



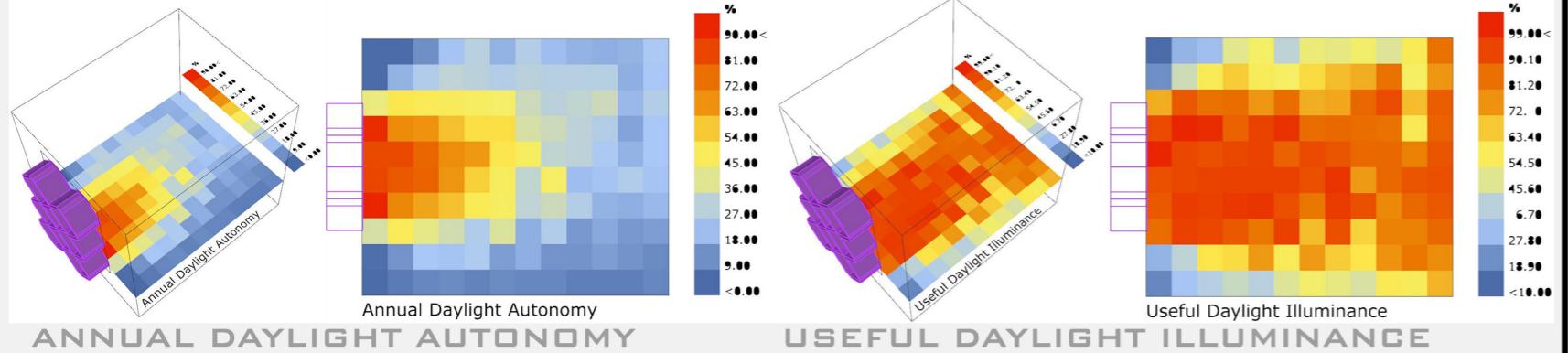
# SHADING SYSTEM REDESIGN

## OKLAHOMA CITY, OKLAHOMA

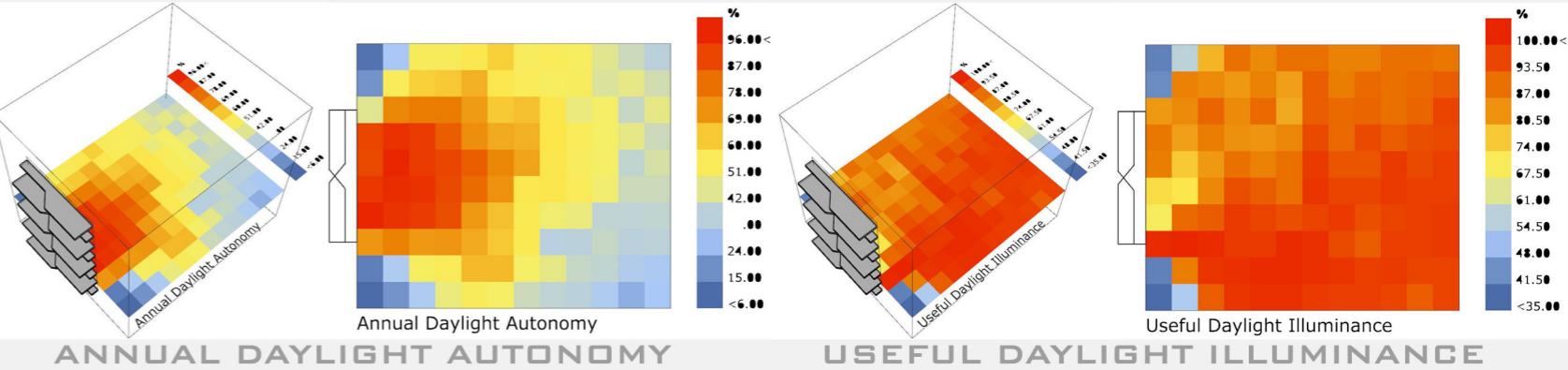
JUAN D. GUARIN

**SHADING SYSTEMS**  
**ANNUAL DAYLIGHT AUTONOMY**  
**USEFUL DAYLIGHT ILLUMINANCE**

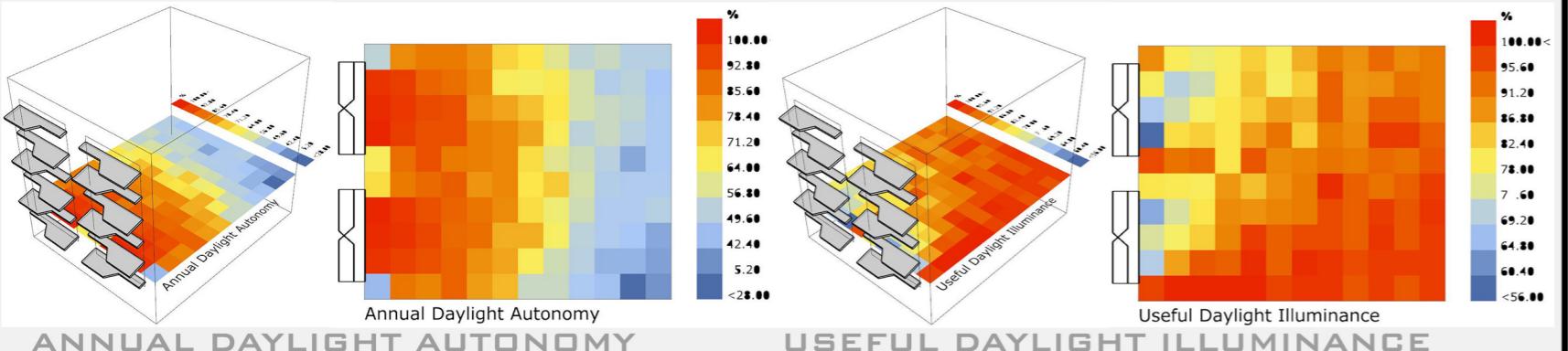
**ORIGINAL SHADING SYSTEM**  
**SPATIAL DAYLIGHT AUTONOMY: 16.67%**



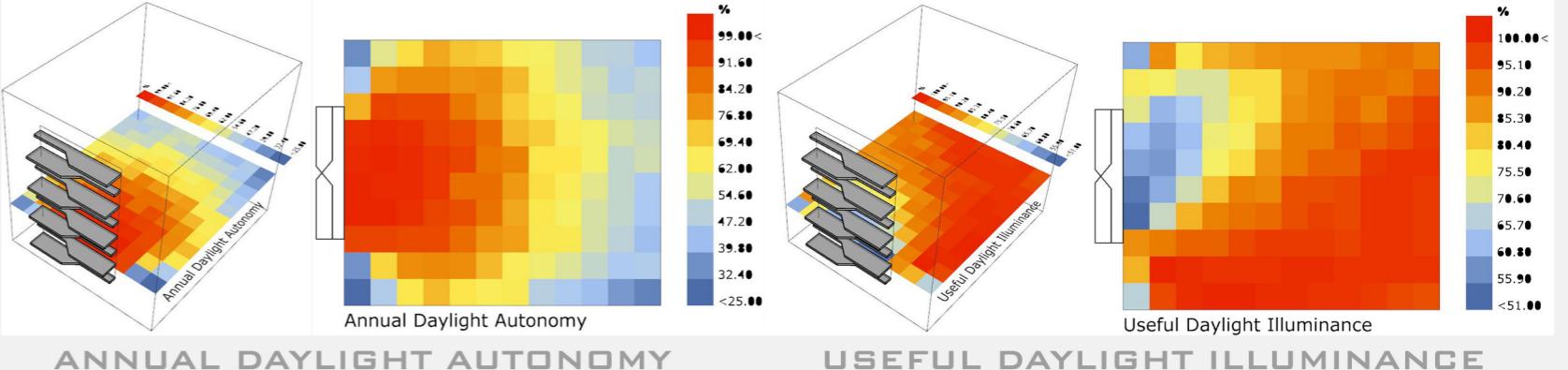
**REDESIGNED SHADING #1**  
**SPATIAL DAYLIGHT AUTONOMY: 51.67%**



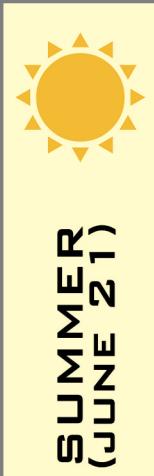
**REDESIGNED SHADING #2**  
**SPATIAL DAYLIGHT AUTONOMY: 76.67%**



**REDESIGNED SHADING WITH NEW MATERIAL**  
**SPATIAL DAYLIGHT AUTONOMY: 81.67%**

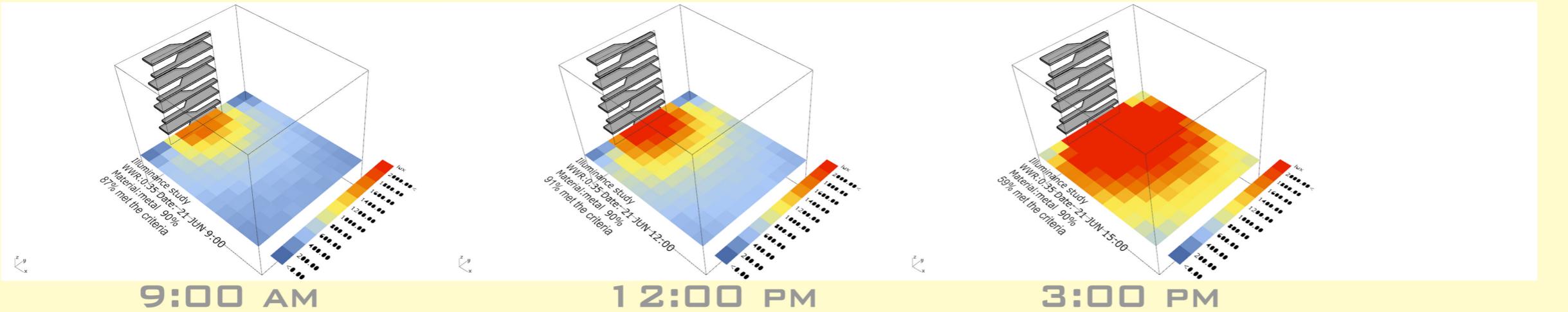


# **DAYLIGHTING ANALYSIS SHADING SYSTEM #1**

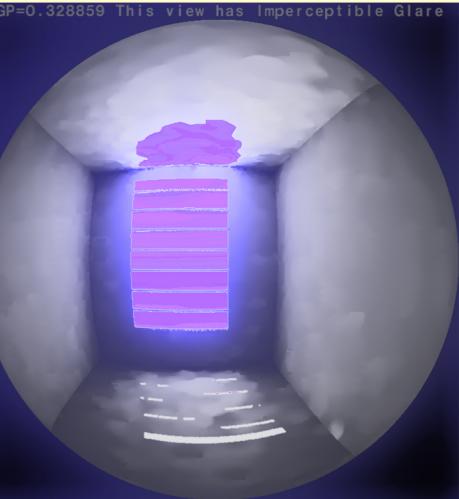


SUMMER  
(JUNE 21)

## REDESIGNED SHADING WITH 90 % REFLECTIVE METAL - SUMMER

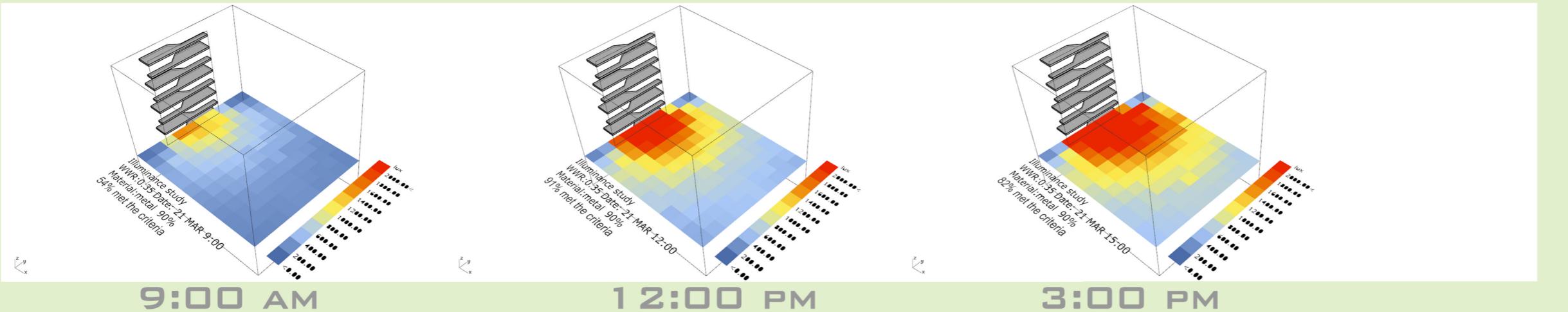


## GLARE ANALYSIS

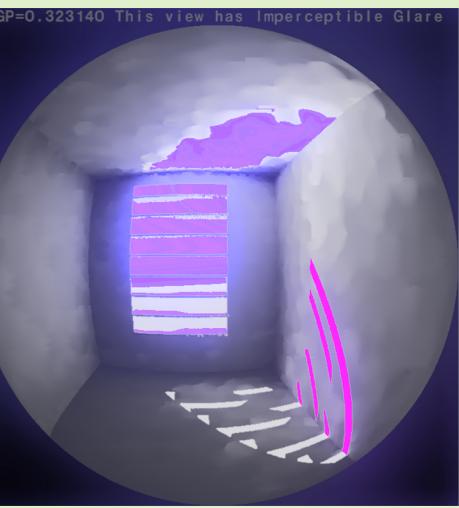


SPRING  
(MARCH 21)

## REDESIGNED SHADING WITH 90 % REFLECTIVE METAL - SPRING

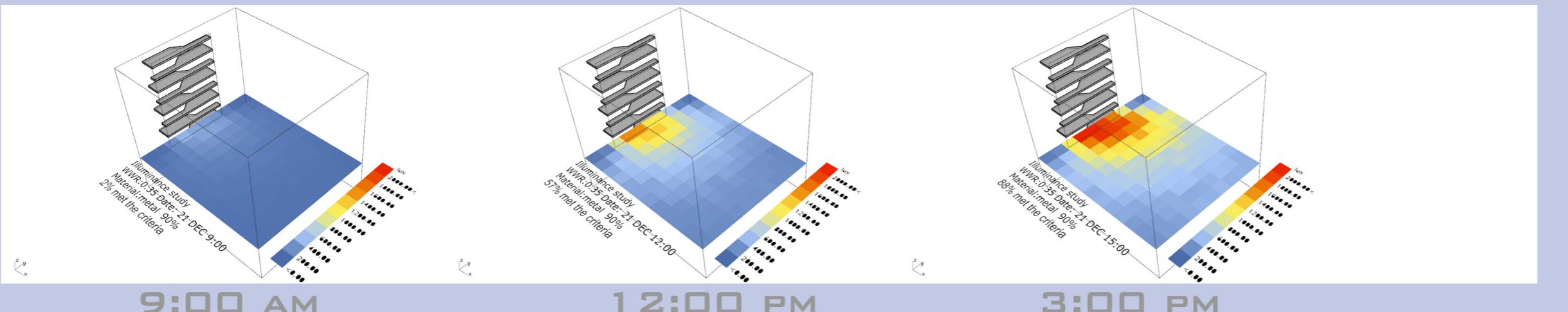


## GLARE ANALYSIS

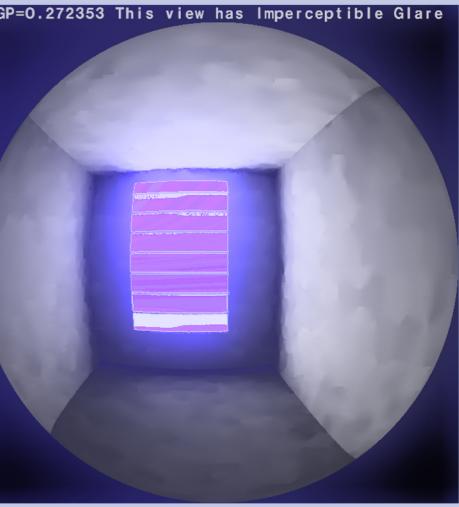


WINTER  
(DECEMBER 21)

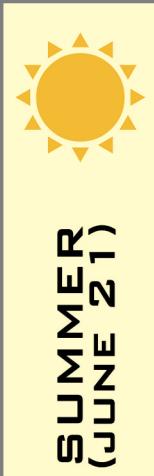
## REDESIGNED SHADING WITH 90 % REFLECTIVE METAL - WINTER



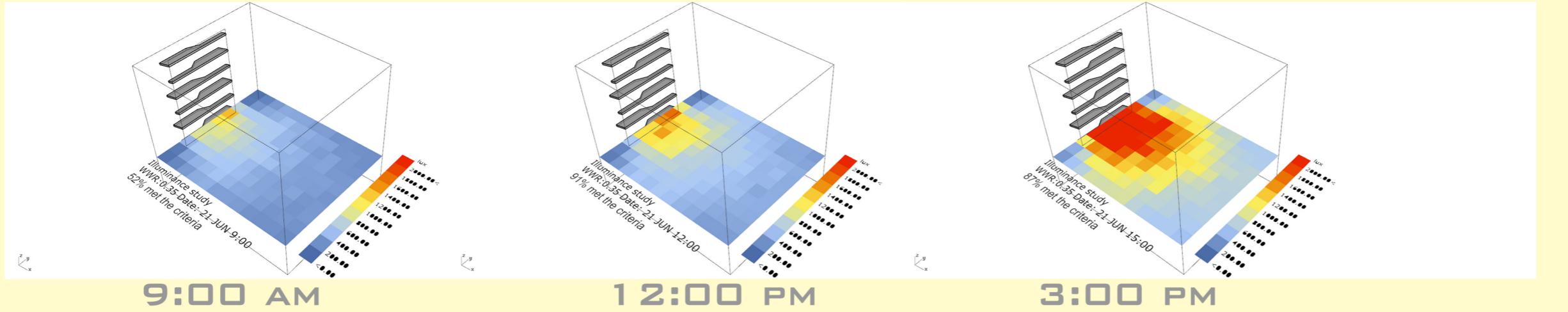
## GLARE ANALYSIS



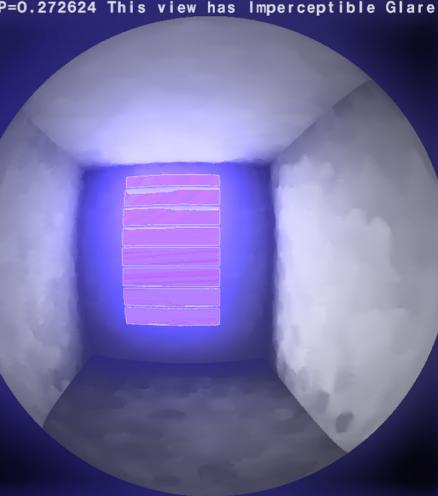
# **DAYLIGHTING ANALYSIS SHADING SYSTEM #2**



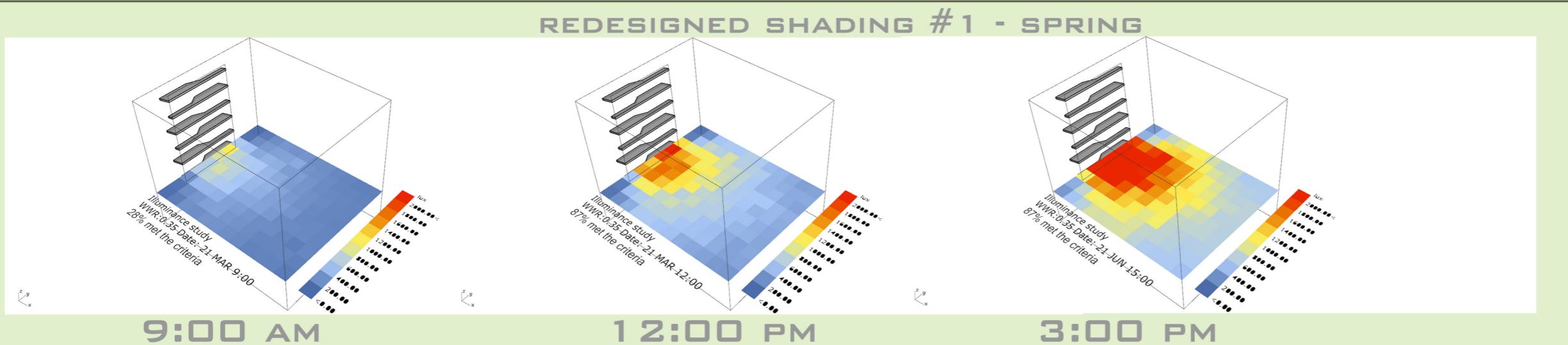
SUMMER  
(JUNE 21)



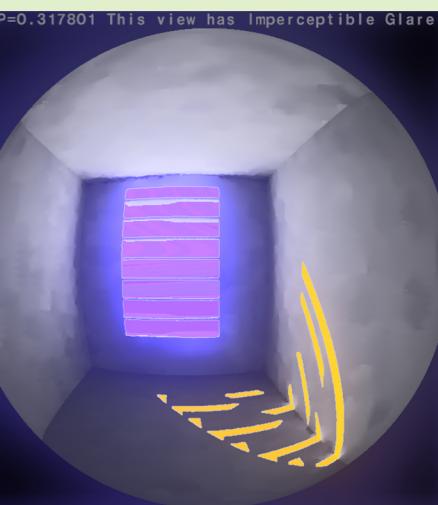
## GLARE ANALYSIS



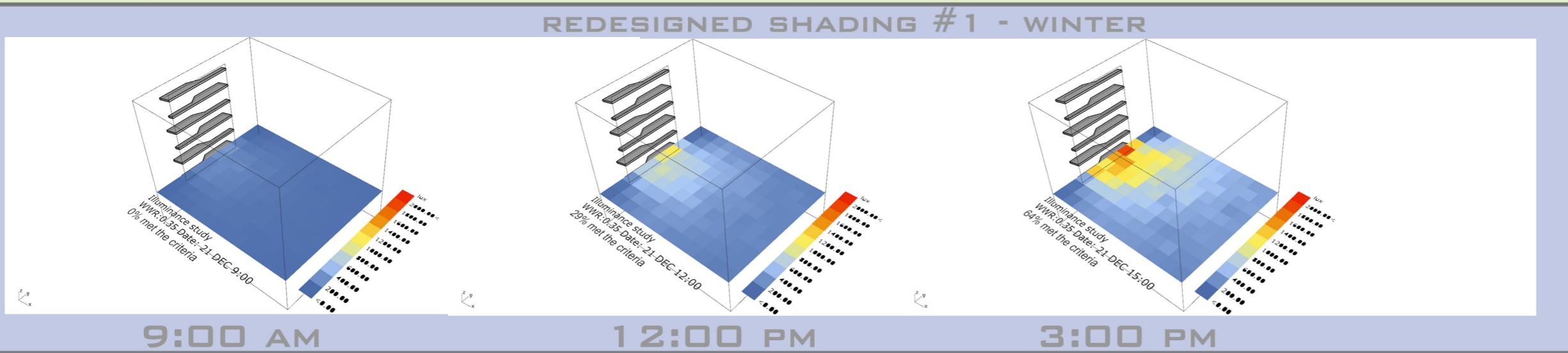
SPRING  
(MARCH 21)



## GLARE ANALYSIS



WINTER  
(DECEMBER 21)



## GLARE ANALYSIS

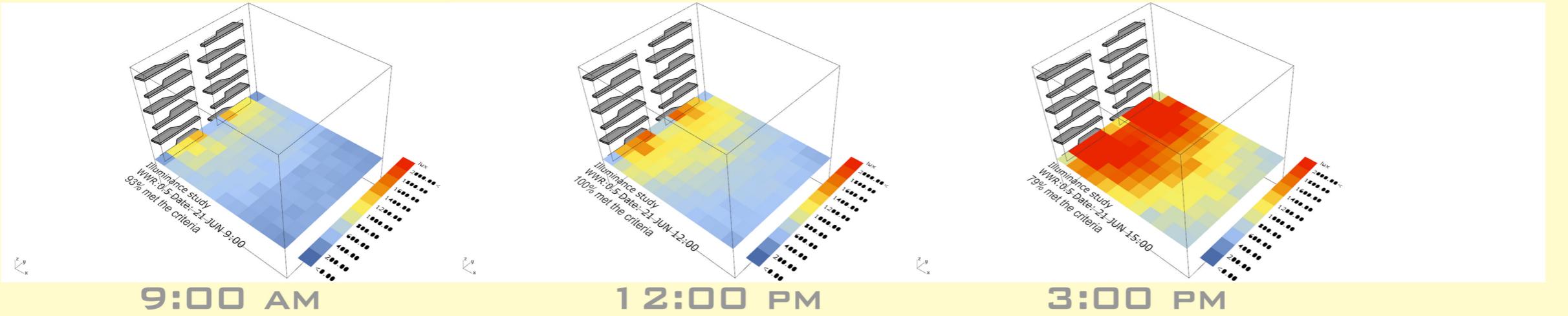


**DAYLIGHTING ANALYSIS  
SHADING SYSTEM #1  
WITH 90% REFLECTIVE METAL**

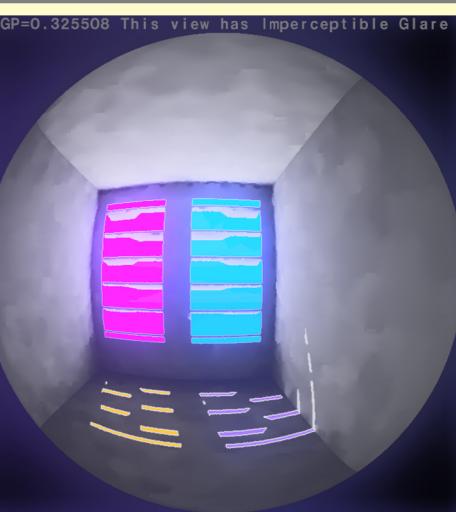


SUMMER  
(JUNE 21)

## REDESIGNED SHADING #2 - SUMMER

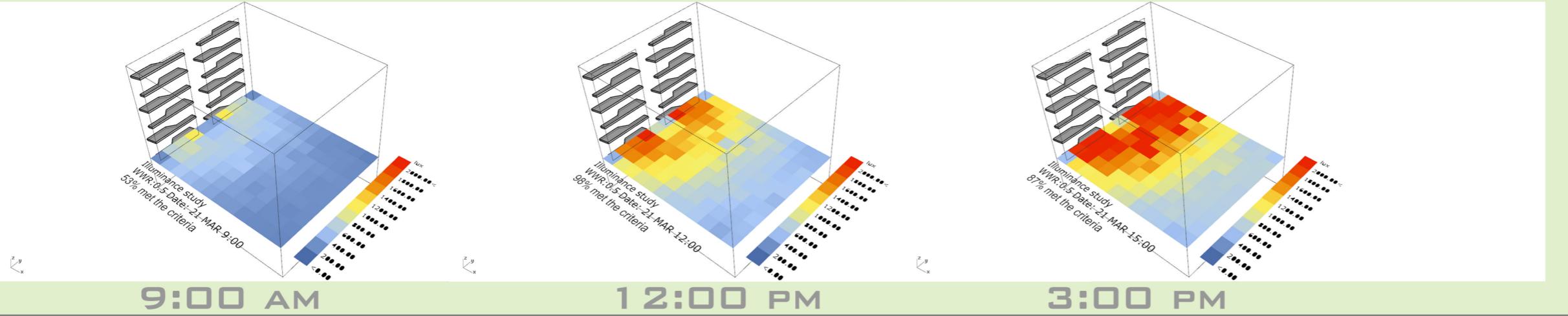


## GLARE ANALYSIS

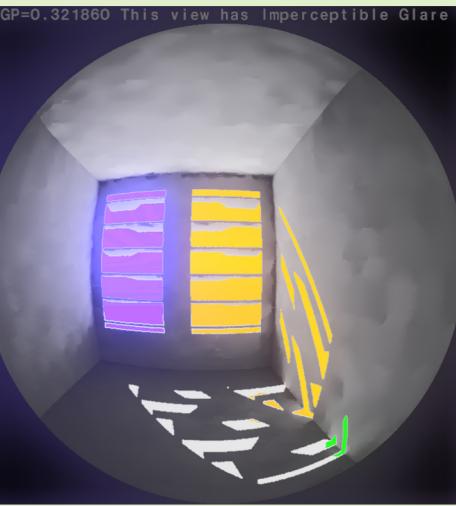


SPRING  
(MARCH 21)

## REDESIGNED SHADING #2 - SPRING

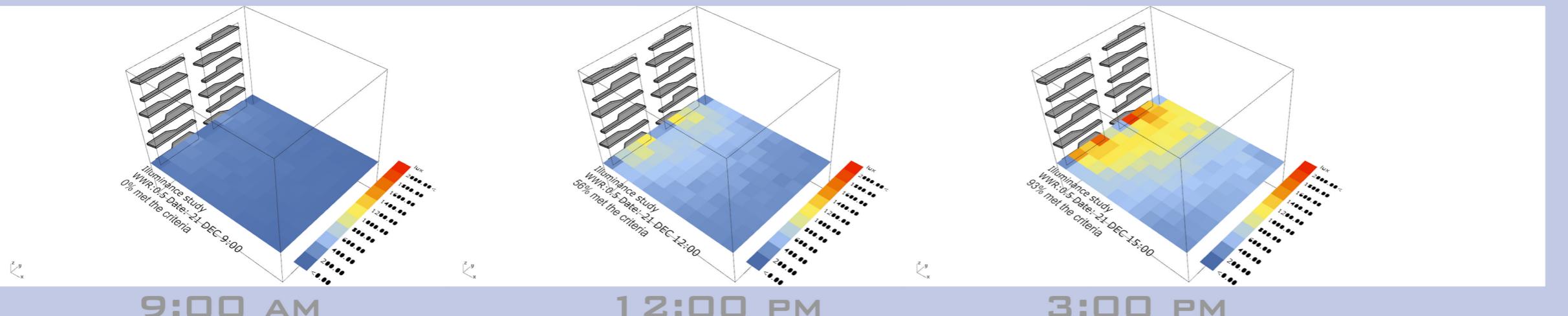


## GLARE ANALYSIS

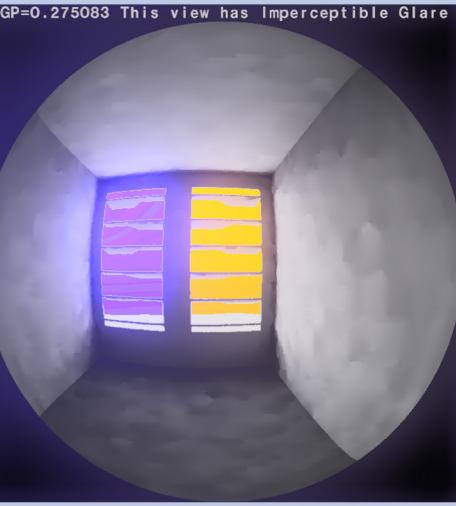


WINTER  
(DECEMBER 21)

## REDESIGNED SHADING #2 - WINTER

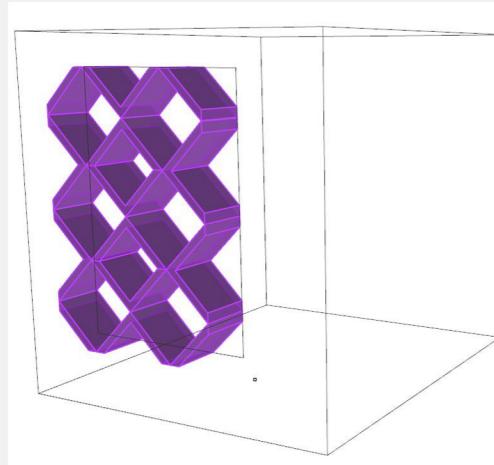


## GLARE ANALYSIS

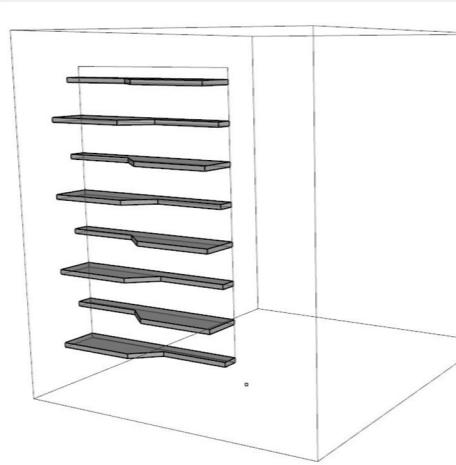


# **CONCLUSIONS**

## ORIGINAL SHADING SYSTEM



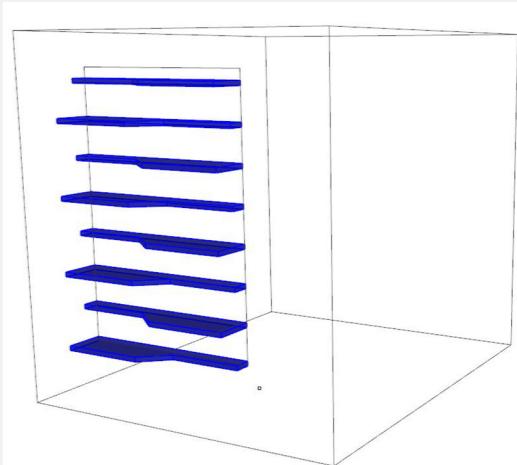
## REDESIGNED SHADING #1



## REDESIGNED SHADING #2



## REDESIGNED SHADING WITH NEW MATERIAL



✗ BY FAR THE WORST PERFORMING SYSTEM USING THE DLA AND UDI METHODS.

✗ THE THICK AND DENSE SHADING ELEMENTS PROVIDE SHADING AGAINST DAYLIGHT, BUT ALSO LIMIT THE USEFUL DAYLIGHT ILLUMINANCE IN THE SPACE.

✗ COMPARED WITH THE OTHER SYSTEMS, THIS IS THE LEAST MATERIAL EFFECTIVE SOLUTION.

✗ THE AMOUNT OF LIGHT THAT ENTERS DURING THE WINTER SEASON IS VERY LIMITED, WHICH MIGHT EVENTUALLY CAUSE VERY LOW TEMPERATURES IN THE ROOM.

✓ THE SYSTEM PROVIDES THE MOST AMOUNT OF SHADING DURING THE SUMMER AND THEREFORE REDUCES THE TEMPERATURE INSIDE THE ROOM.

✓ THICK SHADING ELEMENTS PROVIDE THERMAL MASS THAT INSULATES THE ROOM AND REDUCES THE AMOUNT OF GLARE.

✗ THE AMOUNT OF MATERIAL USED IS CONSIDERABLY HIGH COMPARED WITH THE OTHER SYSTEMS.

✗ THE ANNUAL DAYLIGHT PERFORMANCE IS RELATIVELY LOW, ESPECIALLY AT THE END OF THE ROOM. SPATIAL DAYLIGHT AUTONOMY IS ALSO LOW COMPARED WITH THE OTHER SYSTEMS.

✗ THIS SYSTEM LIMITS THE AMOUNT OF DAYLIGHT THAT IS RECEIVED DURING THE WINTER, CAUSING LOWER TEMPERATURE IN THE ROOM DURING THIS SEASON.

✓ BEST UDI PERFORMANCE, WITH A CONSIDERABLE DIFFERENCE OVER THE OTHER SYSTEMS.

✓ THE HIGH AMOUNT OF LOUVERS ALLOW VERY EFFECTIVE SHADING AND LOW GLARE DURING THE SUMMER SEASON, WHERE TEMPERATURES ARE CONSIDERABLY HIGH.

✓ THE LOUVERS CAN BE ROTATED TO ACHIEVE EVEN BETTER PERFORMANCE.

✗ THIS IS THE LEAST REALISTIC SOLUTION, BECAUSE IT REQUIRES A SECOND OPENING FOR AN ADDITIONAL WINDOW.

✗ BOTH OPENINGS ALLOW A SUBSTANTIAL AMOUNT OF DAYLIGHT AND GLARE INTO THE ROOM DURING THE SUMMER, INCREASING THE TEMPERATURE DURING THIS SEASON.

✗ IN ORDER FOR THE SYSTEM TO BE EFFECTIVE, LOUVERS NEED TO BE ROTATED. IF THEY ARE CHANGED INTO A FLAT POSITION EXCESSIVE DAYLIGHT ENTERS THE SPACE.

✓ THE SYSTEM HAS VERY GOOD DLA AND UDI VALUES. SPATIAL DAYLIGHT AUTONOMY IS ALSO QUITE GOOD.

✓ THIS SYSTEM WORKS VERY WELL SPREADING LIGHT EVENLY INTO THE WHOLE ROOM AND NOT INTO A CONCENTRATED PLACE.

✓ THIS IS THE BEST PERFORMING SYSTEM THROUGHOUT THE YEAR, PROVIDING GOOD AMOUNTS OF LIGHT DURING WINTER AND SUMMER.

✗ HAVING A HIGHLY REFLECTIVE MATERIAL DIFFUSES THE LIGHT INTO PARTICULAR SPOTS IN THE ROOM.

✗ HIGH TEMPERATURES AND GLARE MIGHT BE THE CONSEQUENCES OF THE BRIGHT SPOTS WHERE DAYLIGHT IS CONCENTRATED.

✗ EXTREMELY HIGH LIGHTING VALUES ARE OBTAINED DURING THE SUMMER, MAKING CERTAIN SPOTS IN THE ROOM UNCOMFORTABLE DURING THIS SEASON.

✓ THIS SYSTEM HAS THE MOST EFFECTIVE MATERIAL/PERFORMANCE RATIO, ALLOWING THE MOST AMOUNT OF SUNLIGHT, WITH THE LEAST AMOUNT OF MATERIAL.

✓ THE HIGHLY REFLECTIVE METAL USED IN THE SHADING SYSTEM, ALLOWS THE BEST DAYLIGHTING LEVELS DURING MORNING HOURS.

✓ THIS SYSTEM ALLOWS THE MOST AMOUNT OF LIGHT WHERE UDI IS ACHIEVED IN 100%.