



## Famous astr

Giovanni Domenico Cassini (1625-1712)

was appointed a member of the Paris "Académie des Sciences" (founded in 1667) by the Sun King Louis XIV. At end of 1669 Cassini became director of the Paris Observatory, still under construction at the time. There he discovered Saturn's moons Japetus and Rhea in 1671 and 1672, the gap in Saturn's rings (now called the Cassini Division after him) in 1675, and two other satellites of the ringed planet – Thetys and Dione – in 1684.

# The Planetarium: a Roomful of Universe

Fig. 1:  
The planetarium in Jena  
ca. 1927.

Fig. 2:  
Mechanical model  
of the solar system by  
Glikerson and Co.,  
Tower Hill, London  
(ca. 1810).

Fig. 3:  
Planetarium projector  
SKYMASTER ZKP 3/B.

The notion of plotting the sky and all its phenomena arose at a very early date. Only its implementation posed a problem. In a design similar to early small globes, a lead sphere with a diameter of seven to ten meters was conceived, inside which the stars would be represented by lamps, or made to shine by light from outside, admitted by small holes. Sunrises and sunsets were also to be displayed. Initial designs for the realization of this project required the use of a ball bearing with a diameter of five meters.



## onomers

### Christiaan Huygens (1629-1695)

was the first to discover Saturn's moon Titan in 1655, with a telescope he had built himself. With his telescope's improved resolution, he discovered Saturn's rings, which Galileo had described as Saturn's "ears", and the rotation of Mars. He resolved the trapezium in the center of the Orion Nebula into four individual stars and described other nebula and double star systems.

### Sir Isaac Newton (1643-1727)

was the author of the Philosophiæ Naturalis Principia Mathematica published on 5 July, 1687. In it he describes universal gravitation and the laws of motion: the foundation stone of classical mechanics. This enabled him not only to describe the movements of the planets as Johannes Kepler had done, but also to explain them for the first time.

### Edmond Halley (1656-1742)

applied Newton's law of gravitation to the calculation of the orbital paths of comets. He realized that the sightings in 1531, 1607 and 1682 had to be of one and the same comet, and predicted its reappearance in the year 1758.

### First thoughts

It was thanks to suggestions from Oskar von Miller, founder of the Deutsches Museum in Munich, and Max Wolf, Director of the Heidelberg Observatory, that Walther Bauersfeld designed a concept to project the starry sky, the sun, the moon and the planets. Bauersfeld's team worked hard on the design and construction of the instrument. The great moment came in August 1923 in Jena:

The first starlight from an artificial sky shone forth. In December 1923, the Projection Planetarium Model I, not quite finished, was provisionally installed in the waiting plaster dome of the Deutsches Museum. It was then transported back to Jena, and following a completion phase was re-

turned to Munich in the spring of 1925, where its official opening formed part of the festivities to mark the opening of the Deutsches Museum on 7 May 1925.

Even while the first two Model I instruments were being built, plans got under way for Model Series II. This projector already had the "dumbbell" form that was long typical of planetariums and enabled simulation of the starry sky as it appeared from any place in the world. The first Model II type planetarium was installed in Wuppertal. After that, the planetarium went from strength to strength in locations all over the world.



Fig. 4:  
The STARMASTER  
planetarium projector.

Fig. 5:  
The UNIVERSARIUM  
planetarium projector  
and ZULIP laser image  
projector.

Fig. 6:  
The Tycho Brahe  
Planetarium, Copenhagen.

Fig. 7:  
ADLIP all-dome  
laser image projection.

## Famous astronomers

**Sir Frederick William Herschel  
(1738-1822)**

was not content with observing the moon, planets and comets. He also wanted to study the stars. Since the lens and mirror telescopes in common use around 1770 were not sufficiently powerful, he began to build his own mirror telescopes. Herschel rose suddenly to fame when he discovered a new body in the solar system in 1781: the planet Uranus.

**Pierre-Simon (Marquis de) Laplace  
(1749-1827)**

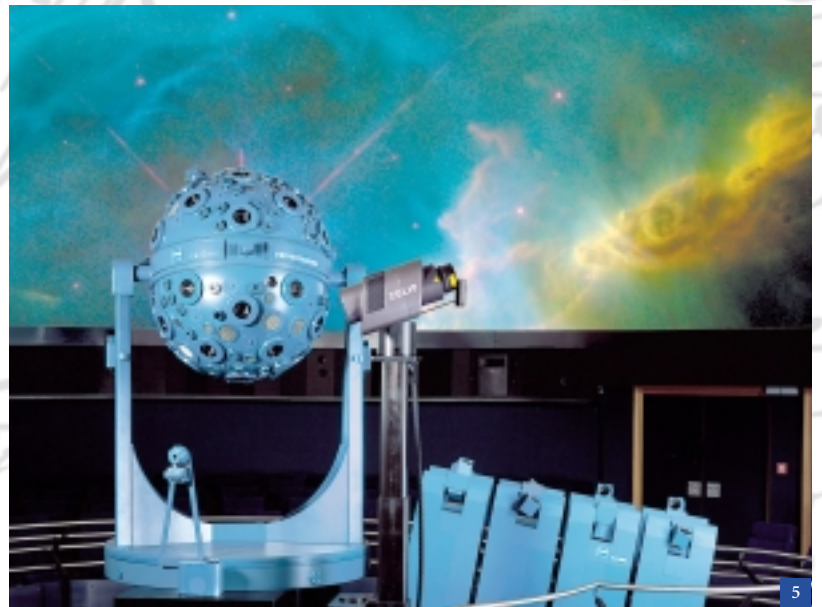
discussed the mechanical problems of the heavens in his work *Mécanique Céleste*: the reason for the tides, the orbits of the earth's moon and of the planets. In addition, he developed a theory about the creation of the solar system (Kant-Laplace theory).

**Johann Carl Friedrich Gauss (1777-1855)**

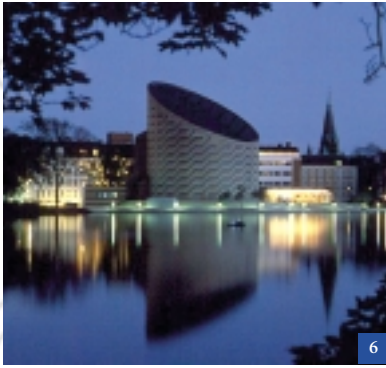
revolutionized the calculation of the orbits of celestial bodies using his least squares method, and set forth his new mathematical method in a treatise on the motion of celestial bodies in 1809.



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### Angelo Secchi (1818-1878)

split the light of the stars and the sun into their components using prisms. The breakdown of the color spectra and dark absorption lines allowed the chemical composition of the solar and stellar atmosphere to be determined: four different spectral classes were created. Secchi's pioneering discoveries are thought to have prepared the way for spectral analysis.



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### Modern technics

A planetarium's instruments are used to create an artificial night sky.

Today, fiber optic technology enables representations so brilliant that they outshine the real stars. The most promising advanced projection technology is the development of the so-called digital planetarium: the projection of full-dome video using video projectors. A particularly major step in this direction was taken with the ZULIP (Zeiss Universal Laser Image Projector), which allows mobility of the attached video projector. It operates on the basis of laser light and

creates sensationally high-contrast images of previously unsurpassed sharpness. The first ZULIP was presented during the IPS 2000 Conference at the Montreal Planetarium. The further development of ZULIP into ADLIP (All Dome Laser Image Projector) now enables the projection of dome-filling video sequences using several permanently installed ZULIPs. But whether a planetarium is small or large, visitors are always at the heart of the action.

The very first suggestion for the construction of a planetarium that would show the sky in realistic detail came from *Max Wolf* (1863-1932), Director of the Heidelberg Observatory. *Oskar von Miller*, who wanted to set up a heliocentric and a geocentric planetarium in the Deutsches Museum, took *Wolf's* idea to Carl Zeiss in 1912/13. *Walther Bauersfeld* (1879-1959) designed the first projection planetarium. He was a member of the Carl Zeiss Board of Management for 50 years. He had the idea of placing the movement of the stars, the sun, the moon and the planets within a projector that would be installed at the center of a spherical dome.