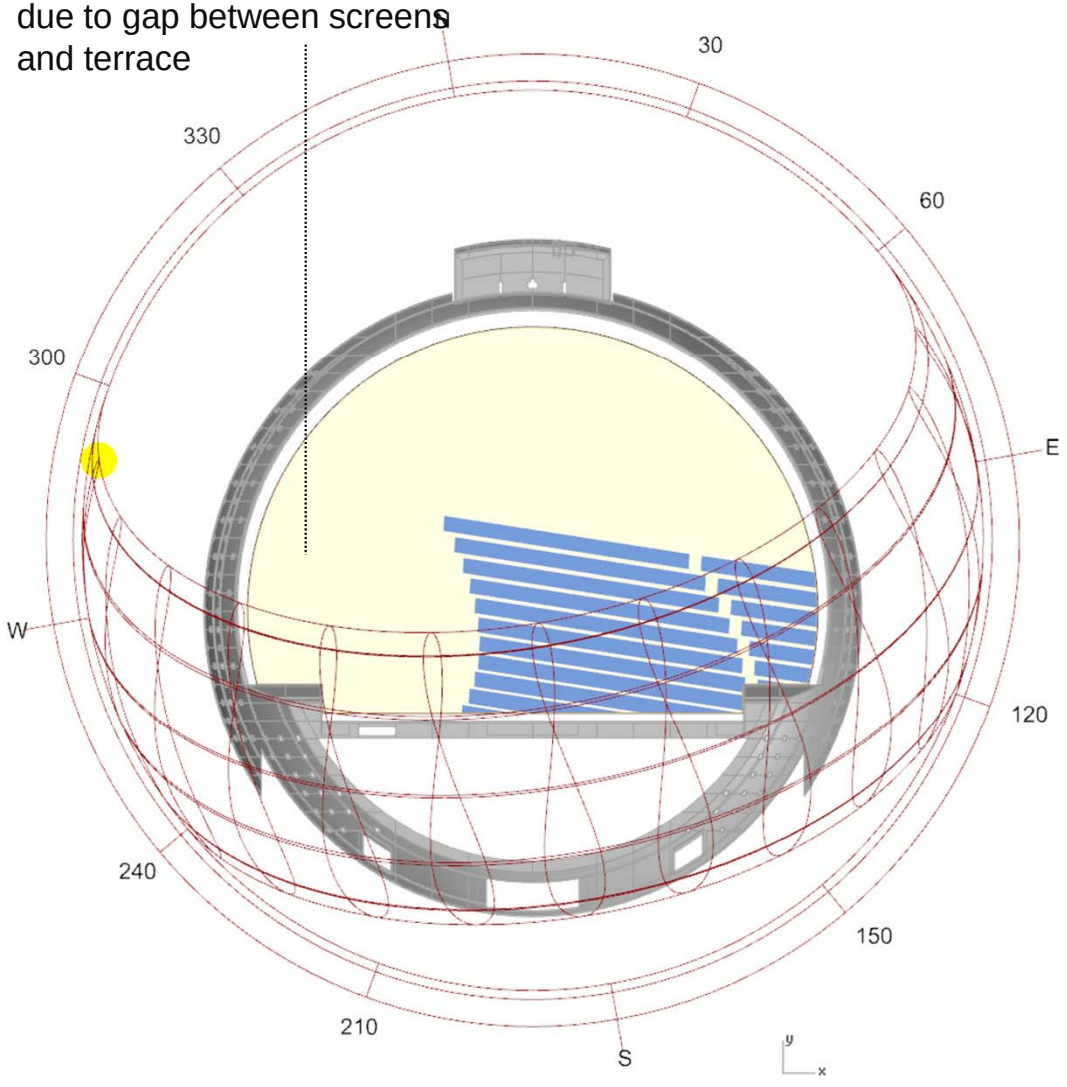
Pattern of activated shading elements

Activated shading elements

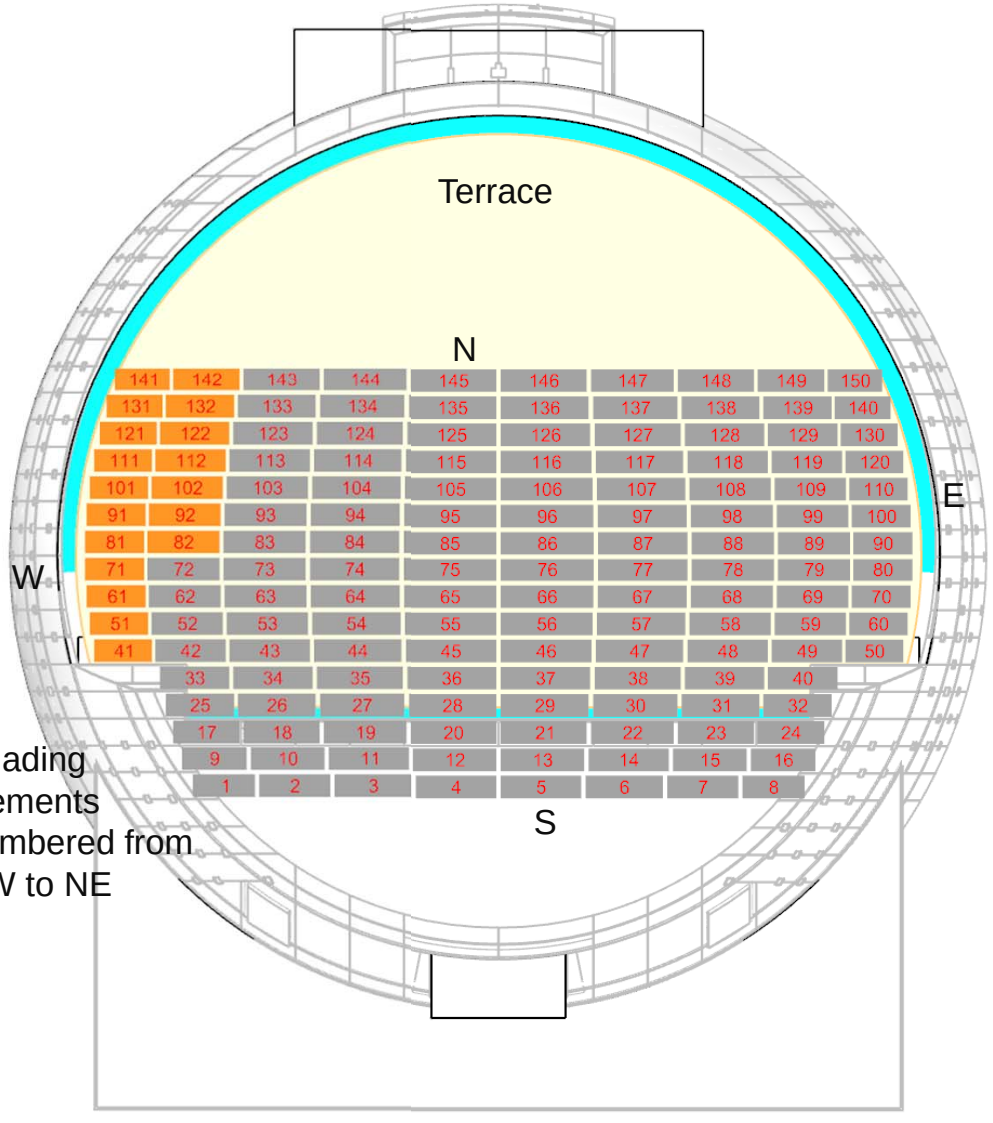
Not activated shading elements

21st June 6:00 p.m.

Low angle sun hits the terrace, no shading possible due to gap between screens and terrace



Shaded terrace area from active shading elements



Shading elements numbered from SW to NE

Pattern of activated shading elements

Activated shading elements

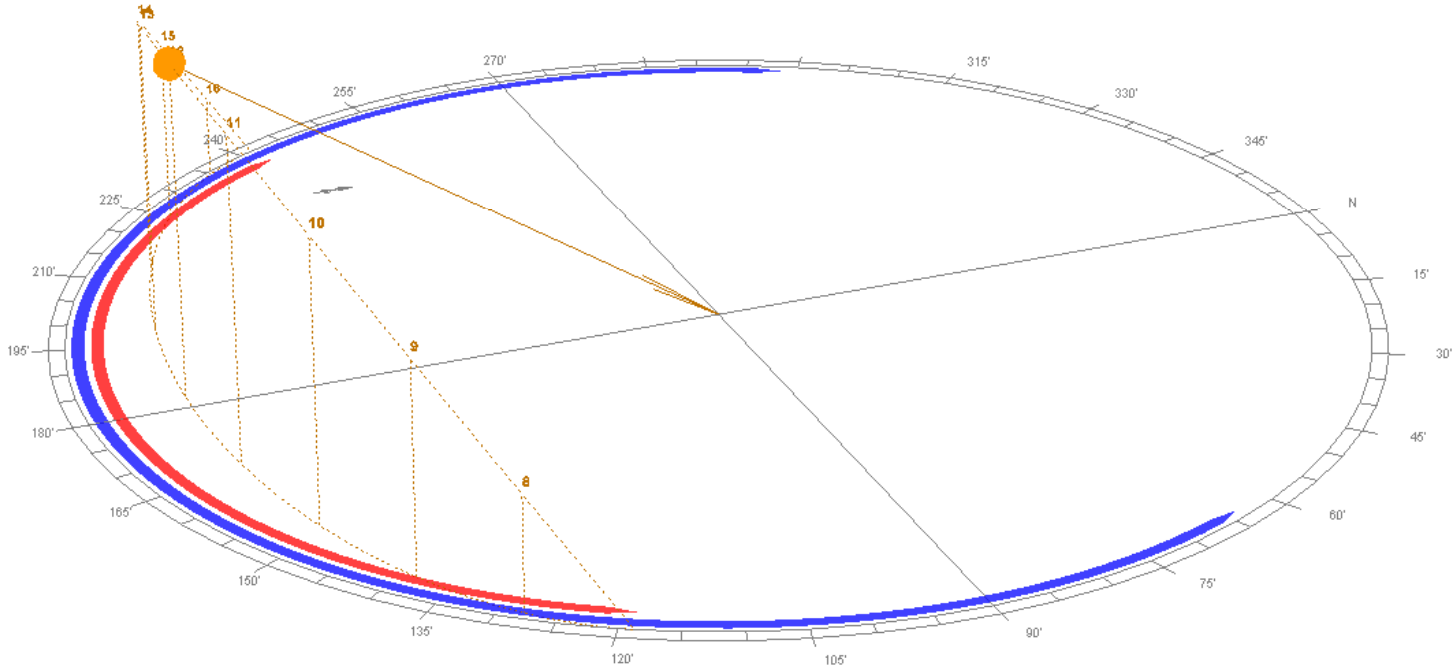
Not activated shading elements

21st June 7:00 p.m.

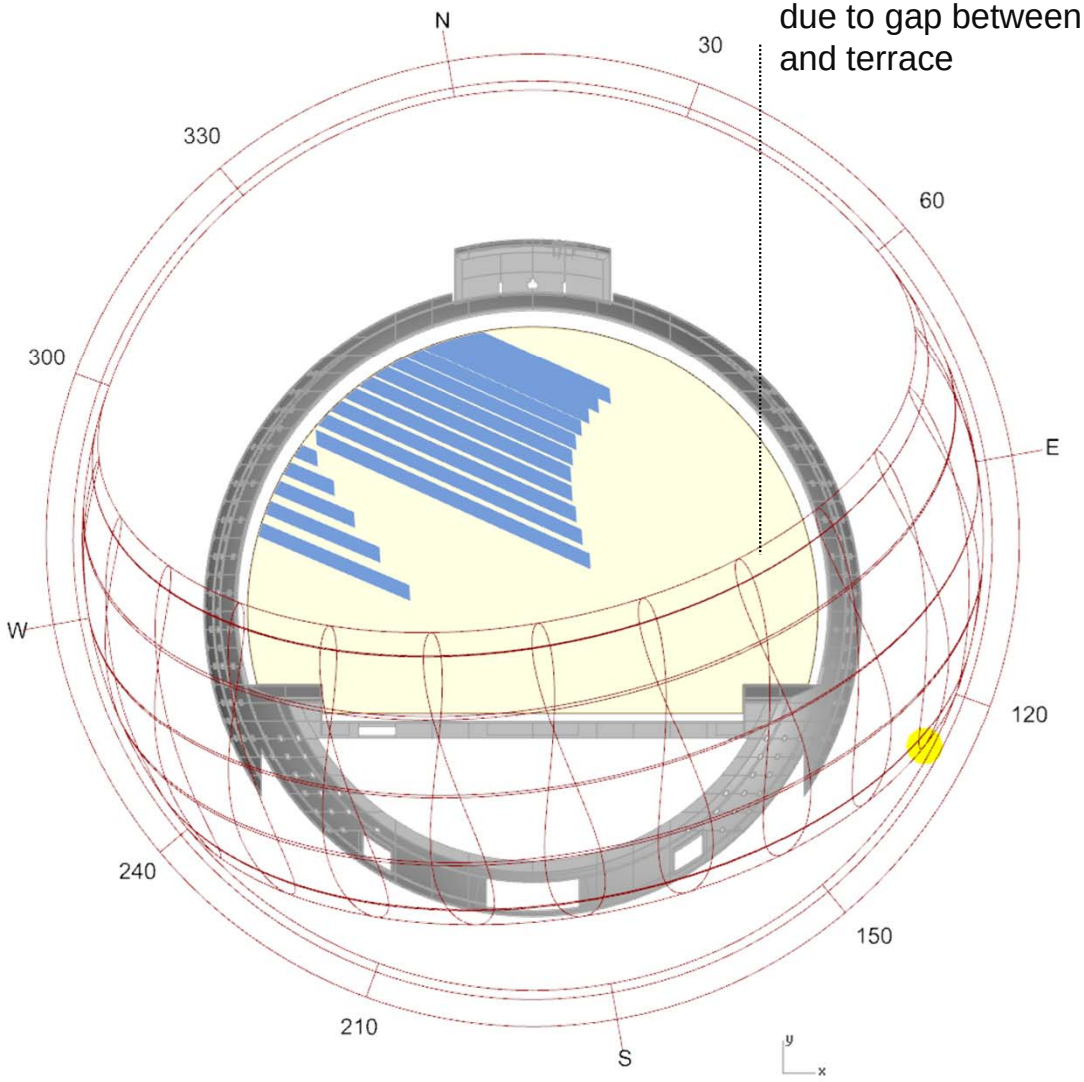
Winter solstice 21st of December

Lowest possible sun path of the year.

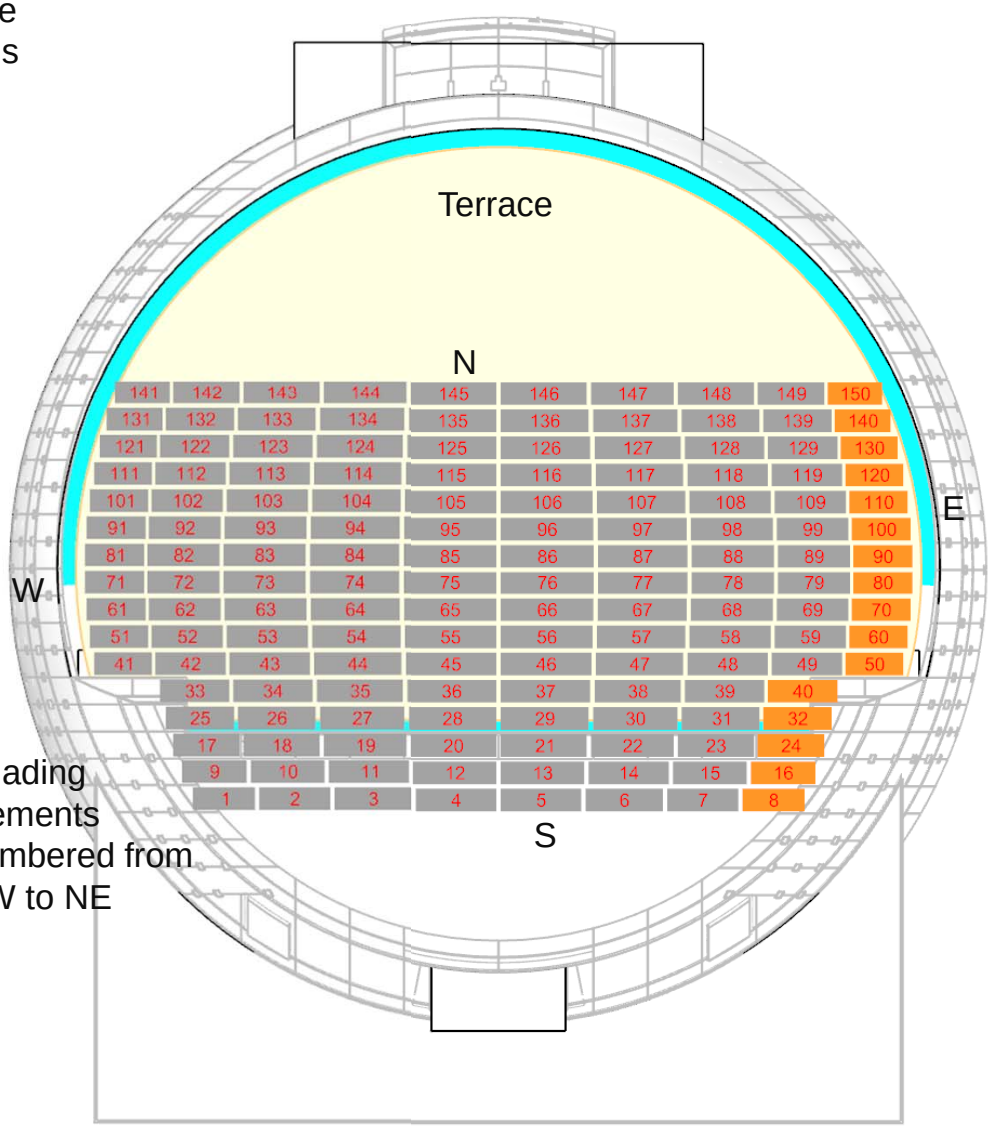
Sunrise 6:54
Sunset 16:47
Max. Sun altitude 32.6°



Low angle sun hits the terrace, no shading possible due to gap between screens and terrace



Shaded terrace area from active shading elements



Shading elements numbered from SW to NE

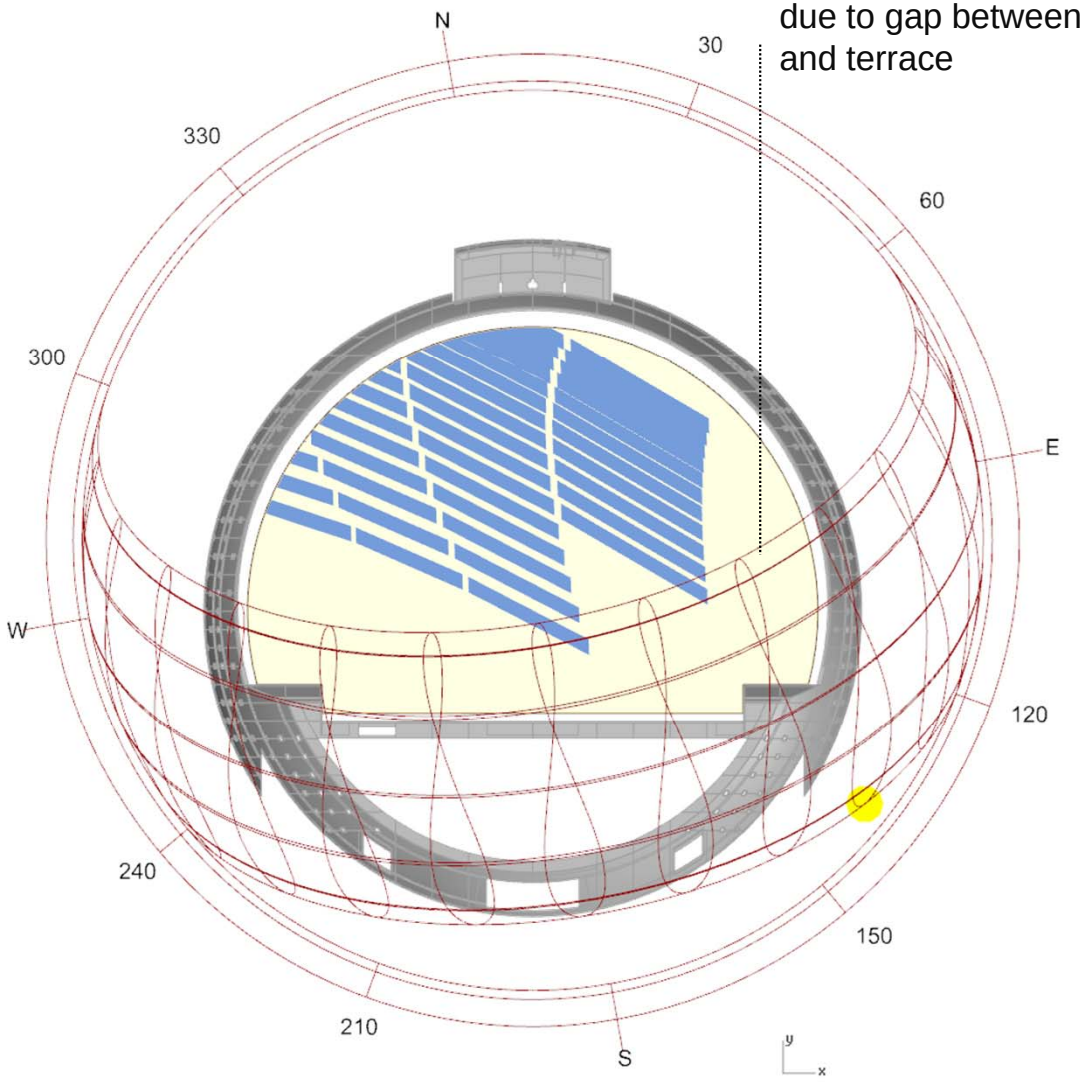
Pattern of activated shading elements

Activated shading elements

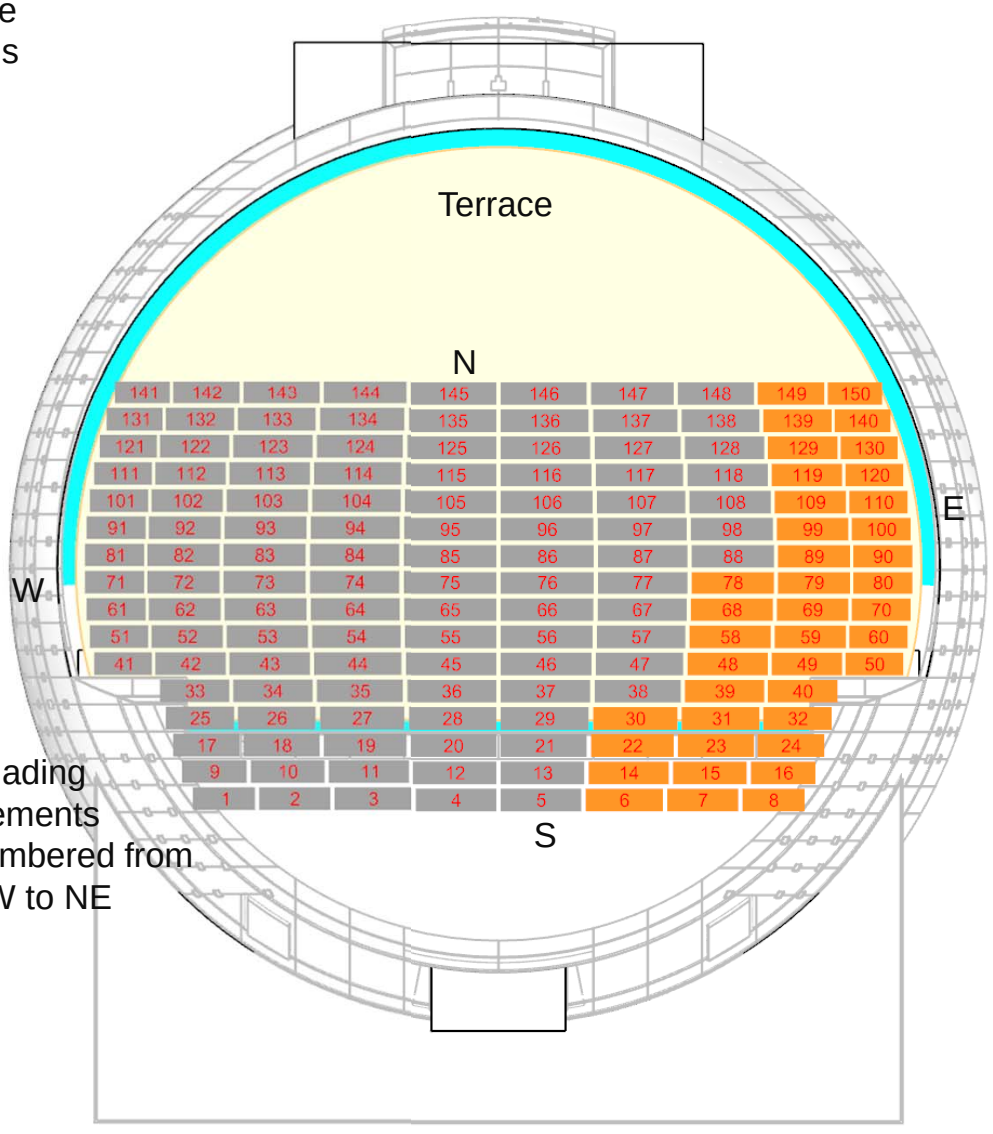
Not activated shading elements

21st December 9:00 a.m.

Low angle sun hits the terrace, no shading possible due to gap between screens and terrace



Shaded terrace area from active shading elements



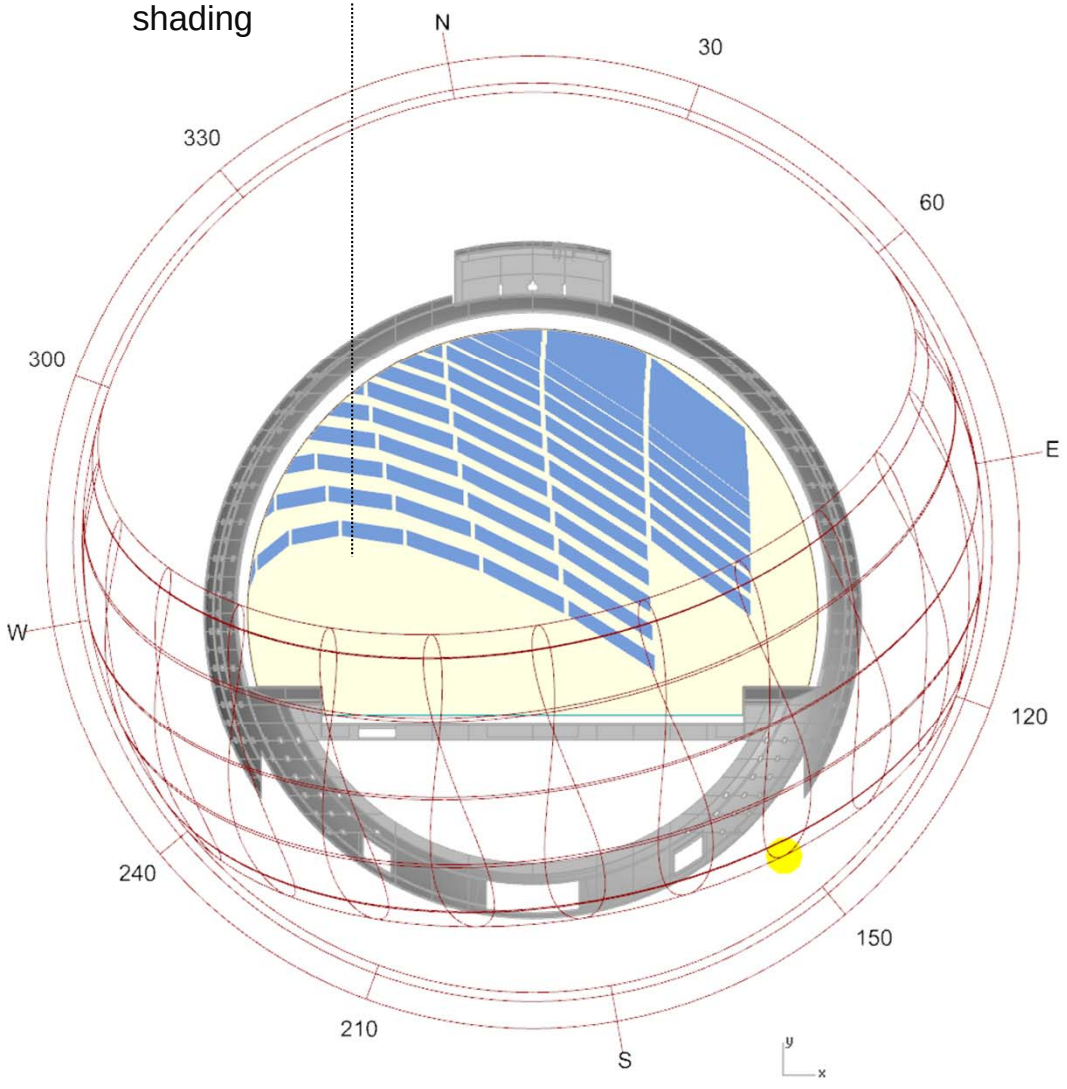
Shading elements numbered from SW to NE

Pattern of activated shading elements

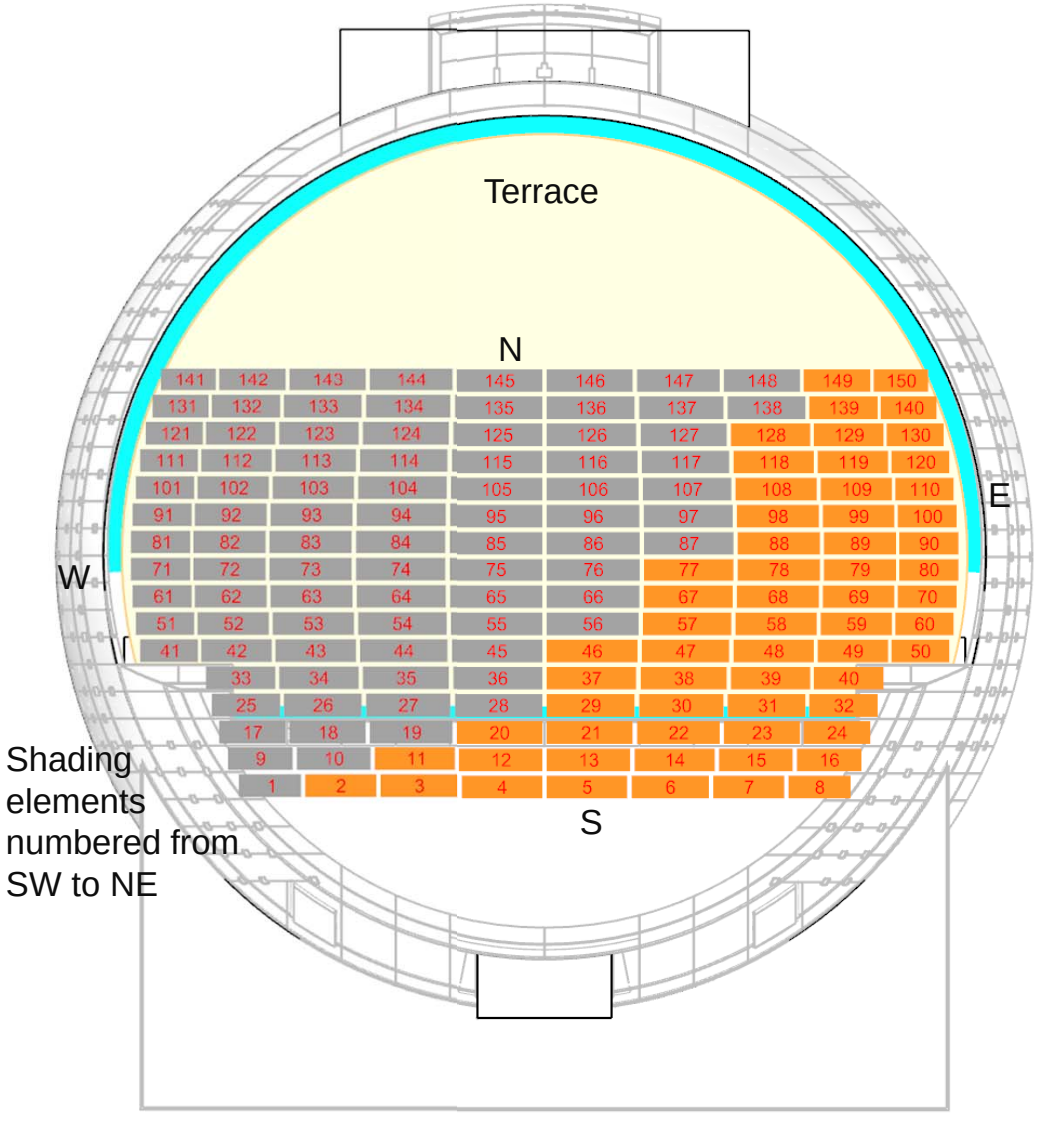
- Activated shading elements
- Not activated shading elements

21st December 10:00 a.m.

Low angle sun hits the terrace, due to no vertical shading



Shaded terrace area from active shading elements



Shading elements numbered from SW to NE

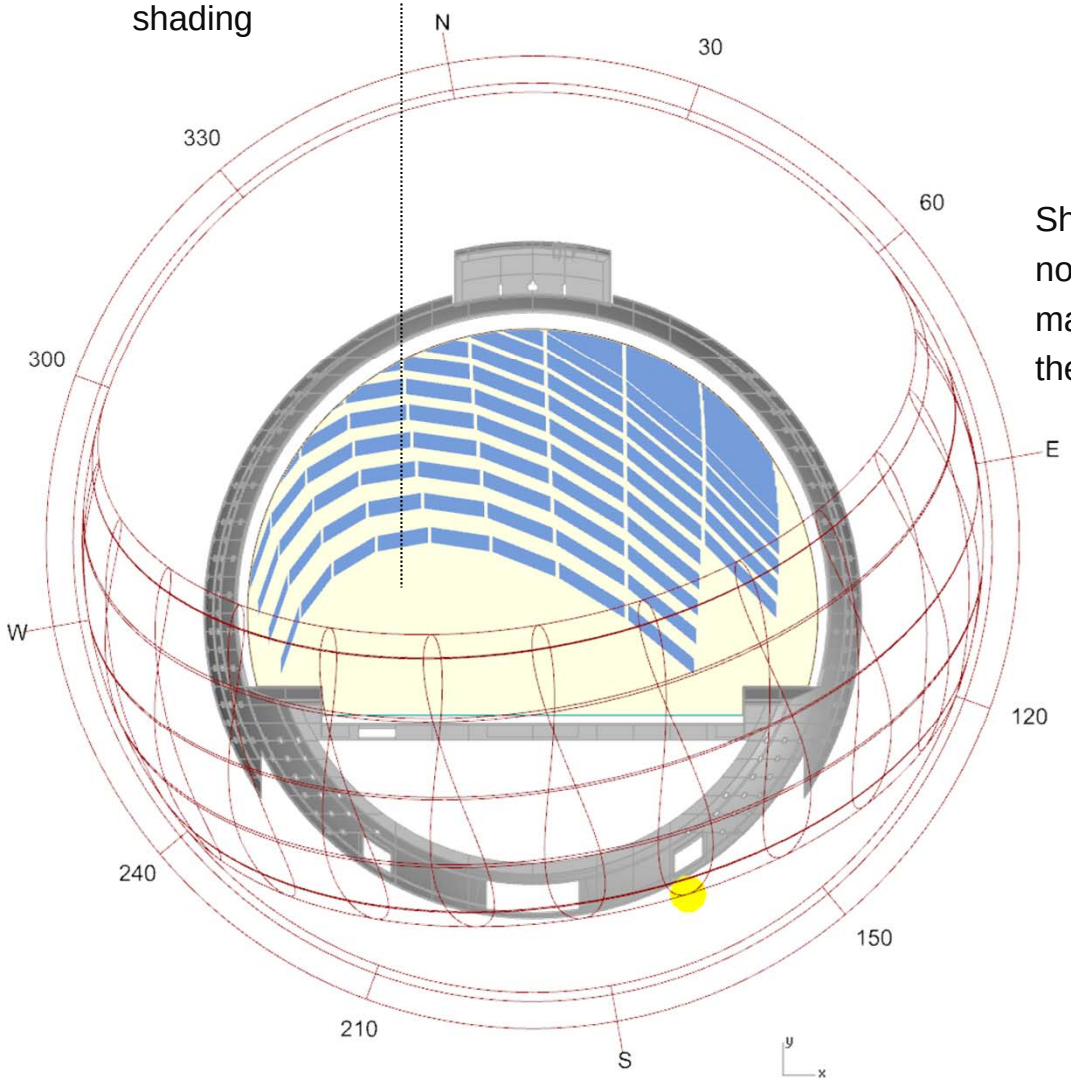
Pattern of activated shading elements

Activated shading elements

Not activated shading elements

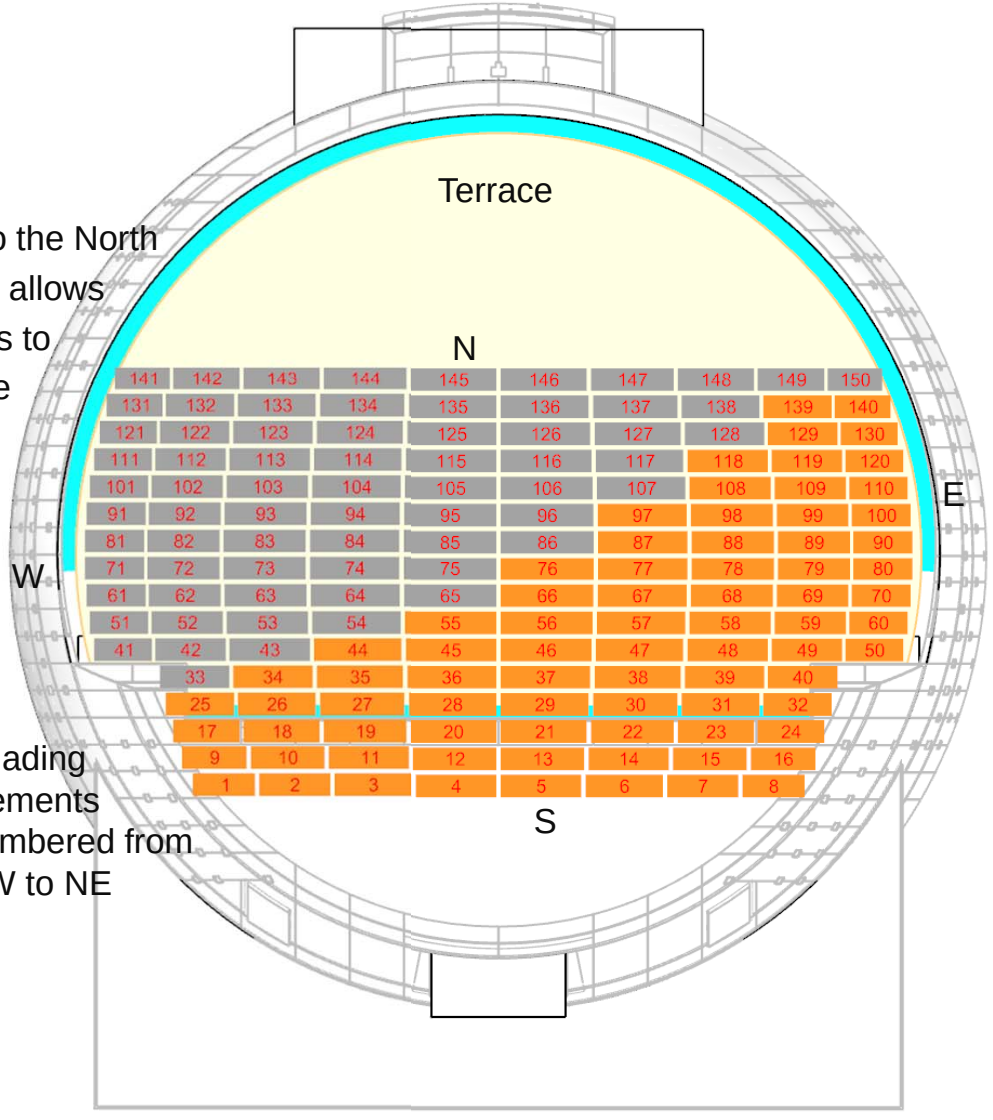
21st December 11:00 a.m.

Low angle sun hits the terrace, due to no vertical shading



Shaded terrace area from active shading elements

Shading to the North not active, allows max. views to the outside



Shading elements numbered from SW to NE

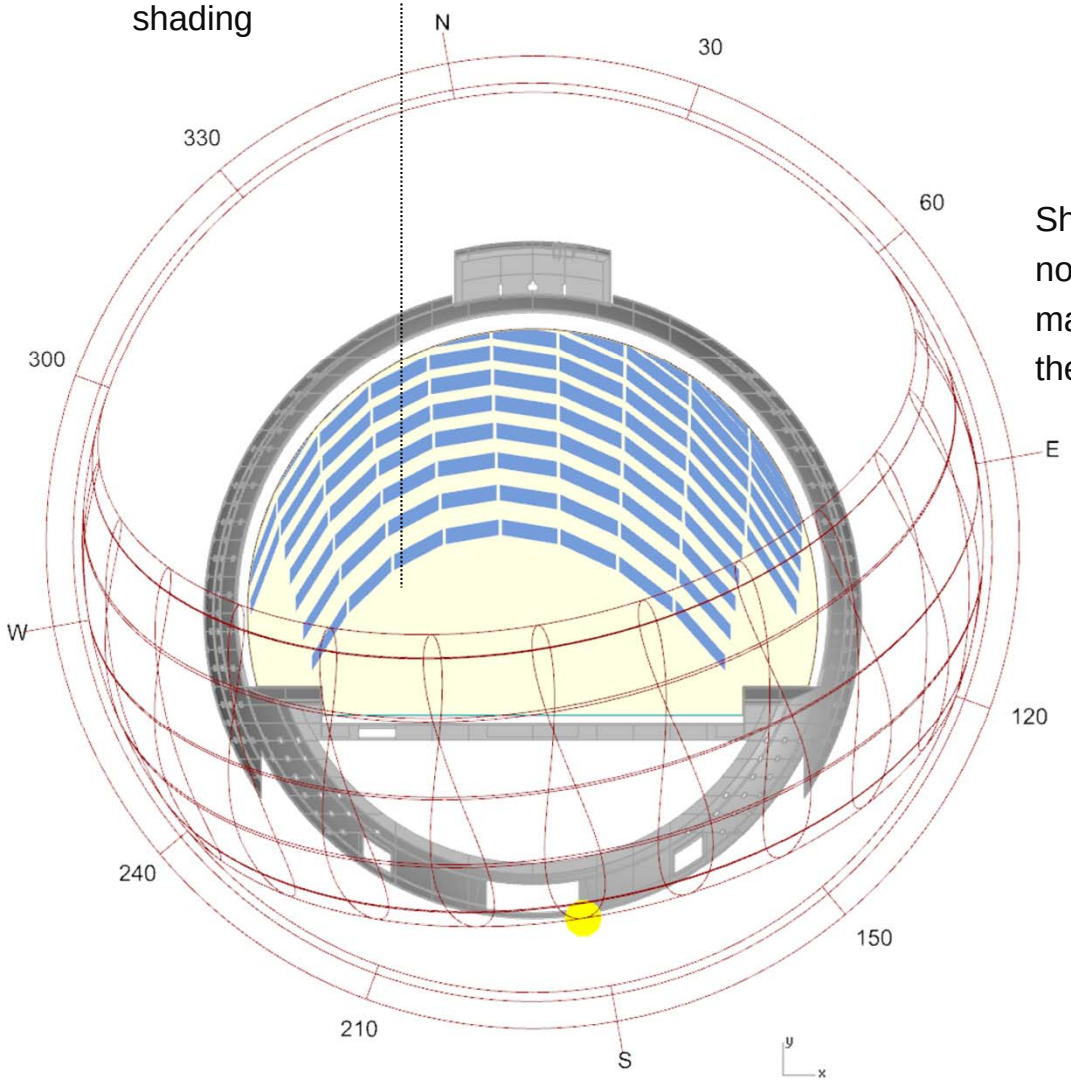
Pattern of activated shading elements

Activated shading elements

Not activated shading elements

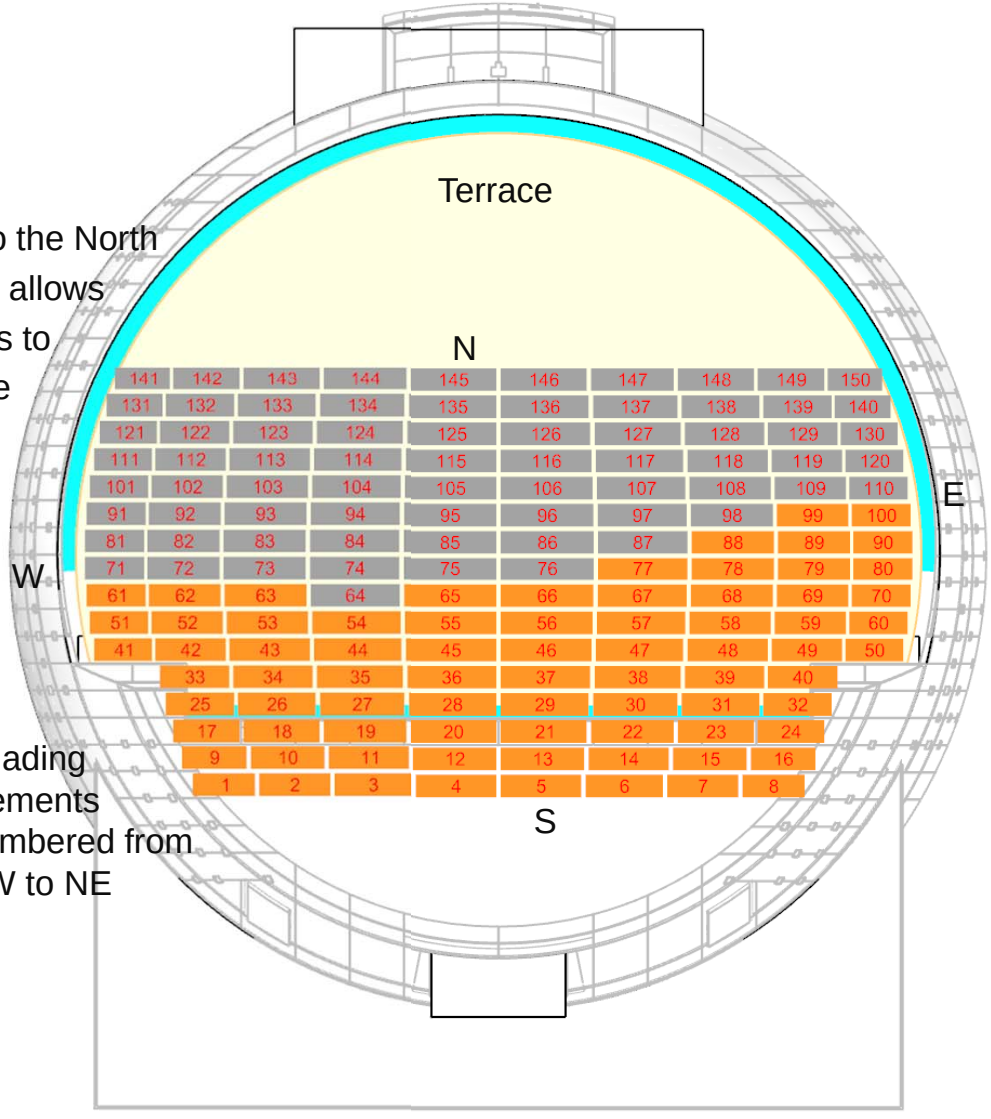
21st December 12:00 p.m.

Low angle sun hits the terrace, due to no vertical shading



Shaded terrace area from active shading elements

Shading to the North not active, allows max. views to the outside



Shading elements numbered from SW to NE

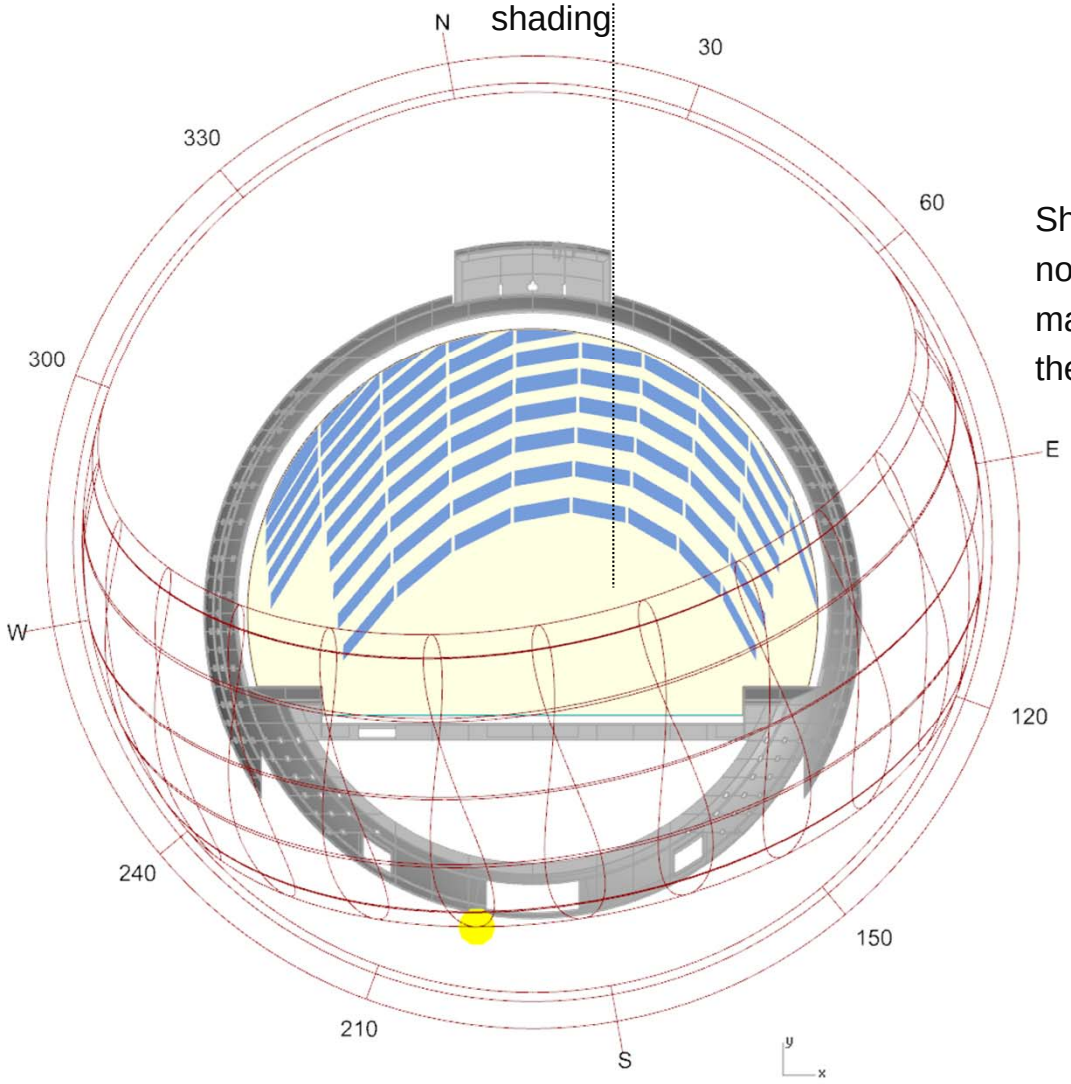
Pattern of activated shading elements

Activated shading elements

Not activated shading elements

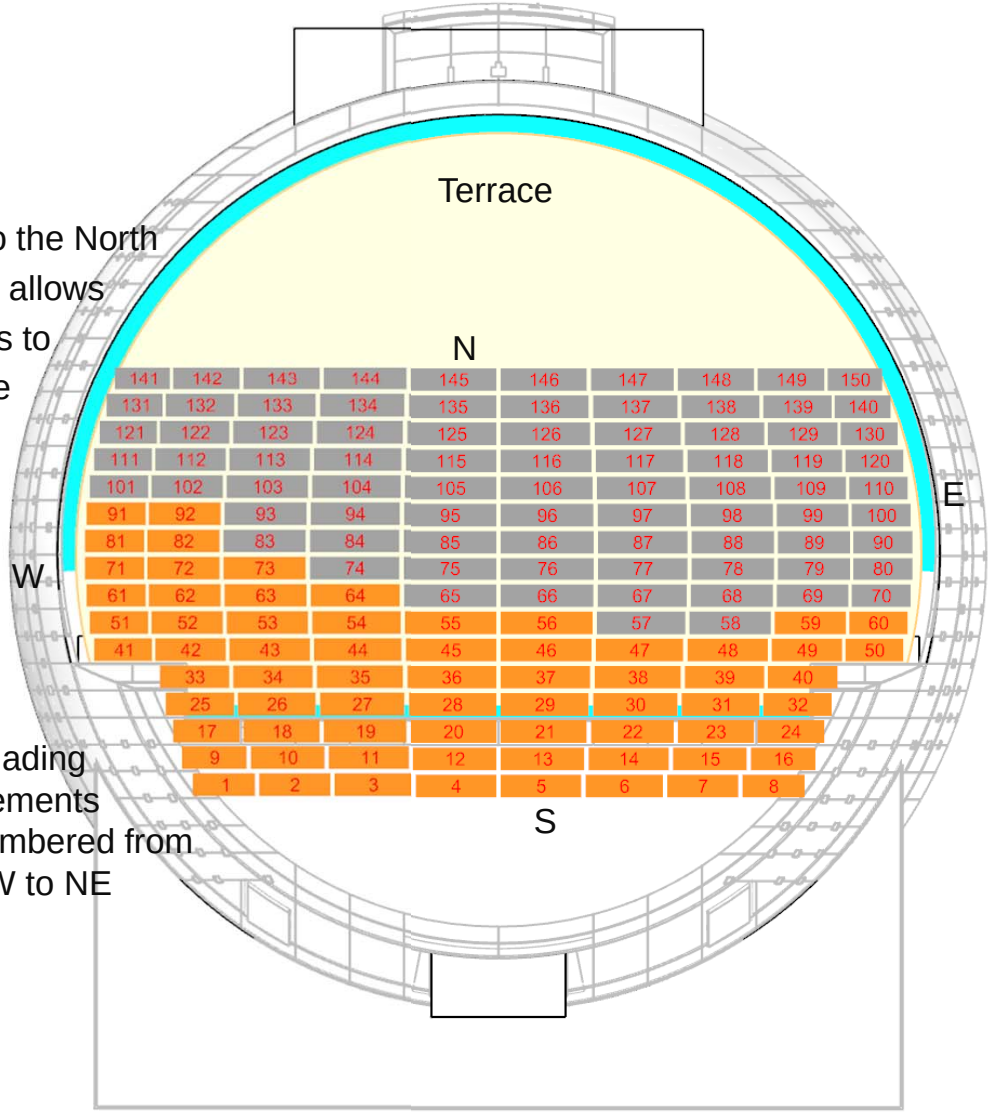
21st December 1:00 p.m.

Low angle sun hits the terrace, due to no vertical shading



Shaded terrace area from active shading elements

Shading to the North not active, allows max. views to the outside



Shading elements numbered from SW to NE

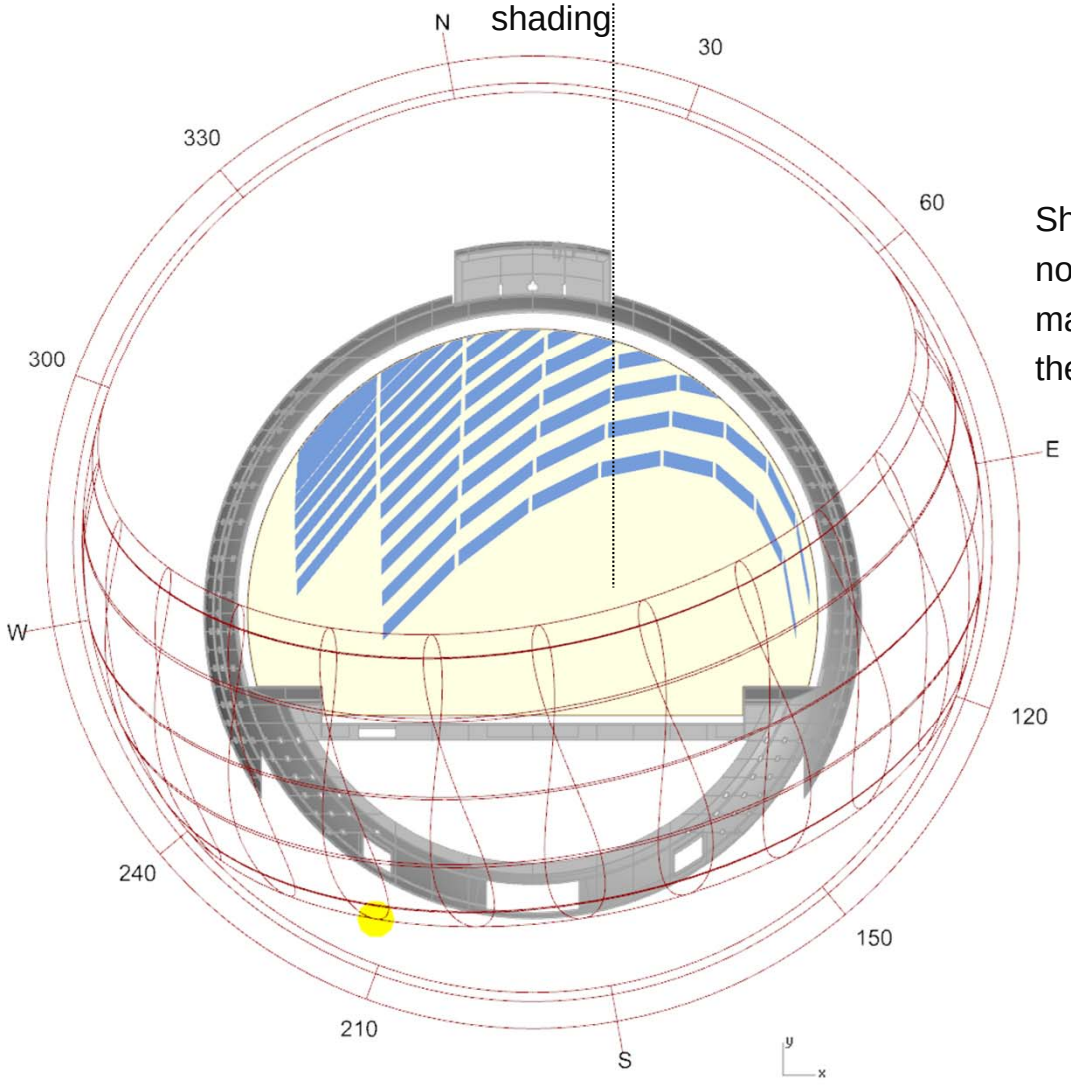
Pattern of activated shading elements

Activated shading elements

Not activated shading elements

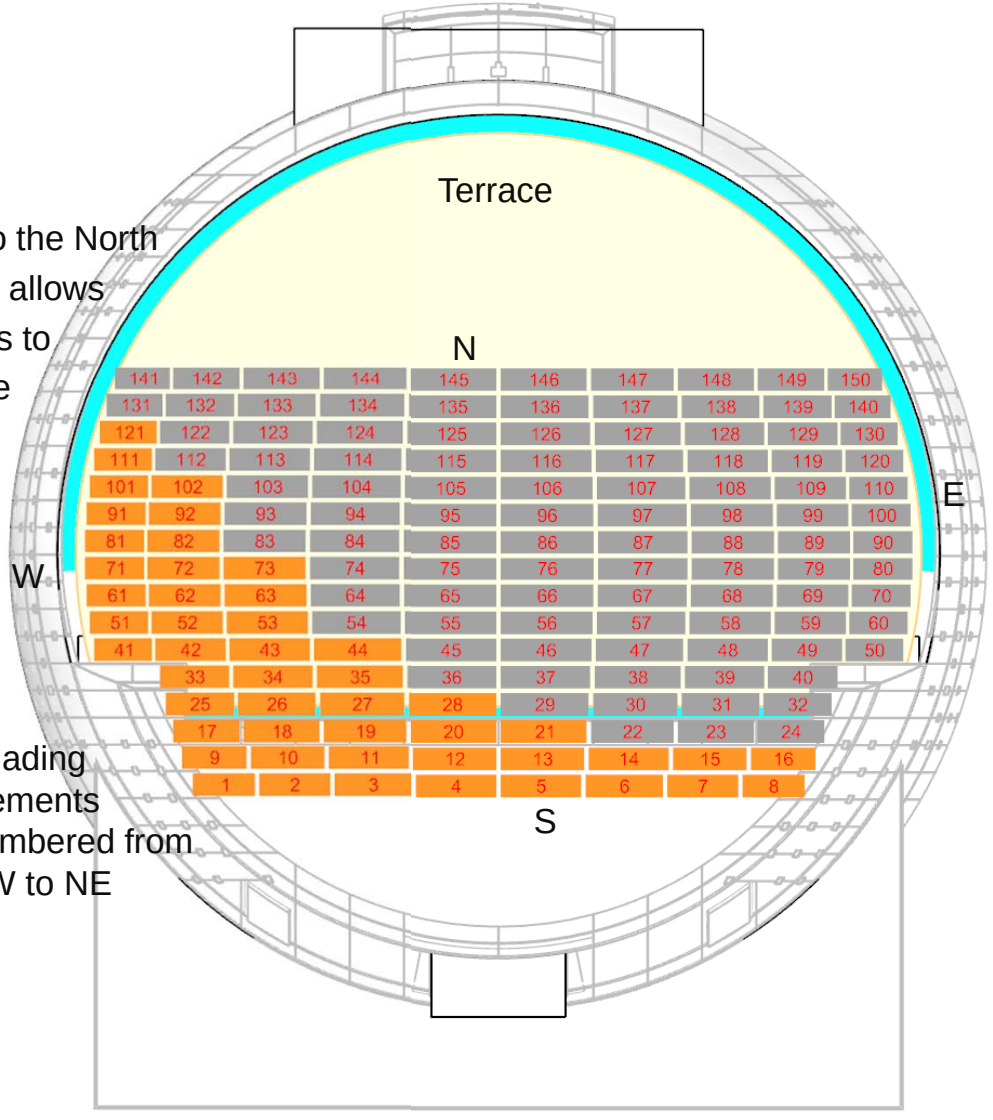
21st December 2:00 p.m.

Low angle sun hits the terrace, due to no vertical shading



Shaded terrace area from active shading elements

Shading to the North not active, allows max. views to the outside



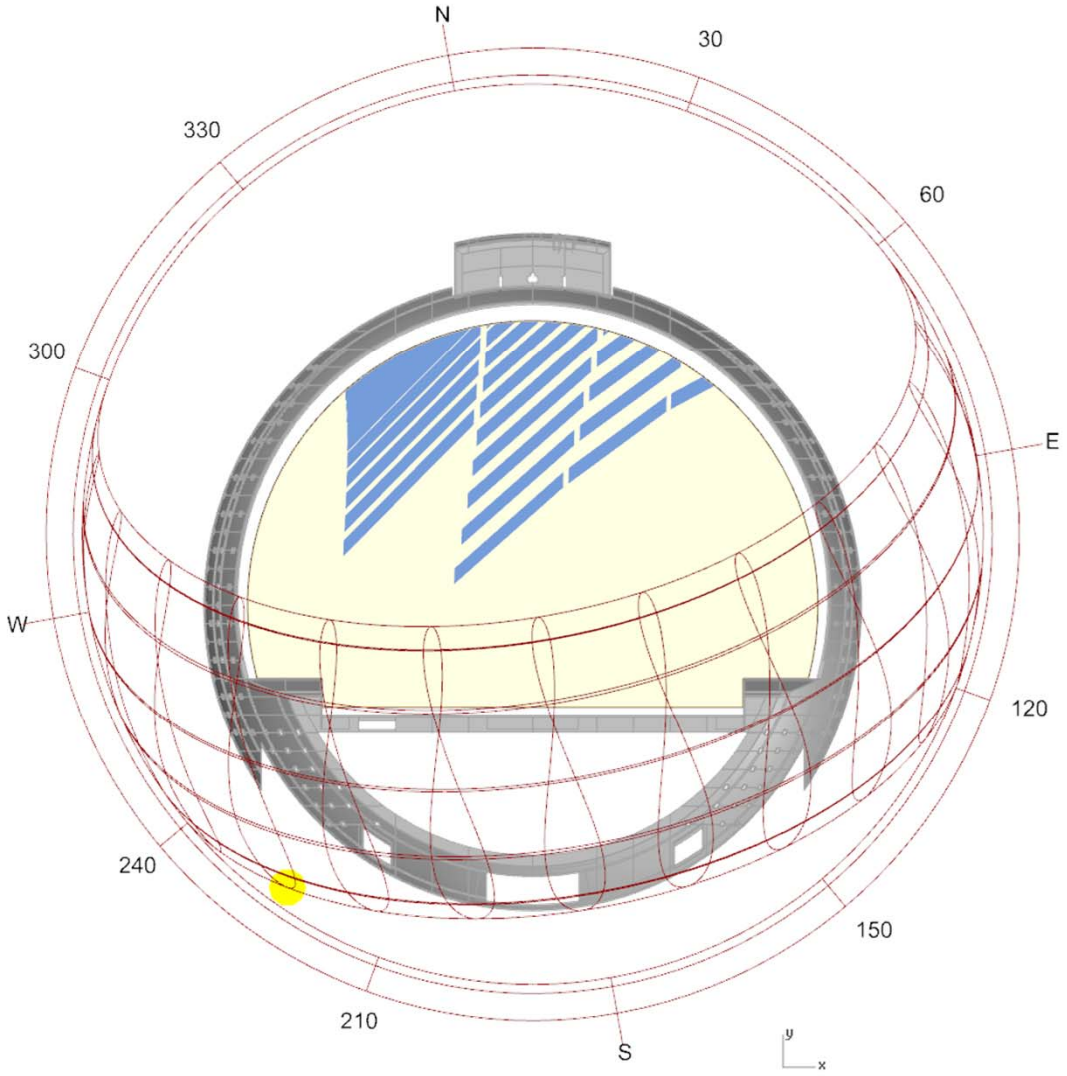
Shading elements numbered from SW to NE

Pattern of activated shading elements

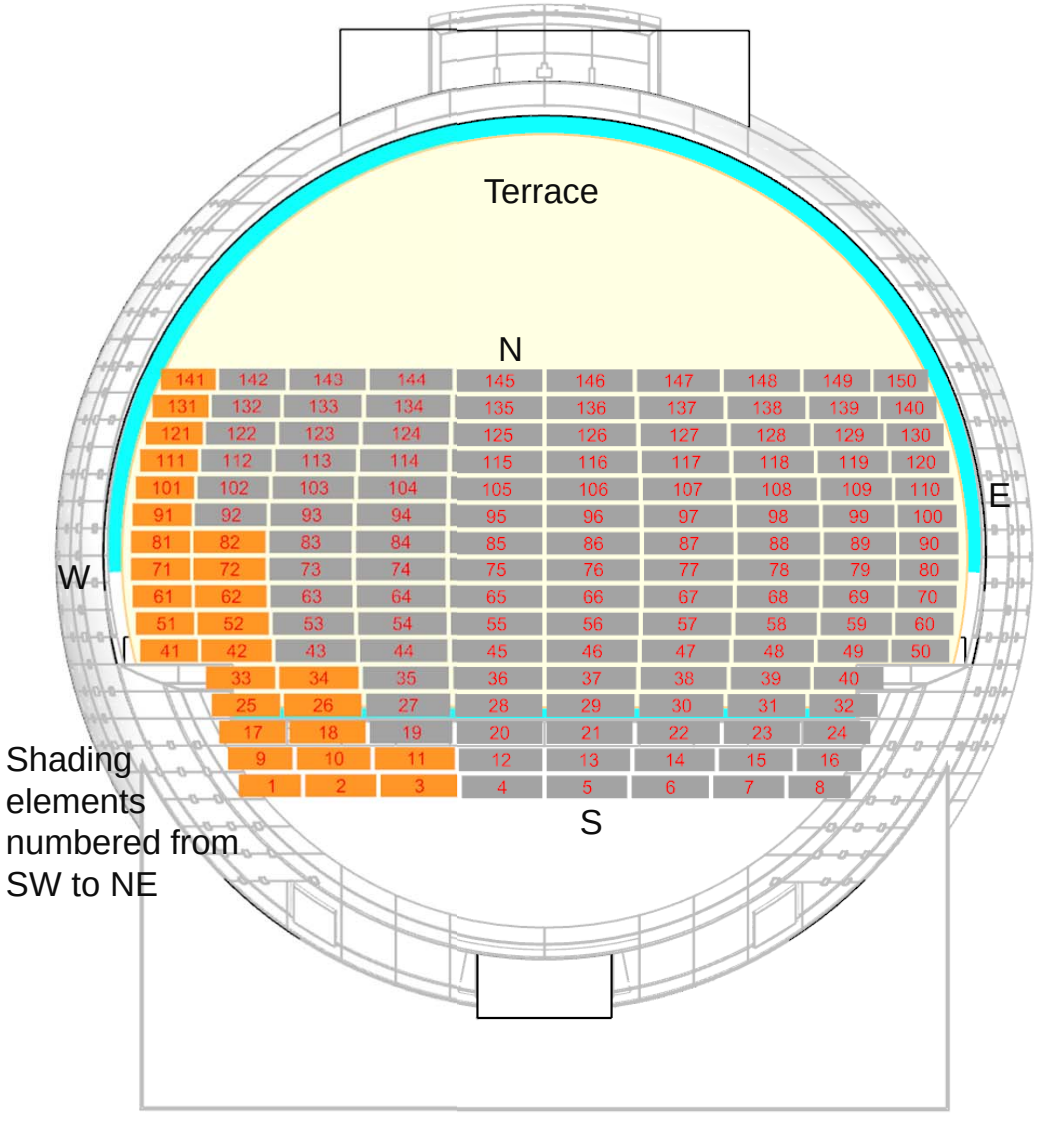
Activated shading elements

Not activated shading elements

21st December 3:00 p.m.



Shaded terrace area from active shading elements



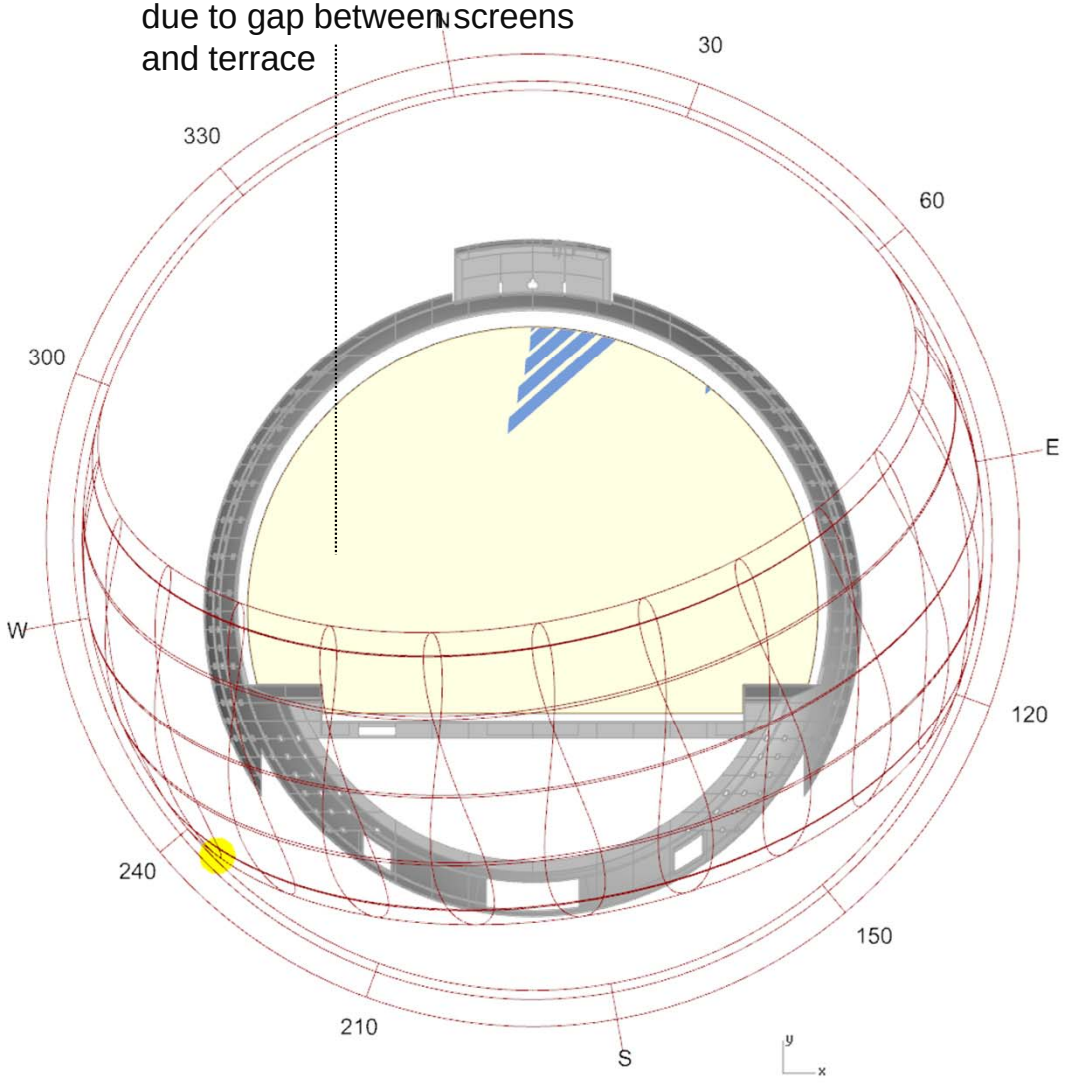
Pattern of activated shading elements

Activated shading elements

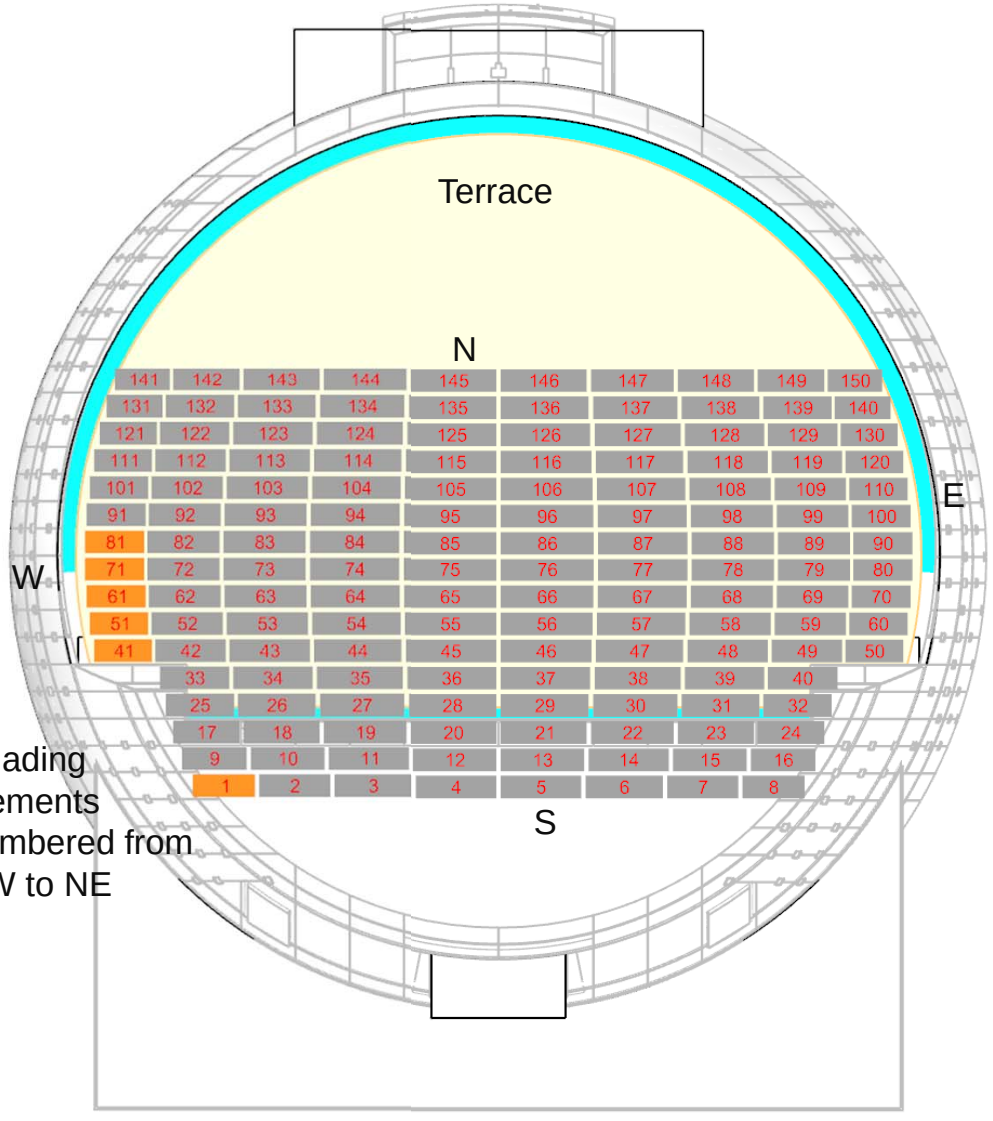
Not activated shading elements

21st December 4:00 p.m.

Low angle sun hits the terrace, no shading possible due to gap between screens and terrace



Shaded terrace area from active shading elements



Shading elements numbered from SW to NE

Pattern of activated shading elements

Activated shading elements

Not activated shading elements

21st December 5:00 p.m.

Conclusion

Transsolar investigated the shading effect of the proposed screen layout for 3 design days. The analysis shows, that a good shading effect can be reached with not having all shading elements active all the time.

The diagrams also shows, that the shading layout allows good shading against high angle sun in summer and has a lower shading effect against low angle sun in winter. Due to low solar radiation and low temperatures in winter, this is acceptable.

The proposed shading control strategy will allow to minimize the amount of activated shading elements with the maximum possible shading effect of the available screens.