

Astronomy in Second Life® by Magnuz of Sweden

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Second Life®, a virtual 3D-world

A short introduction to the virtual environment in Second Life®.

Second Life® is a virtual 3D world, based on a number of continents and islands, both public and private. Its residents, represented by avatars, can interact with each other and the environment by text and voice chat,

gestures, walking, running, flying and teleporting. They can also create content by building, texturing and scripting, making the content both static, animated or interactive.

URL: <http://secondlife.com/>

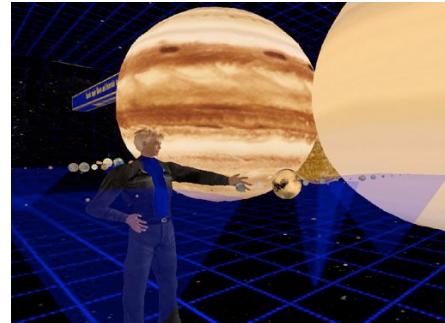
The new Sky Planetarium, bigger and better

Much more space, many new and improved astronomical items, better structure and availability, with a little twist.

Magnuz of Sweden has been present in Second Life since May 2007, and produced astronomy content there since September 2007. In March 2008, the new sky planetarium was “published”, with many new and improved astronomical items. The planetarium is located in the region Honawan, at 400 meters altitude. This newsletter features a compilation of most of the items at the planetarium.

The sky planetarium itself consists of an upper deck with the main interactive items, a beautiful, lower park with some less advanced items, a basement with more spacious exhibitions, like Solar System models, and a large stellarium, interior decorated with dance floor, bar and lounge. The different parts can be reached both by walking, stair climbing, teleporters and an automated, guided tour.

The deck provides a simple walk-around to conveniently access many of the main items, like 4 large, interactive space spheres, advanced, interactive celestial body models and space dioramas.



Part of the basement exhibitions with some of the interactive Solar System bodies.

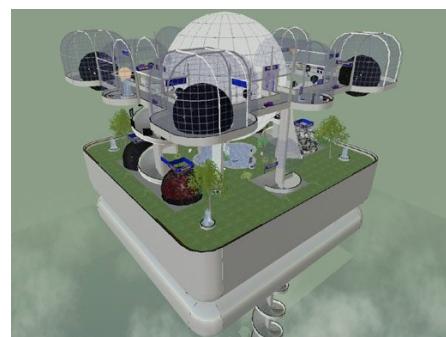
The park is a relaxing place with lawns, plants, fountains, a large pond with a dolphin family, some astronomical items and plenty of seats for meetings, lectures and such.

The basement is like a large hangar, with the inner walls as a star map. It features interactive exhibitions comparing sizes of the Sun, the planets, their orbits, their moons and some other Solar System bodies.

The large stellarium is intended as a meeting and recreational place, with a dance floor offering dance animations to avatars, and more relaxed bar and lounge areas. All interior decorations can be switched off though, for an unobstructed view of the starry sky.

As a special twist, the sky planetarium can be reached by one of the highest spiraling stairs in Second Life®, some 300 meters high, but also offers convenient teleportation for the physically less fit.

SLURL: <http://slurl.com/secondlife/Honawan/96/122/422>



An overview of the new sky planetarium by Magnuz of Sweden.

In this issue

The new Sky Planetarium

Much more space, structure and better availability, with a little twist...

[page 1](#)

The Mini-Planetarium

An advanced but easily managed guide to our Solar System and the night sky.

[page 2](#)

The Mini-Stellarium

High resolution and quality starry sky with adjustable display and size.

[page 2](#)

The Galaxy Sphere

Interactive and informative 3D display of our nearby galaxies and galaxy sky.

[page 2](#)

The Star Sphere

Interactive and informative 3D display of our nearby stars and the starry sky.

[page 2](#)

The Galaxy Clusters sphere

3D display of our billion light year neighborhood with markers.

[page 3](#)

The Black Hole model

Rotating black hole with characteristic accretion disc and polar jets.

[page 3](#)

The Hevelius Sphere

The beautiful baroque constellations drawn by the 16th century astronomer.

[page 3](#)

The Celestial Body

Shapes, surfaces and data of 200+ Solar system bodies, all in one.

[page 3](#)

The Space Dioramas

Science as art, displaying rotation and revolution of the major planets.

[page 4](#)

The Celestial Globe

A simple table globe displaying solar system bodies and starry sky.

[page 4](#)

Club Stellarium

Be a star among stars, on the dance floor, at the bar or in the lounge.

[page 4](#)

Thoughts from Magnuz

Some personal reflections on (second) life, the universe and everything.

[page 4](#)

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The Mini-Stellarium

High resolution and quality starry sky with adjustable star attenuation, grids, texts and size.



The resolution of the star renderings inside the mini-stellarium permits close encounters.

Mini-Stellarium 2 is a high-quality and high-resolution star-map drawn from a catalog of some 2.5 million stars and projected on the inside of a sphere. It contains 8 parts and 25 functions in a 0.5-10 meter resizable sphere. The mini-stellarium displays stars with colors based on their spectral classes and allows setting of star brightness and toggling of grids and text by touching. This offers both a natural view with just the stars and a more informative view with constellation outlines, designations and grids. The owner can also control and limit usage of the stellarium.

The Galaxy Sphere

Interactive and informative 3D display of nearby galaxies and distant galaxy projection, with interactive markers and galaxy information.

Galaxy Sphere 1 offers a 3D representation of the Local Group of galaxies to scale, in a sphere lined with rendering of some 1.5 million more distant galaxies. It contains 57 parts and 28 functions in a 10 meter sphere. The object allows selection of galaxies, by touch or a menu system, to highlight and get information about them. It also allows setting of distant galaxy brightness and toggling of grids and text. This makes it easy to locate the galaxies in comparison to the starry sky and each other. The owner can also control and limit usage of the sphere.



Examining a galaxy representation. Not visible are the legends over the galaxies.

The Star Sphere

Interactive and informative 3D display of our nearby stars and the starry sky, with interactive markers and star information.

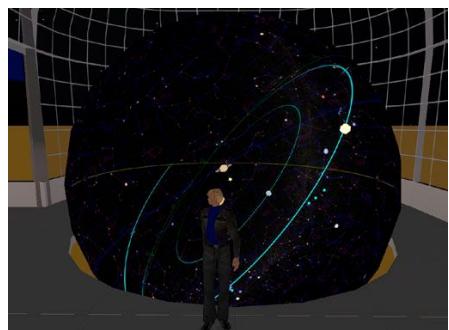


Among Sirius, Procyon and our Sun. Not visible are the legends over the stars.

Star Sphere 1 offers a 3D representation of nearby stars, in a sphere lined with renderings of some 2.5 million more distant stars. It contains 57 parts and 28 functions in a 10 meter sphere. The objects allows selection of stars, by touch or a menu system, to highlight and get information about them. It also allows setting of distant star brightness and toggling of grids and text, as well as setting of outside sphere appearance. This makes it easy to locate the stars in comparison to the starry sky and each other. The owner can also control and limit usage of the sphere.

The Mini-Planetarium

An advanced but easily managed guide to our Solar System and the night sky.



The mini-planetarium in all its glory. Not visible are the legends over the planets.

Mini-Planetarium 2 is an extensive and advanced map over our Solar system, displaying major planets, Sun and Moon in 3D view or projection, with or without legends and orbits. It contains 32 parts and 68 functions in a 10 meter sphere. The planets are to scale with each other, and so are their orbits, but planets and orbits are different scales, necessary for visibility of the planets. Times, places, projections and animations can be set, different parts displayed or hidden, and also outer appearance of the sphere can be controlled. It is e.g. possible to set an animation that shows how the night sky changes from night to night, at a certain position on Earth and hour of night. Both the main celestial bodies themselves, scaled up but realistic, and their projections on the starry sky can be seen, or one or both of them hidden, to better understand their appearance in the sky. The owner can also make custom default settings and control usage of the planetarium.



An inside view of the mini-planetarium, showing off some of its features.

The Galaxy Clusters sphere

3D display of our billion light year neighborhood with interactive markers for prominent galaxy groups and clusters.



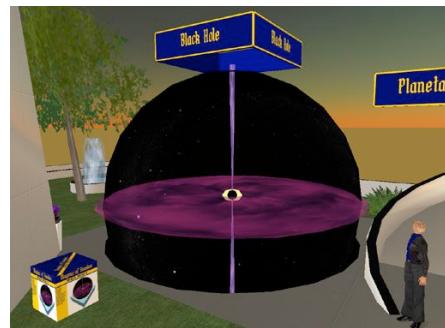
Overlooking a billion light years of galaxies, groups, clusters and superclusters.

Galaxy Clusters 1 displays the space within 500 million light years from us, with galaxies projected onto a number of discs to enable a 3D view. It contains 54 parts and 23 functions in a 10 meter sphere. Some nearby and prominent groups and clusters of galaxies can be selected and highlighted to facilitate the localization. Sphere appearance can also be controlled. Each of the 50 discs represents a 20 million light thick slice of the space. The galaxy projection size is proportional to their brightnesses. The owner can also control and limit usage of the sphere.

The Black Hole model

Rotating black hole with characteristic accretion disc, corona, event horizon and polar jets.

Black Hole 1 models a rotating black hole with a gas accretion disc, corona and polar jets. It contains 7 parts and 21 functions in a 0.5-10 meter resizable sphere. The outer appearance of the surrounding sphere can be adjusted concerning transparency and color. Since no real black hole has actually been depicted, this model is based on educated guesses and mathematical models. Some relativistic effects are also hard to model since they depend much on the viewer's position. The owner can also control and limit usage of the object.



Watching from safety the violent matter and energy turmoil around the black hole.

The Hevelius Sphere

The beautiful baroque constellations drawn by the 16th century Polish astronomer Jan Hevelius in his famous *Uranometria*.



Step back in time, admiring the stars as they were depicted more than 400 years back.

Hevelius Sphere 1 displays a spherical adaptation of the beautiful baroque star maps drawn by the Polish 17th century astronomer Jan Hevelius. It contains 1 part and 22 functions in a 0.5-10 meter resizable sphere. The color of the star maps can be inverted, and the outer appearance of the sphere can be adjusted concerning transparency and color. Although star magnitudes and general positions are correct, the projection used by Hevelius is not compatible with modern day projections. The owner can also control and limit usage of the sphere.

The Celestial Body

Shapes, surfaces and data of 200+ Solar System bodies, all in one interactive object.



Watching Saturn while being told information about it by the celestial body.

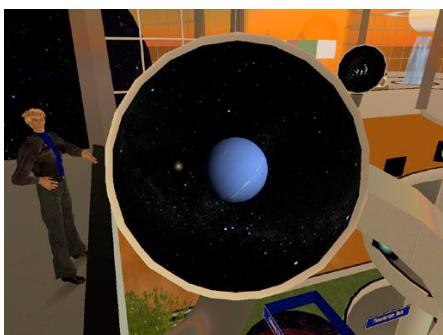
Celestial Body 1 is an interactive object where you can use a menu to select one of 224 celestial bodies of our Solar system, have it displayed and get information about it. It contains 2 parts and 9 functions in a 0.5-2.5 meter resizable object. The owner can also control and limit usage of the sphere. Brightnesses are not comparable between the bodies. Some textures are from photos of the bodies, but in many cases data is missing partly or entirely, and textures are then generic or artist's impressions. Sizes, and especially shapes, of the minor and more distant bodies are very uncertain. In many cases they should be considered "educated guesses". Small bodies are generally not spherical but irregular. Bodies are not shown to scale, but rather at the same approximate size, regardless of if it's the Sun or a moon less than a millionth the diameter of the Sun.



Is it a potato? No, it's a celestial body disguised as the Mars moon Phobos.

The Space Dioramas

Science as art, displaying rotation and revolution of the major planets and ring systems, true to axis and orbit tilts, if not to time scale.



Space diorama with Neptune and its rings, rotating and orbiting in space.

The space dioramas is a series showing the eight major planets of our Solar System, 4 of them with ring systems, in their starry environment. The dioramas contain 4-5 parts each in a 2 meter sphere. Rotation of the planets and the casting of shadows from the sun are prototypically correct regarding axis tilts and orbit inclinations, although the rotation and orbit periods are not, due to reasons of visibility. Textures and ring systems are based on scientific data. The dioramas lacks interactivity but their settings offer both pedagogical and artistic merits.

The Celestial Globe

A simple table globe displaying main solar system bodies and starry sky projections, selected by a touch-controlled menu.

The celestial globe resembles a common table earth globe, but offers a menu controlled toggle between the main planets in our Solar System, the Sun and Moon, plus star spheres with or without grids, static or rotating. The 0.5 meter globe contain 5 parts and 14 functions. It has no real scientific merit, but for very basic demonstrations, even if textures are based on scientific knowledge. Still, it is good for creating an “astronomical” atmosphere in buildings and other environments, and works well as a souvenir or gift with its simple, yet attractive, appearance.



Celestial globes as Moon and Jupiter, straddling the planetarium pond with whales.

Club Stellarium

Be a star among stars, on the space-inspired dance floor, at the celestial bar or in the cool and calm lounge.



Club Stellarium dance floor, with the bar seen through the semi-transparent floor.

Club Stellarium is a recreation area with dance floor and sitting areas, in a large sphere lined with rendering of some 2.5 million stars. The sphere is 30 meters in diameter, has three floors and consists of 288 panels, allowing for a more precise projection of star positions compared to a single large sphere in Second Life®. Interior furniture and such, comprising some 100 parts, are semi-transparent and can also be temporarily hidden to allow a free view of the starry sky. The club also has dance pose-balls and some interactive decorations to play around with.

Thoughts from Magnuz

Some personal reflections on (second) life, the universe and everything.



Magnuz of Sweden at his sky planetarium in the Second Life® region Honawan.

It's always hard to tell where things really start, but one definite starting point for me was 1972, when I became 8 years old. My father had a knack for Reader's Digest books, and he brought home the Swedish edition of Sir Patrick Moore's "The Planets and the Universe". The book was neither given to me nor pushed onto me, but it was available, and I was hooked. Even if I didn't become an astronomer, my interest in astronomy expanded into many of the interests that is part of my professional career, like mathematics, physics, chemistry, imaging, 3D and computers.

My father was responsible for my early start with computers as well. He bought one for his company in 1977, but never managed to learn it, so it became my "toy" instead. Among the first programs I wrote in BASIC for that computer was astronomical simulations of planet orbits and small "galaxies", and one of the most advanced was a two-pass (light and shadows) 3D rendering program, which I used to draw a space-ship of own design. A modern rendering of that very space-ship is actually at my new planetarium.

Today, more than 30 years later, it feels like the circle has kind of closed. I work with computers and 3D both to present one of my favorite subjects, astronomy, and to have a great excuse to refresh my sometimes rather outdated knowledge in that area. Even if I would like to, I may not manage to make a living out of it, but I'm sure having a lot of fun while working with it anyway.