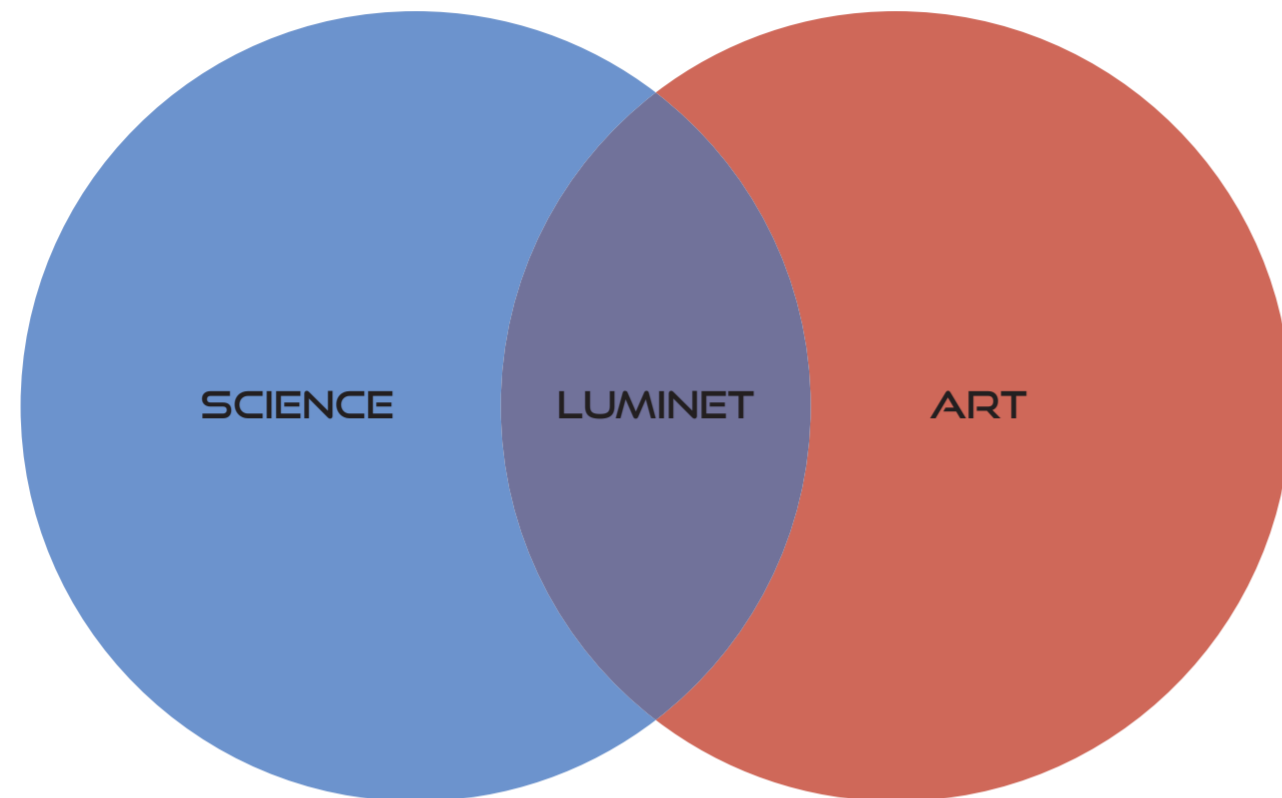


LUMINET - THE INTERSECTION OF ART AND SCIENCE

Luminet is my 4th year project that explores the interconnectivity of science and art. Luminet is inspired by the first image of a black hole that was produced 50 years before the first photograph.

The space I have designed is first and foremost a 'Science Gallery' that teaches more intermediate level science through artistic mediums. An exhibition space allows users to explore different areas of science through different mediums that explores modern materiality and emerging technologies. There is also a planetarium, cafe, and observatory each with their own innovative feature.

Throughout the development of this project I have conducted research into various areas of science, different technologies and how they could be repurposed or improved. In order to execute the design I experimented with 3D modelling, laser cutting, woodworking, and 3D printing.



This multifaceted project seeks to establish a dynamic hub in Glasgow Green where the realms of science and art converge seamlessly. The primary goal is to cultivate a symbiotic relationship between these two disciplines, fostering an environment that encourages exploration, inquiry, and creativity.

The design inspires a culture of curiosity, lifelong learning, and collaboration. By transcending traditional educational models, the space seeks to inspire the next generation of scientists, artists, and thinkers who recognize the interconnected nature of human knowledge and creativity.



The West Boathouse is one of the grandest of its kind in the UK and features a timber frame construction which was a rare type of construction at the time. The boathouse had been in poor condition for decades with many of its notable features being damaged such as the timber detailing and the structure of the balconies at risk.

There were a lot of calls to restore the historic building, funding came in from sources like National Heritage Lottery, Historic Environment Scotland, The Robertson Trust, Glasgow City Council and many others. The total raised for the project was £3.05m, this meant restoration could begin.

Work on the site began in February 2021, led by ARPL Architects and overseen by Glasgow Building Preservation Trust. The work finished May 2023 and was celebrated by more than 250 people who attended the grand reopening. Among those who attended were notable figures like Harry Leask, a Tokyo Olympics silver medalist.

Due to light pollution, stargazing in Glasgow would be very difficult. A solution to this would be updated street lights in the surrounding area. Warm LED lighting at 500 Lumens provides enough light for a safe journey and benefits for surrounding wildlife. It also has health benefits for humans as it lets the eyes adjust naturally and prevents a glare of excessive brightness.

The diagram below shows the light pollution index of Glasgow where red is the most polluted and blue the least. It shows that the centre of the city is the most polluted and heading outwards it gets better. This is to be expected as all cities have the same issue.

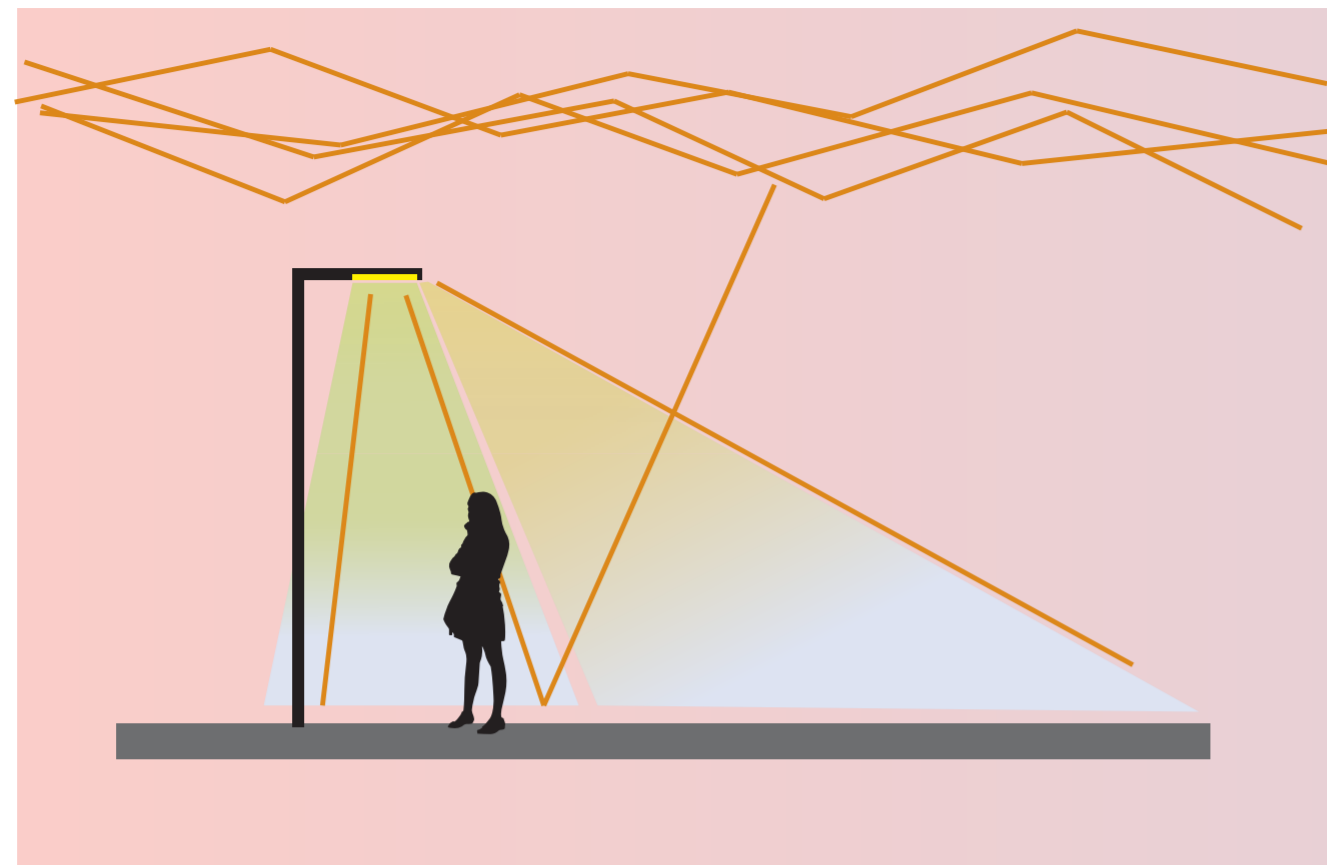


■ — Site ■ — Embedded Walkway LED

The West Boathouse is a category B listed building that was built by the Glasgow Corporation in 1905. The building is located near the Eastern entrance of Glasgow Green and situated by the River Clyde providing views of local activities and wildlife.

The building has two floors and features a newly developed terrace, planetarium, and observatory with charming timber exterior detailing and arched windows. The building is on an incline facing the river which partially houses the planetarium. The site boundary extends beyond that of the building and includes walkways using specialist lighting to aid with light pollution.

TRADITIONAL STREET LIGHTING



SKY GLOW

Brightness of the night sky in a built-up area as a result of light pollution.

LIGHT TRESPASS

Light pointing in an unwanted direction. This affects visibility and animal migrations.

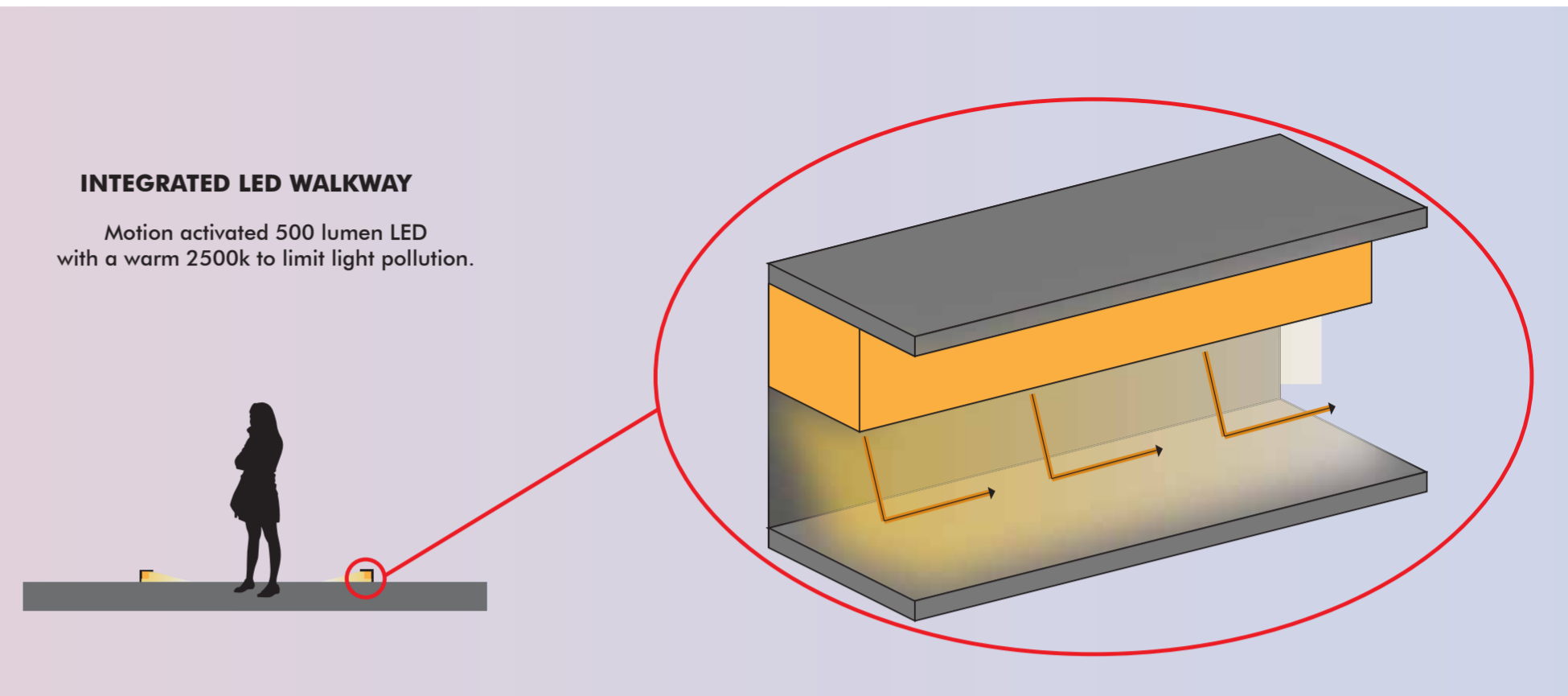
GLARE

A form of excessively bright light caused by ineffective design. Often causes eye discomfort.

EXCESS BRIGHTNESS

Upward reflected light that contributes to the "sky glow" seen above cities.

PROPOSED STREET LIGHTING



INTEGRATED LED WALKWAY

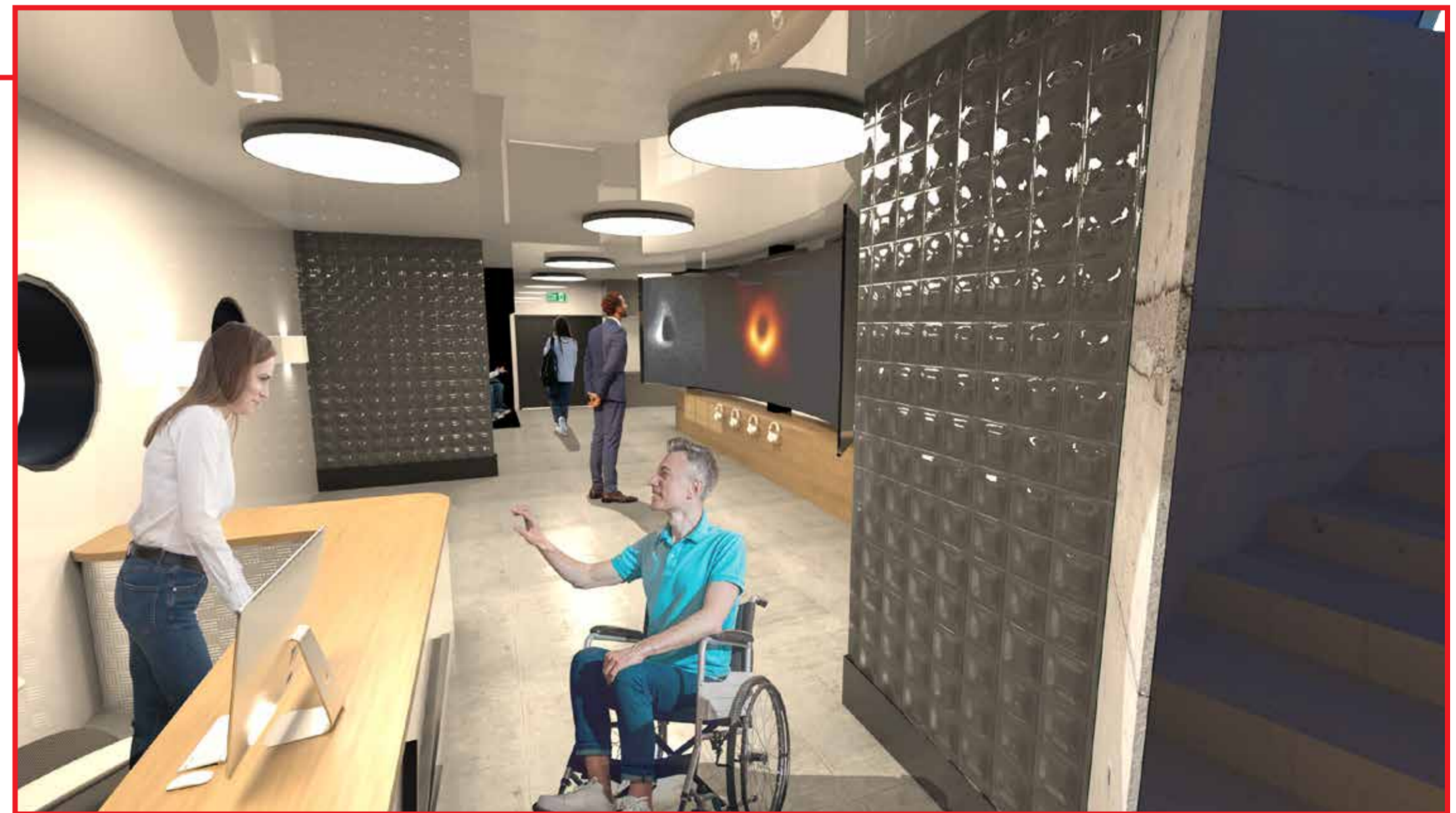
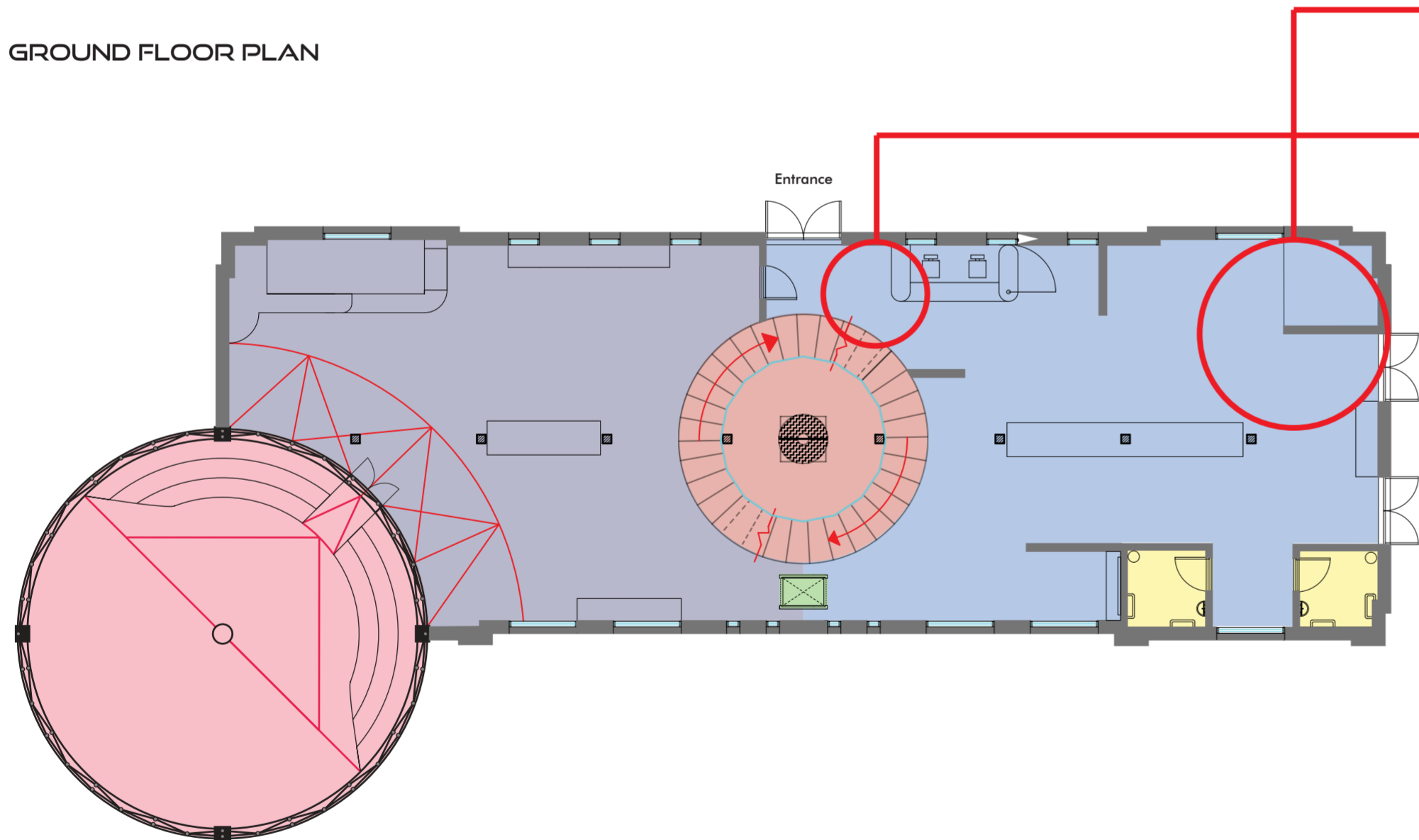
Motion activated 500 lumen LED with a warm 2500k to limit light pollution.

Light pollution, the excessive or inappropriate use of outdoor artificial light, is affecting human health, wildlife behavior, and our ability to observe stars and other celestial objects.

People living in cities with high levels of sky glow have a hard time seeing more than a handful of stars at night. Astronomers are particularly concerned with sky glow pollution as it reduces their ability to view celestial objects.

By flooding the night skies with artificial light we're also putting our well-being at risk. Since most living things run on a 24 hour day/night cycle known as the circadian clock, too much night-time light can prove harmful to us on a molecular level. This cycle controls 10 to 15 per cent of our genes, which means brainwave patterns, hormone production and cell regulation can all be disrupted by interfering with its pattern.

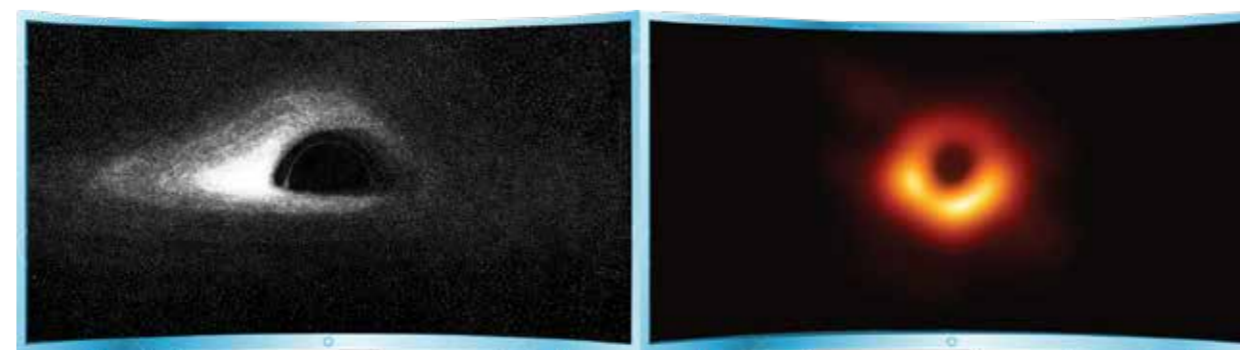
GROUND FLOOR PLAN



ASTRONOMY EXHIBITION

The astronomy exhibit features two large curved screens comparing the first image of a black hole (simulated and drawn by John Pierre Luminet in 1979), and the first picture taken of a black hole by the Event Horizon Telescope 50 years later in 2019.

Each image will be animated to show the motion of a black hole and will pair with an audio background that will explain the history of each image highlighting how Luminet used his artistic experience to create the first accurate image of a black hole 50 years before we had the technology to do so.



Sealed Concrete Flooring



Pine Accents



Glass Block Barriers



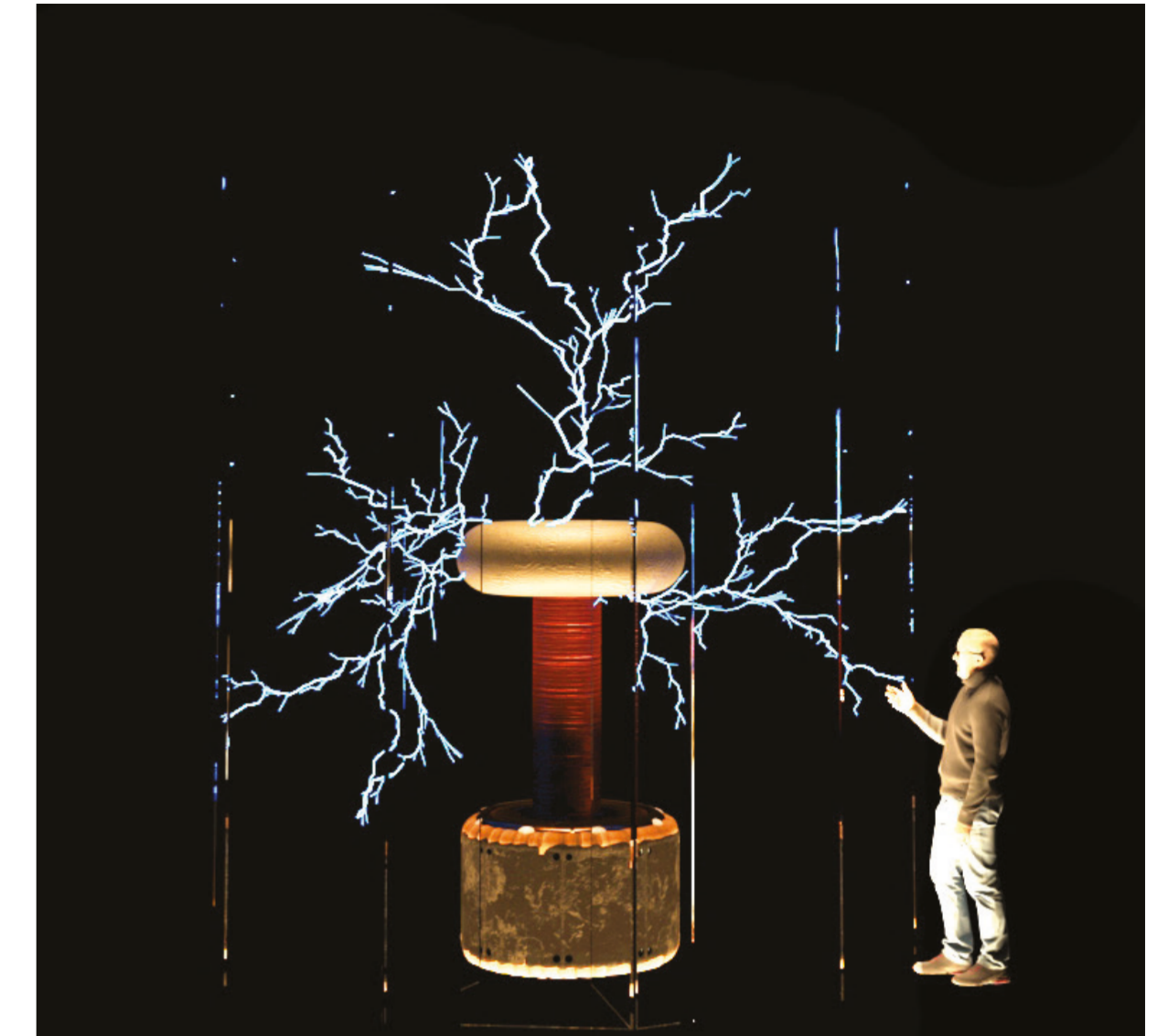


TESLA COIL STAIRS

One of the defining features of my design is its one-way system which is encouraged by the use of two central spiral staircases.

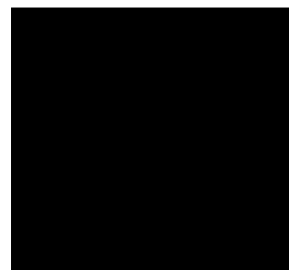
In the centre of the stairs is a large Tesla Coil surrounded by a glass structure that allows users to interact with the electricity given off by the coil.

This essentially turns the entire staircase into a giant plasma lamp that is hidden away until you need to use the stairs.

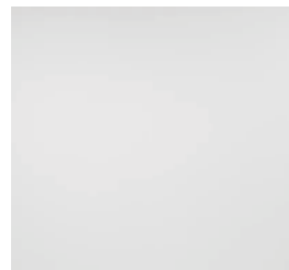


TESLA COIL STAIRS MODEL - 3D printed and laser cut

Black 4.0 Paint



High Gloss PVC Ceiling



Brushed Steel Finishes



PHYSICS EXHIBITION

The exhibition used to teach people about physics will focus on the absorption of light, what light is and how we process it.

The corner of the space will be coated in 'Black 4.0'. A paint that absorbs 99.96% of visible light. This gives the users a space to walk into that absorbs so much light it would appear 2D.

Standing within the space users would be immersed in a totally black environment and have the option to listen to how light travels, how the paint absorbs it, and how other materials reflect it.

OTHER EXHIBITIONS

Mathematics

This exhibit focuses on mathematics, specifically The Fibonacci Sequence or 'The Golden Ratio' and its appearance in nature, art, and science. The Fibonacci sequence is a type series where each number is the sum of the two that precede it. The Golden Ratio is often used in architecture, product design, engineering and more recently, software engineering as its mathematical nature is useful for growth models.

The goal of this exhibition is to question and assess if there is a connection between a mathematical sequence and what shapes and forms appeal to humans and natural processes.

Chemistry

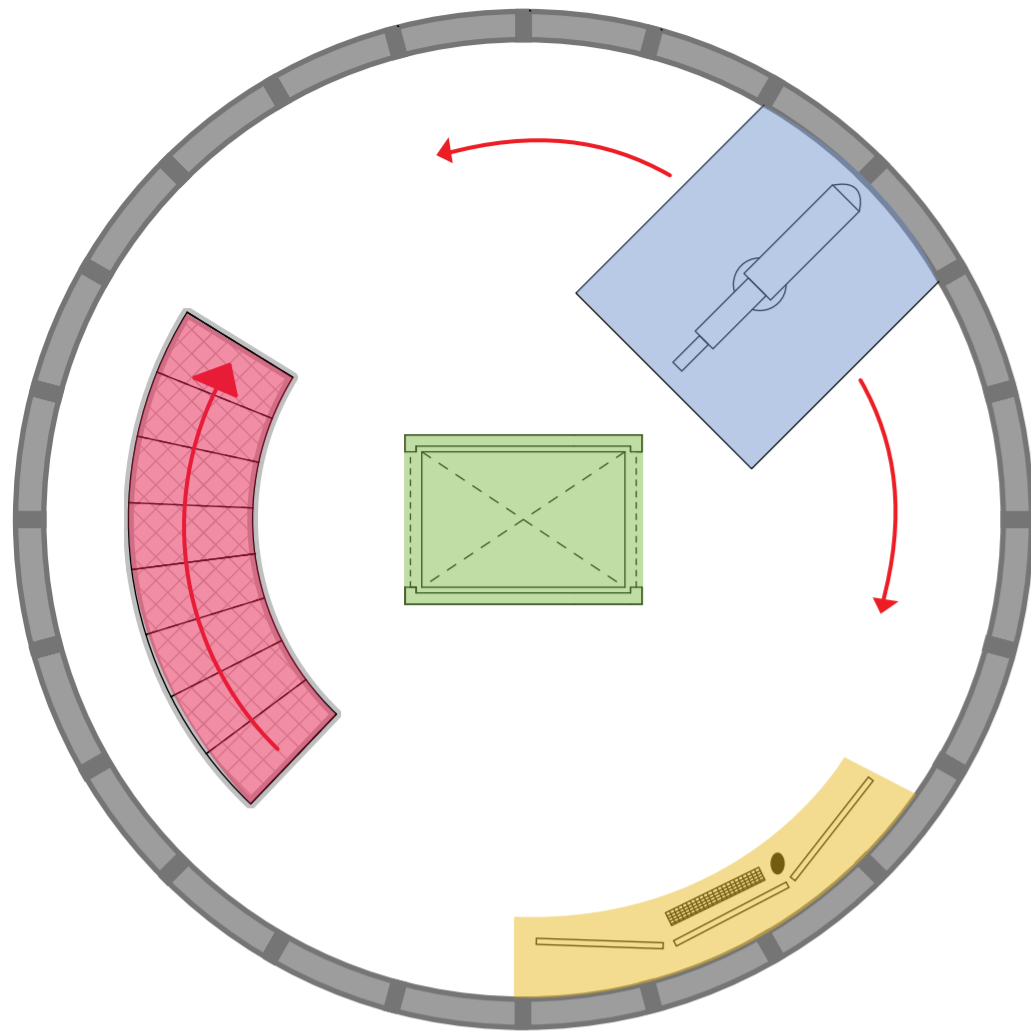
The chemistry exhibition focuses on the illustrative artwork by Prof David Goodsell who creates educational sectional drawings of molecules.

Combining this with interactive holographic technology, users will be encouraged to play with sand in the table below and watch as a holographic animation zooms into each grain and shows the different molecules within. Users will be able to pick apart the molecules and learn about specific elements within to gain a better understanding of what they are and what they do.

Biology

The exhibition focusing on biology will feature a series of glass sculptures by artist Luke Jerram, who makes these intricate glass sculptures of different biological structures His transparent and colourless glass-works of viruses points out how the artificial colouring of scientific microbiological imagery, affects our understanding of these phenomena. His work has helped educate people on the medical visualisation of the HIV virus with more of his work being published in medical textbooks to educate others on the pointless artificial colouring of microbiological illustrations





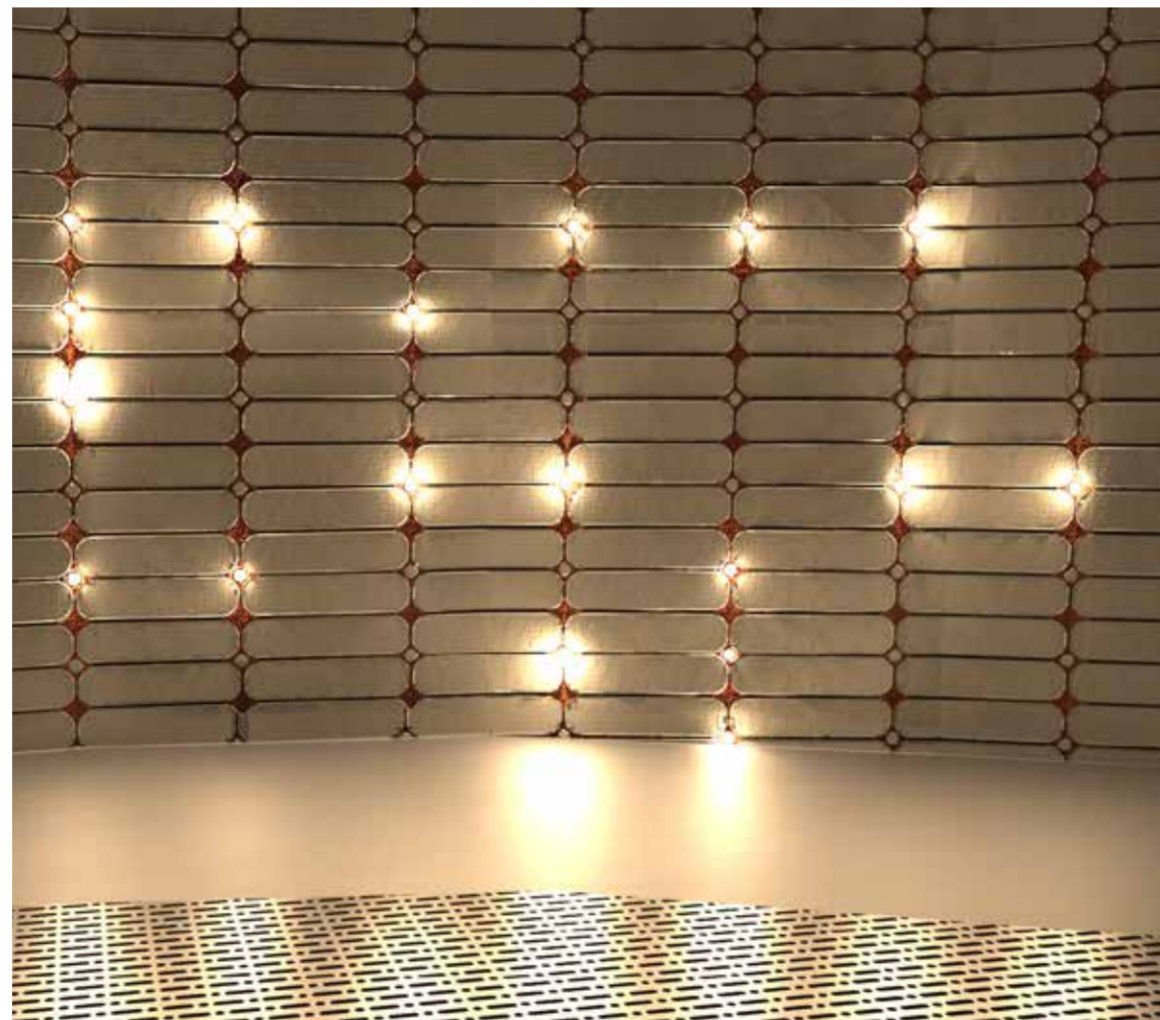
PROTOTYPE LED TILE

Observatories have very specific lighting requirements as most of the instruments they use are sensitive to light. A solution to this would be embedded wall lights that use the same temperature and brightness as those specified earlier.

The prototype LED tile acts as a joint for capsule shaped tiles and has the capacity to be colour and temperature adjustable.

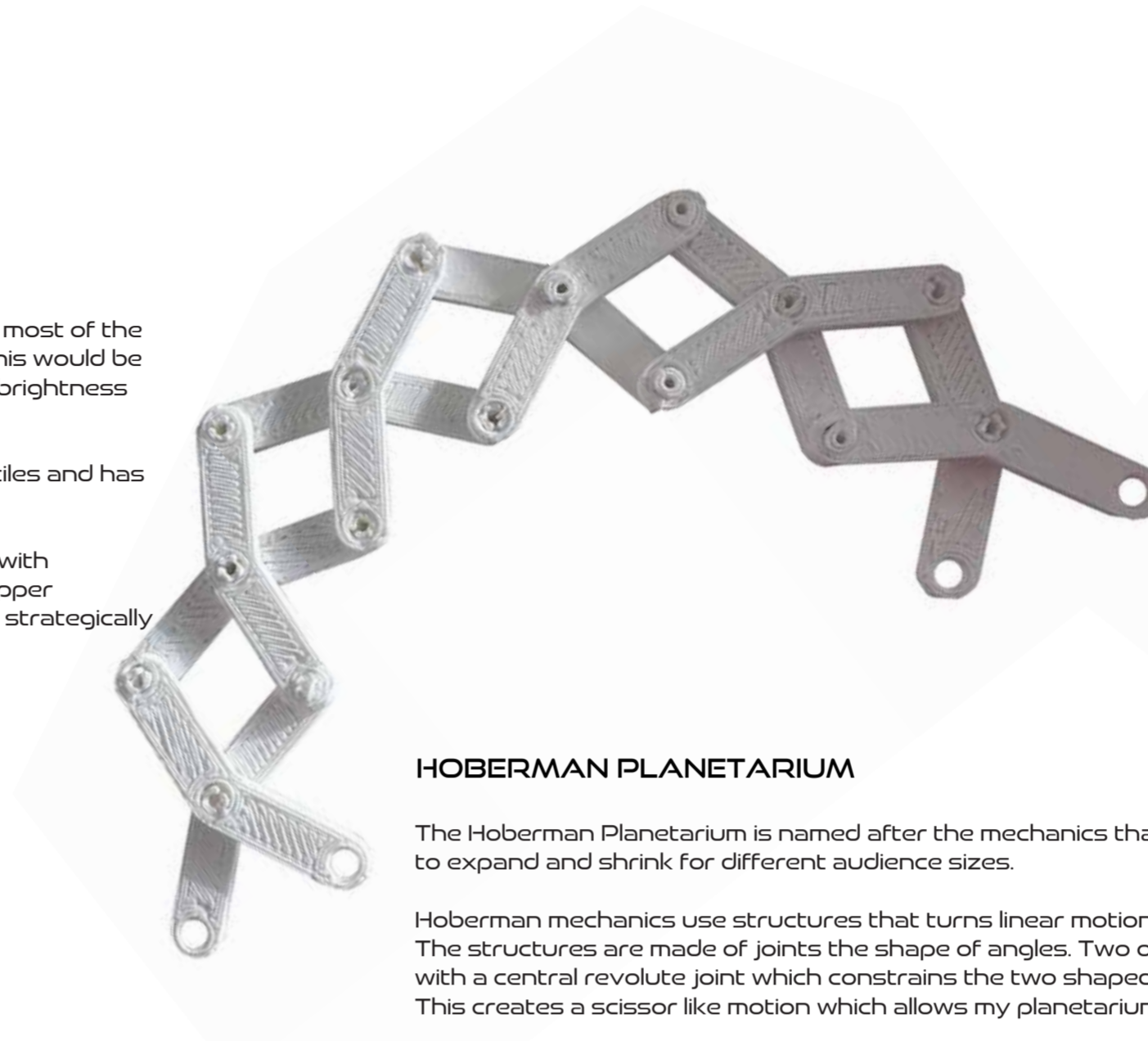
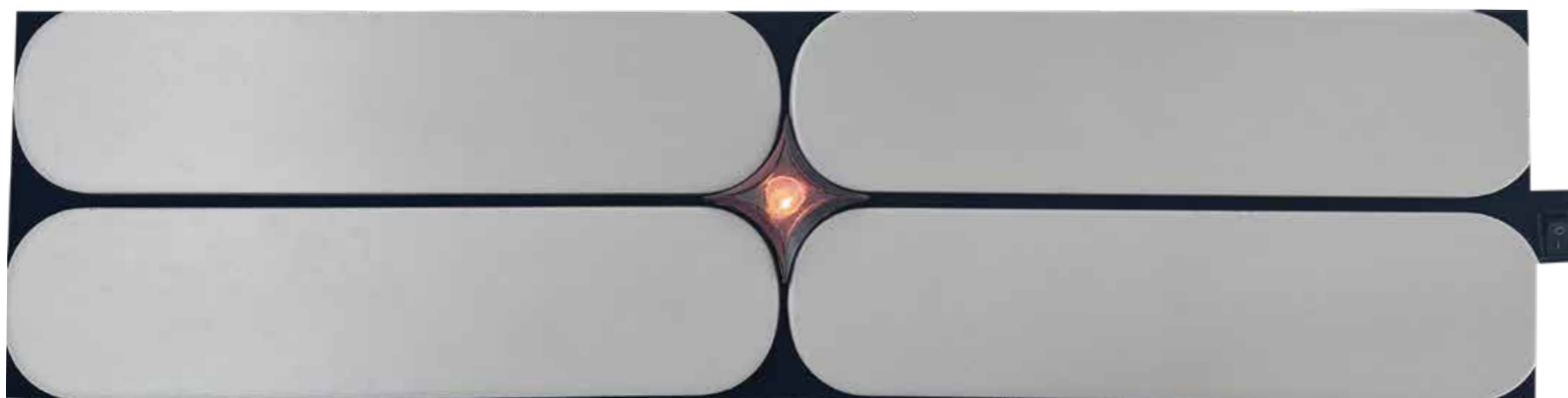
I have specified the interior of the observatory to be lined with matte white capsule shaped tiles with a dark grout and copper accented stars that fit between the tiles. The LEDs can be strategically placed to give the desired lighting for the space.

PROPOSED RENDER OF TILE



WORKING PROTOTYPE

I have 3D printed the star shape to fill the gap left by the tiles and left enough space for a light within the print. All of this has been mounted to show what it would actually be like in the space.



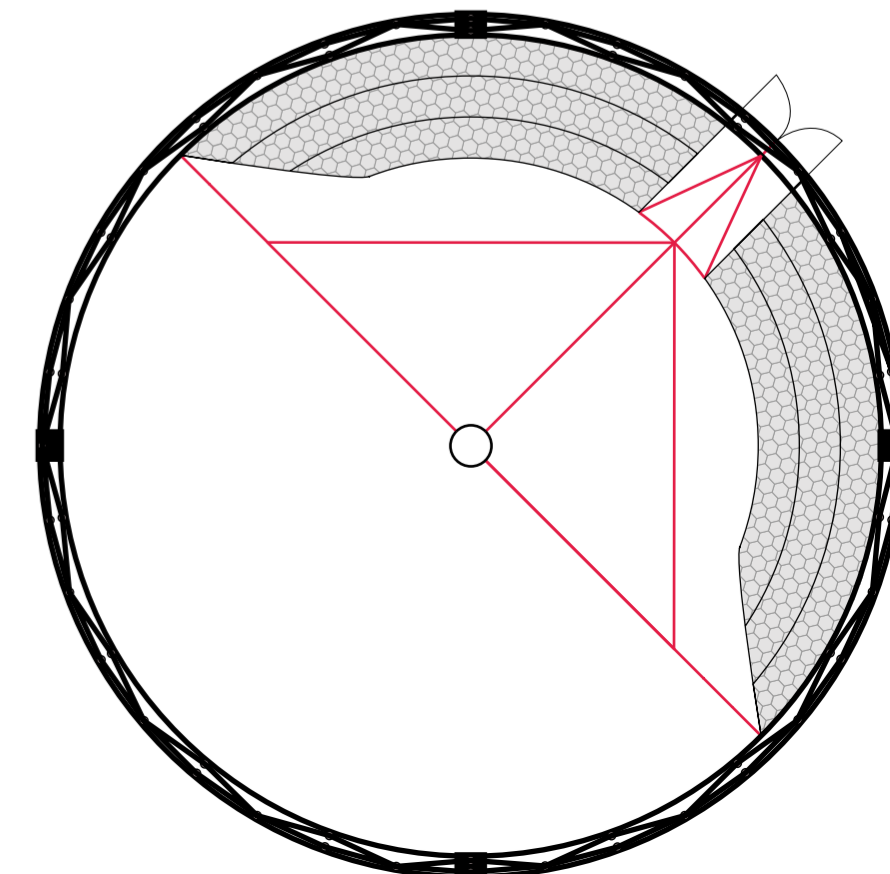
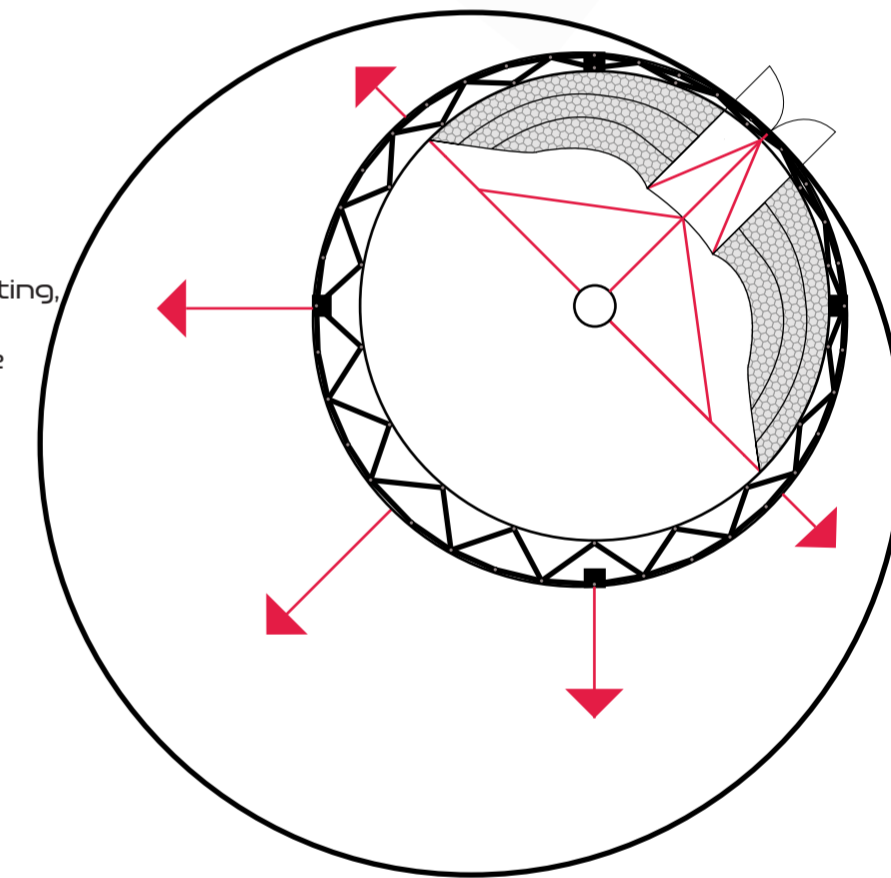
HOBERMAN PLANETARIUM

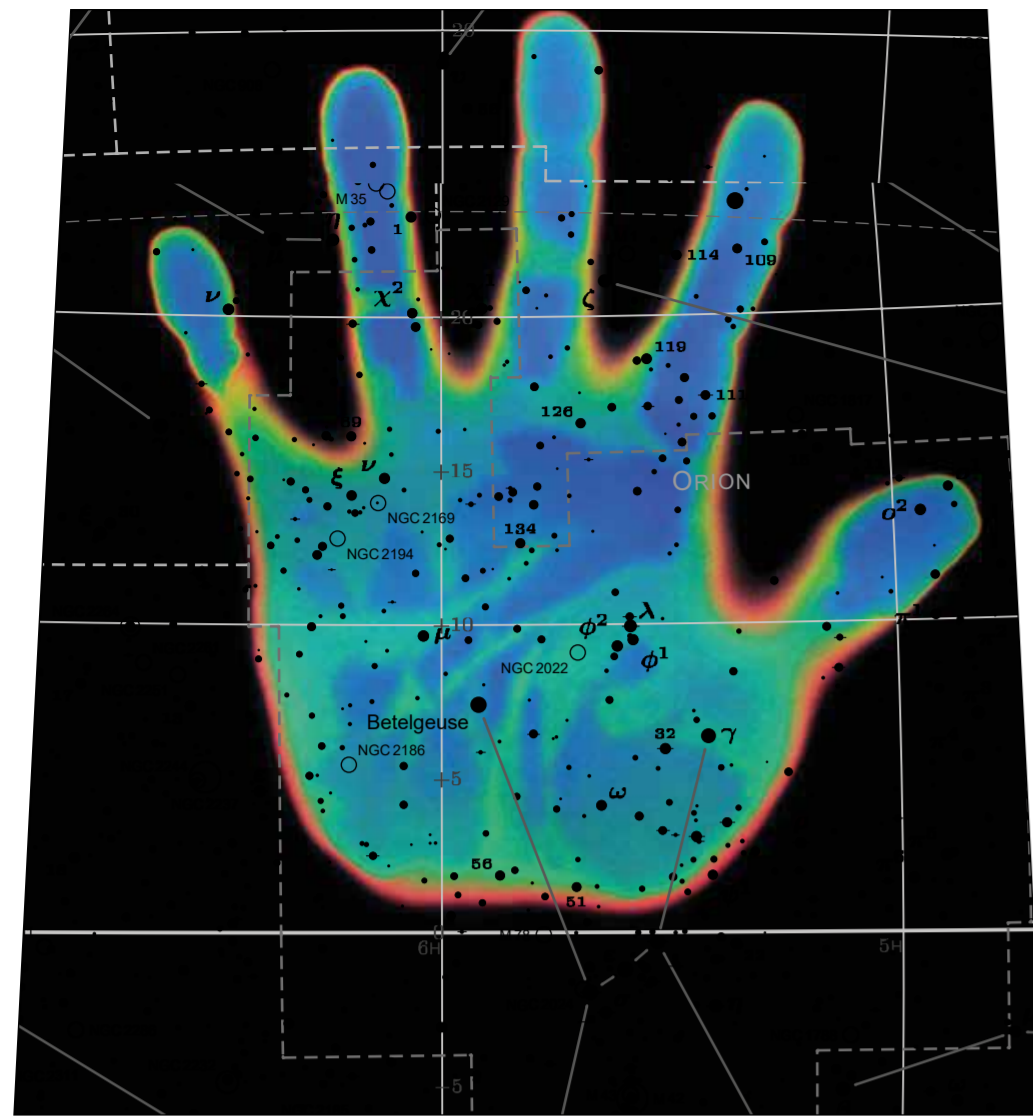
The Hoberman Planetarium is named after the mechanics that enables it to expand and shrink for different audience sizes.

Hoberman mechanics use structures that turns linear motion into radial motion. The structures are made of joints the shape of angles. Two of these shapes connected with a central revolute joint which constrains the two shapes to one axis of movement. This creates a scissor like motion which allows my planetarium to change size.



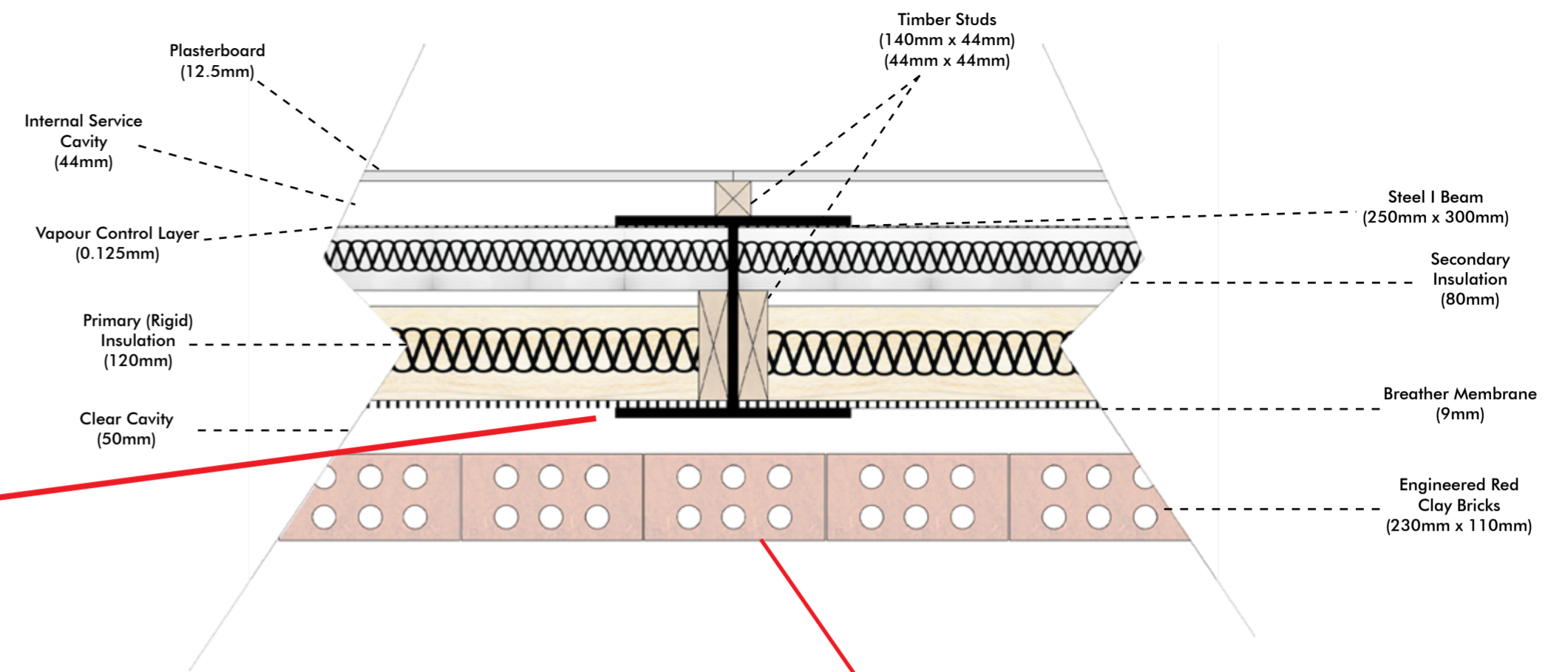
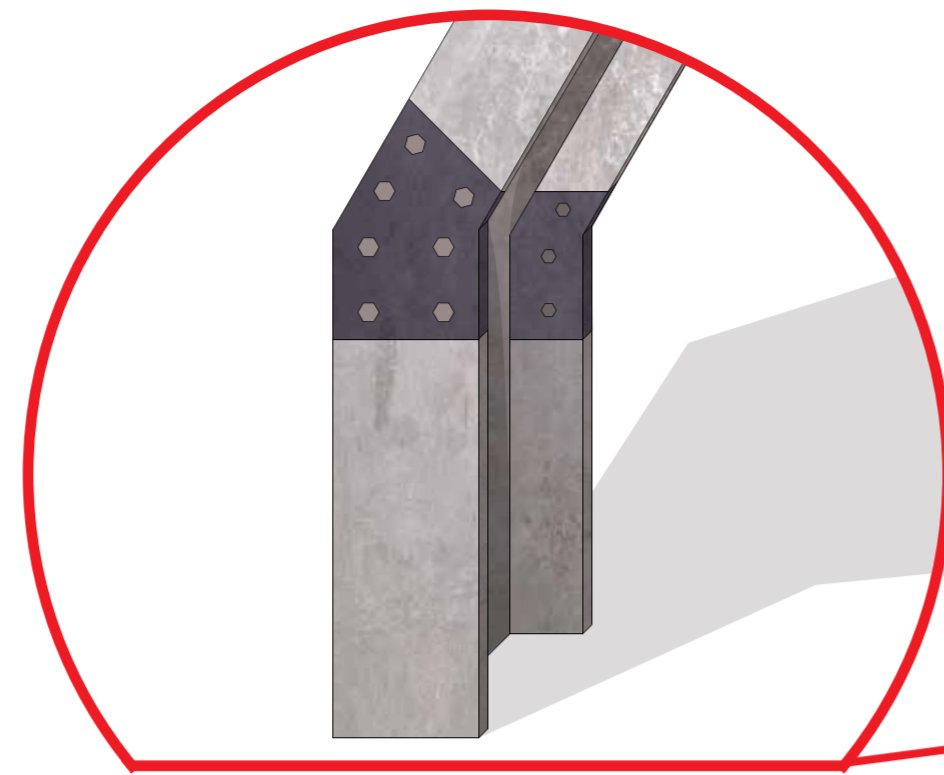
Through a series of experiments in rendering, modelling and 3D printing, I finalised the basic structural model for the space which would allow for it and all furniture within to change size to give different audience sizes the optimal viewing experience.



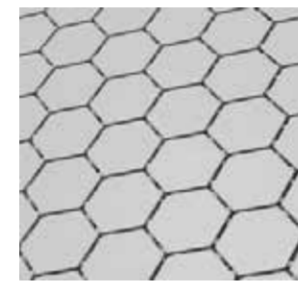


THERMOCHROMIC STAR CHART

The panels are made from mild steel which is affordable and fit for purpose, it also cools quickly when compared to cheaper metals and panel alternatives. The panel is lined with the thermochromic film which has an adhesive backing, which then has a layer of thin perspex lined with the star chart secured on top through the use of snap frames. The materials specified make the star chart easy to use, clean and reset for the next user to interact with.



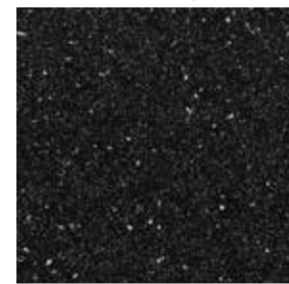
NASA Fabric Upholstery



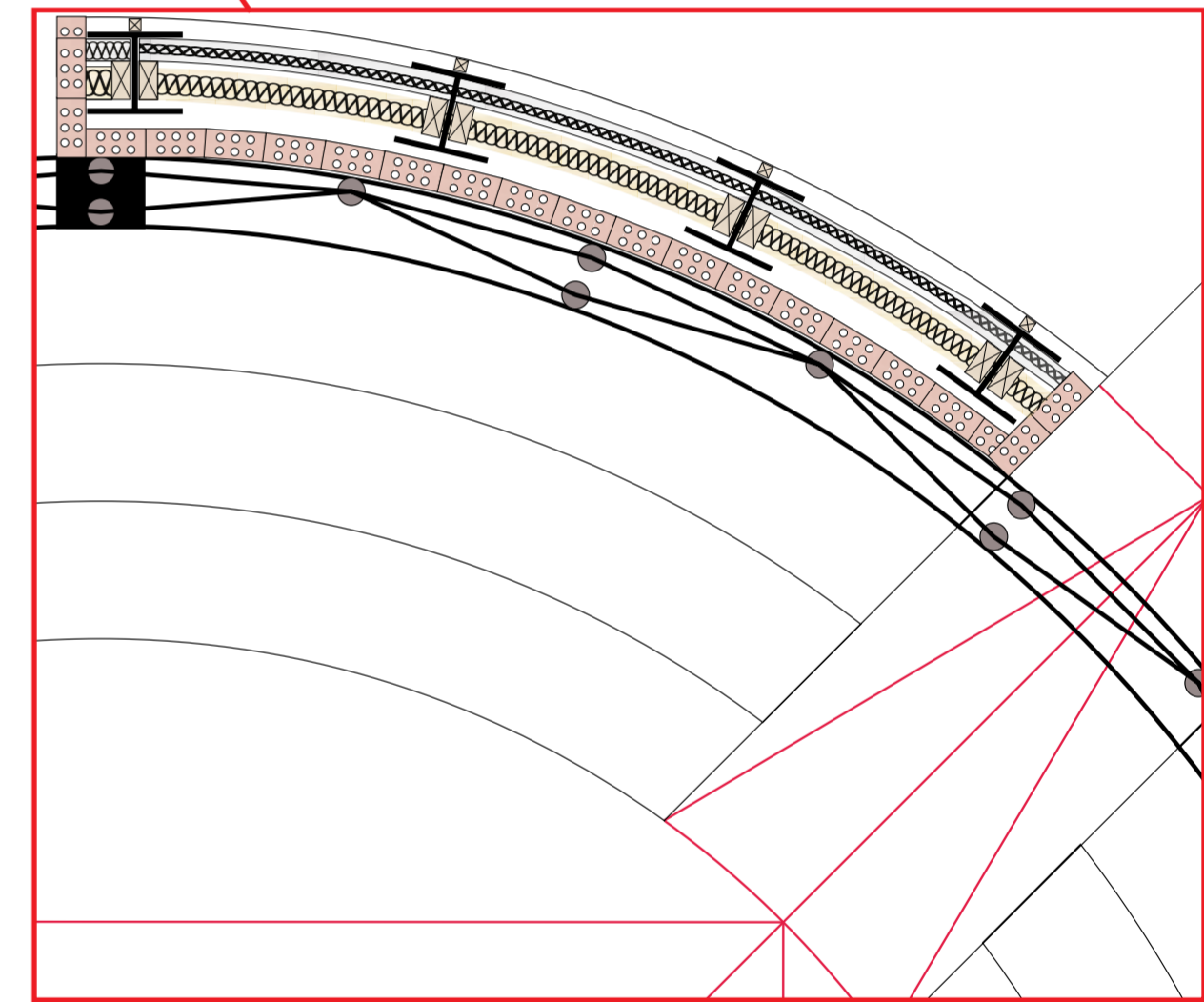
Aluminium Projector Screen



Charcoal Safestep R10 Flooring

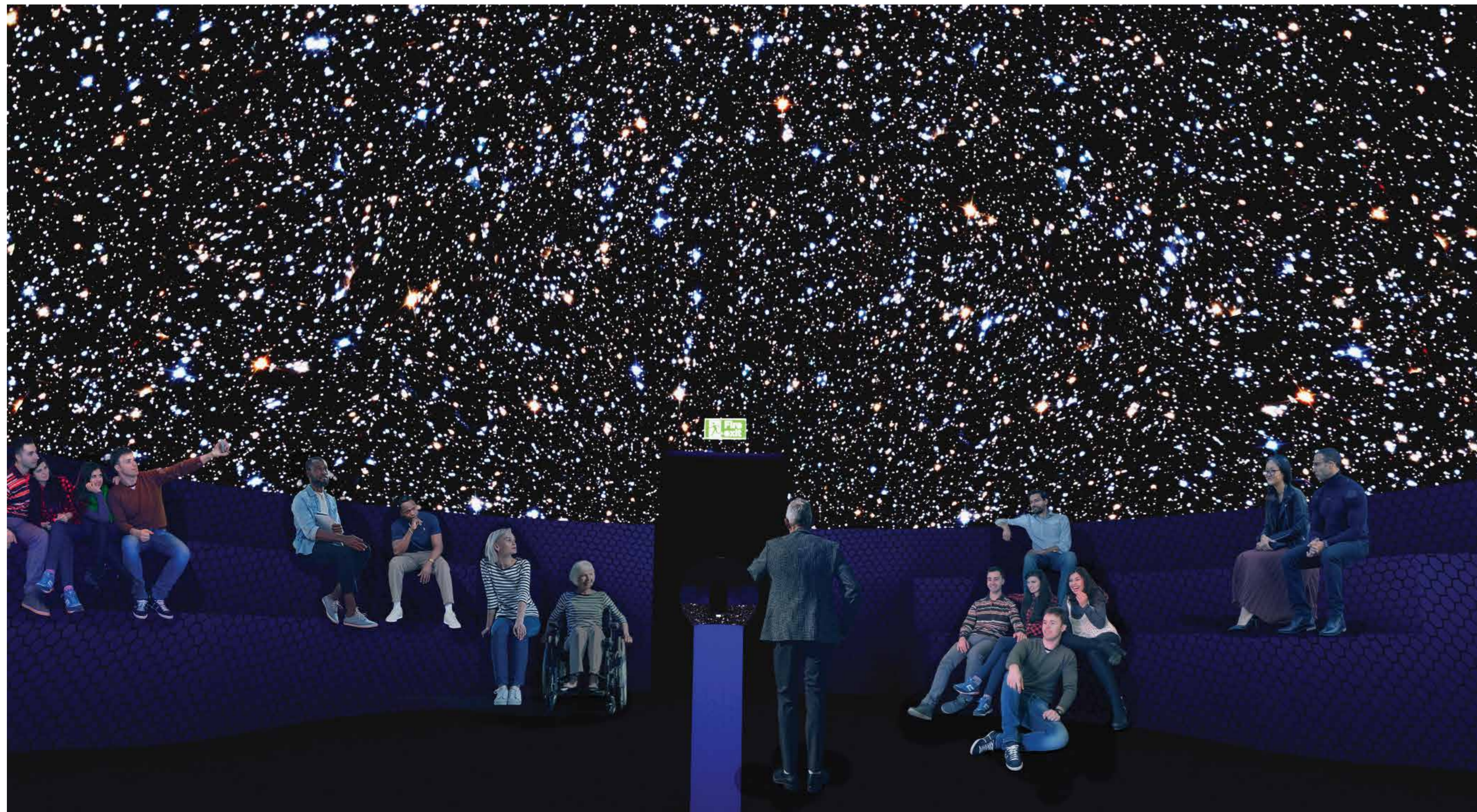


As the planetarium expands and retracts, the fixed seating for the space also adjusts using the same mechanics as the structure. To accommodate for this, an upholstery made from 3D printed TPU allows a lot of flexibility while keeping its shape.



INTERIOR WALL DETAILING

The new wall that encompasses the planetarium uses steel I beams for structural integrity, it can also be manipulated to move with the curve of the dome. The wall meets the standards of Scottish building regulations by using two types of insulation, a water and breather membrane as well as cavities for circulation and utilities.



HOBERMAN PLANETARIUM INTERIOR RENDER