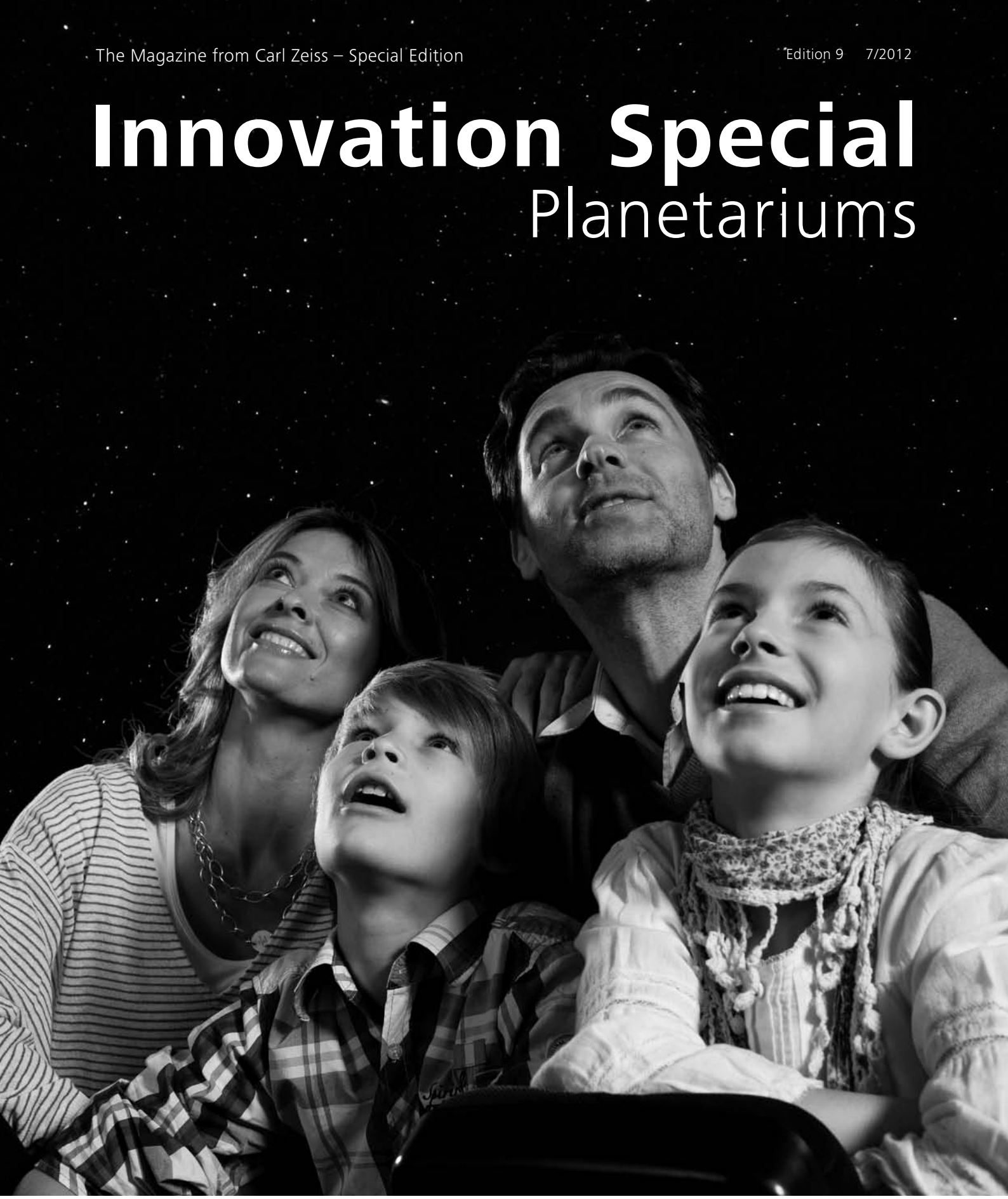
The Magazine from Carl Zeiss – Special Edition

Edition 9 7/2012

# Innovation Special
## Planetariums



- powerdome® II
- VELVET Duo
- The World's Largest Planetarium

ZEISS

We make it visible.


The moment of inspiration when he
decides to fly to Mars one day.
**This is the moment we work for.**
// INSPIRATION
MADE BY CARL ZEISS

# Editorial

## Passion to Win

*Wilfried Lang*
*Vice President Planetarium Division*

*Dear Planetarium Friends,*

Could Carl Zeiss possibly have had the slightest idea of what his fine mechanics and optics workshops founded in Jena in 1846 would have become in 2012? Could he have foreseen, at a time when a couple of his employees were screwing together the first microscopes by candlelight, that 166 years later his little business would have developed into a world famous global enterprise?

I think nobody could ever have imagined that, and I also believe that a company with such an eventful history is simply unique.

Could Carl Zeiss know, when he got Prof. Ernst Abbe of the Friedrich Schiller University to join his crew, that he was not only a highly gifted scientist, but that he would also develop into a skilful business manager and social reformer the likes of which had not been seen before? When, after Carl Zeiss' death, Ernst Abbe transformed the Company into a foundation enterprise in 1891, he enshrined in its Charter social standards for every Zeiss employee that were downright revolutionary. Ernst Abbe transferred his property of the Carl Zeiss Company to the Carl Zeiss Foundation, just as Otto Schott also contributed his stock in the Jena glassworks to the Foundation. Even today, all Zeiss and Schott employees are still bound by this Charter.

Over almost 100 years Carl Zeiss has developed into the leading optics company worldwide. At the end of World War II, the American troops saw a chance to access Carl Zeiss technologies, competences and technical human capital to secure them for the US Armed Forces. They only stayed for a few weeks in Jena, as in accordance with the decisions of the Yalta Conference the Thuringia region was part of the Russian occupation zone. They left Jena with 77 executives and scientists, including the entire management of Carl Zeiss. In this way, design plans and patents made their way into the American occupation zone, to Heidenheim in Swabia to be precise. A new factory for optical instruments was supposed to be built not far away, in Oberkochen.

After the bombings of March of 1945, the main Zeiss facility in Jena was a field of rubble. The Russian occupiers took it over with the goal of leaving only 6 % of the manufacturing capacity in Jena. Two hundred and seventy-four managers and scientists had to follow the dismantled machinery into the Soviet Union to help build up an optical industry there.

I am describing the situation as it was in around 1945 in such a detailed way because it helps assess the incredible fact that two different Zeiss companies developed in East Germany and in the West, respectively, and that they both once again attained world renown. Because the Soviets had expropriated the Foundation in Jena, the split was an essential necessity. Until 1971 the "Zeiss" brand was bitterly fought for before a London court. This resulted in coexistence, but also in harsh competition with equivalent products between Carl Zeiss East and Carl Zeiss West.

This prior history shows why the combination of the two companies as a result of the collapse of Communism and German reunification in 1989/90 was such an important step. Of course, existential fears and each unit's desire to secure its achievements for itself also rendered this process extremely difficult.

Today, 22 years later, the old story has become a success story. The joint Carl Zeiss Company is as strong as never before. Even the latest economic crisis in 2009 could not unsettle it. The Board and the staff jointly managed the situation. In the last fiscal year, sales exceeded the EUR 4 bn. mark for the first time, and the Company recorded an outstanding operating profit. Carl Zeiss employs more than 24,000 people worldwide. The Company embodies future technologies and is extraordinarily well positioned in all growth markets. We have every reason to look to the future with confidence.

If you have our Company history in mind, you may wonder how exactly the critical situations of 1945 and 1990 were mastered. Now, after I have been lucky enough to work in this company for almost 40 years, I would like to tell you that, just as there is a Zeitgeist, there is also a "Zeiss-Geist", the Spirit of Zeiss, that makes such achievements possible.

Carl Zeiss, Ernst Abbe, and Otto Schott set an example for us, and we have a responsibility towards them. And if now you ask me what all this has to do with the ZEISS Planetaria, then I'll tell you: "Just everything".

Sincerely,

Wilfried Lang

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***New Projects***



***Report***



**Publisher's Imprint**

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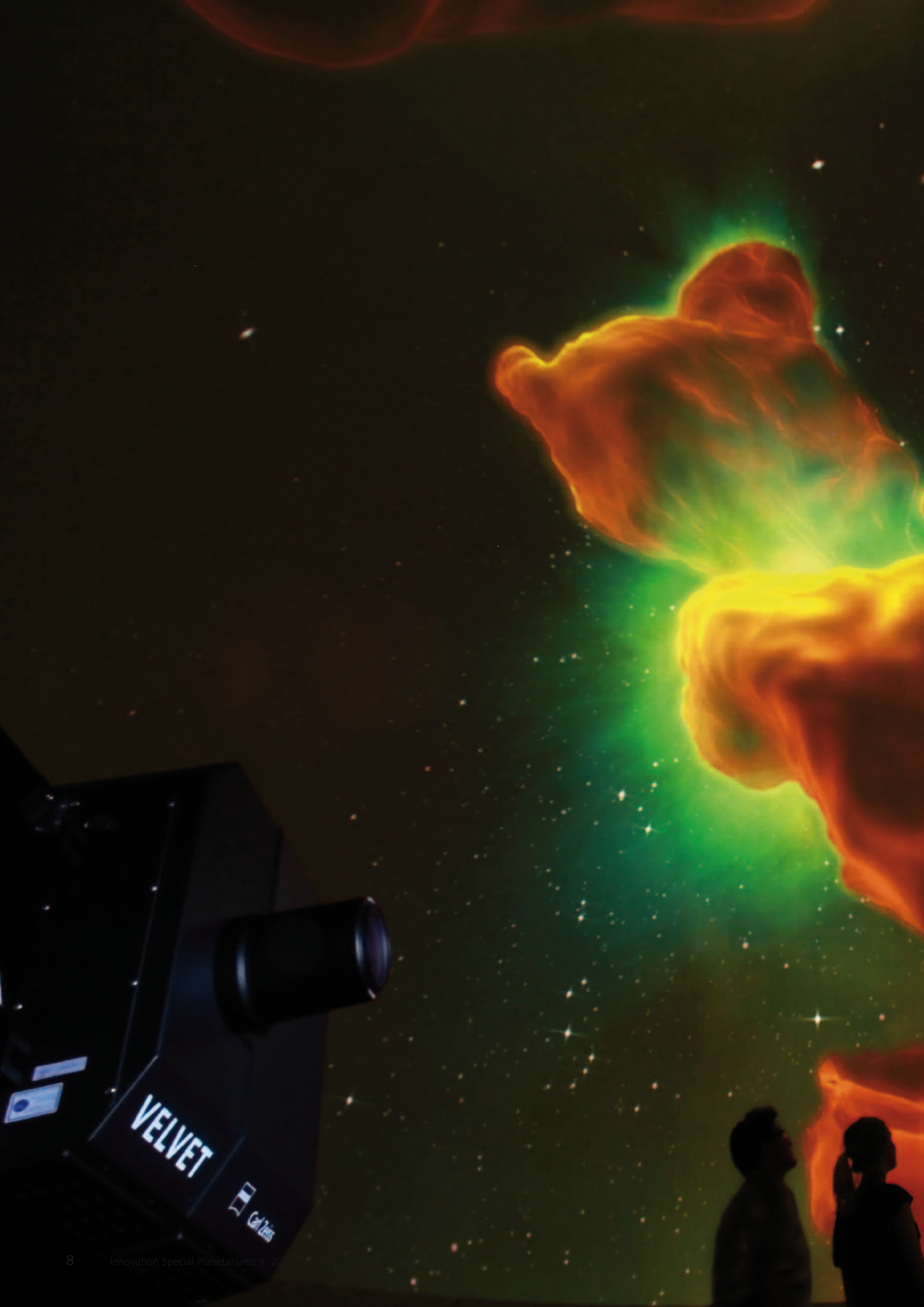

VELVET
Carl Zeiss

# powerdome® II

Since Carl Zeiss introduced powerdome® in 2006, this platform for digital fulldome projections has been in everyday routine operation in 56 facilities, mostly in combination with Carl Zeiss optical-mechanical planetarium projectors. Over the years we have repeatedly adapted powerdome to the computer hardware available while also investing in the extension and improvement of the software.

In mid-2012, powerdome® II becomes available to our customers, with new functions that by far exceed the scope of customary updates.

# Improved and extended software

*Ralf Hasse, Christian Schlager, R&D*
*Carl Zeiss, Planetarium Division*

**Analog and digital shows with a personal touch**

When we developed powerdome, we consistently followed the concept of providing users with every possibility to create their own shows, with digital audiovisual contents for dome projection in perfect combination with planetarium projectors from Carl Zeiss.

Most planetarium visitors expect shows that address them directly, reveal a presenter's personal concept, and refer to things and events of local interest. With powerdome, you can prepare fulldome shows with no need to be skilled in scripting, 3D modeling and rendering. Operate the planetarium projector in the usual way, use the same operating panel to control digital planetarium functions, and make use of diverse digital resources which you have previously positioned on the timeline and now can call up for playback. By animating these resources, i.e. by adaptation and variation of parameters such as position, color, movement, text, sound volume etc., you can create fulldome presentations the easy way.

**Classical planetarium and fulldome video with powerdome**

With powerdome you can easily and quickly use your digitized planetarium contents for projection, the simplest way being the playback of fulldome videos. We have made a point of saving our customers unnecessary cost. Fulldome videos can be encoded from dome masters with the encoder that is integral with powerdome. In this way you create fulldome videos from dome master frames on your own, without needing help from Carl Zeiss or engaging slicing and encoding services at costs that my add up to several thousands of euros per year with other fulldome systems. With powerdome you have got at hand everything you need to create and play fulldome videos.

Since, in playback, powerdome also performs channel distribution, geometry correction and edge blending computation in real time, fulldome videos and powerdome shows, once encoded, can be played on all powerdome®Systems. All fulldome shows sold and delivered by Carl Zeiss come encoded and tested. As a powerdome customer you only need to copy the show to your system in order to present it.

**New capabilities with powerdome® II**

Fulldome systems delivered by Carl Zeiss from the summer of 2012 will come with the powerdome® II platform. This version offers users many added capabilities, which have been integrated after extensive exchange of experience with powerdome users.

**Control of 3D models**

With powerdome® II, 3D models (DirectX®) can be loaded and controlled. The parameters needed can be animated and permit control of the properties assigned to the 3D models. For example, you can control the hatches of a space shuttle or the solar collectors of the ISS.

The new function allows 3D objects to be projected and animated realistically and in real time. Otherwise, such presentations can only be done with complex and expensive 3D software and in an indirect way via video programming. Carl Zeiss will supply a library with several 3D models. Of course, every customer can load and animate their own models.

*3D model of Space Shuttle.*

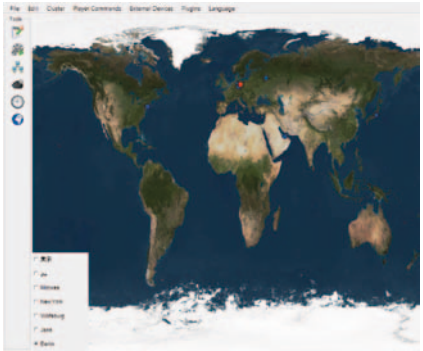
**Plug-ins for expanded functions**
The new plug-in interface makes it possible to add new system components to powerdome. This means that such components, if desired, can be programmed and installed subsequently without affecting the system kernel. This makes powerdome expandable and open for special requirements.

Examples of plug-ins already implemented are Earth View, Slide Show Creator and Show Package:

*3D Earth View*
This plug-in presents the Earth in three dimensions, with its day and night sides, its atmosphere, clouds, and (separately selectable) axis of rotation. The plug-in replaces the traditional map projector of analog machines and provides additional functions.

- Travel to geographic positions is by direct live operation, by animation or by coupling with a ZEISS star projector.
- The transparency, position, rotation and various other model properties can be animated.
- Markers for a geographic location can be varied in shape, color and size.
- You can integrate the plug-in into show programming and live presentations in a varied ways.

*Slide Show Creator*
This plug-in allows you to compile a slide show in powerdome with a few mouse clicks. This is helpful especially if you want to use powerdome to present pictures provided by a lecturer. The pictures selected and the parameters set make up a slide show you can present immediately.

*New Earth View plug-in: Views in the Player (dome view) and the ShowManager.*

- Select any number of pictures by the drag & drop method.
- Define fade-over parameters and the presentation time per frame.
- Define whether the sequence is to be stopped automatically with each frame.

*Show Package*
Frequently, the resources of a show are in different directories. With this plug-in you can package all elements belonging to a show for transfer from your workstation to other powerdome systems. All resources of the show are copied to a common, freely selectable directory, so that even in a complex show no files will get lost.

**Higher definition in fast movements**
Since several years ago, a frame rate of 30 frames per second (fps) has become established as a standard for the playback of fulldome videos. This rate yields good fulldome presentation in general. In quick movements, though, blurs and double images (especially of stars) appear as soon as the object position differs by more than a certain limit from frame to frame. Doubling the frame rate will half this limit difference – the projected video gets sharper, and double images are avoided.

In powerdome, contents shown in real time are generally presented with a frame rate of 60 Hz. To be able to project fulldome videos at 60 fps, the encoder and the player have been adapted. You can create and project fulldome videos with your choice of classical frame rates or 60 fps. If available, the latter should be chosen for new show productions.

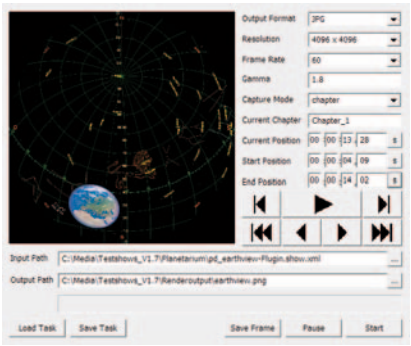
**Improved ShowManager**
Programming of the ShowManager has been improved in several parts without interfering compatibility with shows created previously.

As added capabilities, whole chapters can be exported or imported, and show elements can be grouped, copied and shifted across chapter borders.

**Fulldome video from powerdome**
An optional module available with the new powerdome version allows you to create a fulldome video from a timeline-programmed fulldome show.

The powerdome®ShowRenderer renders dome masters from the show elements in the ShowManger as well as from the functions of the SKYCONTROL digital planetarium. Resolution and frame rate are selectable. The exported dome masters can be used to create fulldome videos for other fulldome systems.

The ShowRenderer can also be integrated in a work flow for the subsequent encoding of the dome masters. In this way, a fulldome video can be created from a powerdome show more or less over night. The sound needs to be saved as a separate audio file, as common in powerdome.




*User interface of powerdome®ShowRenderer.*

The powerdome®ShowRenderer can create dome masters also with 60 fps, which may be useful in case of real-time components.

**Theater control with powerdome**

Powerdome offers ways to communicate with other systems. We have implemented user-defined interfaces and protocols, which can be adapted for other control systems without major programming efforts. What is needed is compatible protocols written in ASCII characters.

Some examples:

- Communication with all current Carl Zeiss planetarium projectors
- Protocols for light control systems (lamps and LED illumination)
- Room light control systems
- Protocols for projector control systems of fulldome systems
- Communication with sound systems
- Communication with sound computers (e.g., Spatial Sound, Fostex)
- Communication with earlier planetarium projectors that have already been fully or partially automated by project-specific control systems (e.g., ZKP 1, ZKP 2)
- Standardized interfaces: DMX, RS232, RS424, RS484, Ethernet.

**ShowManger in several language versions**

The ShowManager, the user interface of powerdome, is available in several languages with immediate effect. Further language versions will be made as required. The shows are stored in such a way as to be executable in all language versions. Comments and explanations will, of course, remain in the language in which they have been written.

**powerdome®WebInterface**

We have developed the original remote control into a Web interface and provided it with many additional functions. This means that you can use any device featuring a browser application for remotely controlling powerdome, including many planetarium functions.
Start shows from a smartphone, iPad, iPod touch or from a PC connected via WLAN.

The Web interface contains a user interface for the digital planetarium, with many controls and tools for controlling the planetarium functions. For example, you can vary the color and brightness of all 88 constellation overlays, stick figures and constellation borders.

With the WLAN integrated in powerdome you can offer your planetarium visitors access to the Web interface. Visi-


*powerdome®WebInterface with planetarium functions (Firefox).*


*Web page for selecting a show (Safari).*

*Digital planetarium applications in powerdome.*

tors bringing their smartphone or other device with browser application can interact. The powerdome®WebInterface offers many ways of simultaneous interaction, e.g., in a quiz: Ask a question, and members of the audience can choose from several answers shown on their browser-capable devices. The correct answers are saved to a database, and a list of the best contestants will be shown on the dome.

Another possible use is voting. Have your audience take part in a majority decision on which show or sequence to be played. Viewers can read descriptions on their smartphones and vote accordingly. The votes cast will be shown on the dome.

The Web interface offers show producers novel capabilities to involve audiences. You can make use of freely available Web technologies such as SQL databases, php and Javascript for creating interactive show contents. We think that our powerdome®WebInterface is an extremely useful solution for remote control and an interesting approach to audience interaction.

**Extended integration of Uniview**

With the Uniview program package, users can expand their systems by a visualization platform for three-dimensional presentation of the observable universe. Powerdome® II offers the capability for all system commands admissible in Uniview to be placed on the timeline or actuated directly. This yields entirely new possibilities of integrating Uniview in the course of a show, among them the direct invocation of bookmarks, selection of time and place, and selection of a celestial body even before Uniview takes over. In this way, smooth transition from analog planetarium projection to the 3D sky and the combination of star projection with 3D effects can take place without the audience noticing any jump.

**Autocalibration**

Camera-based automatic geometry correction, originally developed for powerdome®VELVET, is now available for all other projection systems with mechanical masks. Autocalibration is not tied to powerdome® II but can be retrofitted to systems supplied earlier. Once it is installed, the user can effect geometry correction at any time. Autocalibration ensures consistent, exact adjustment, with the least time involved, and independent of the skill of a service engineer. For an eight-channel system, the procedure will take between 15 and 30 minutes, depending on computer power. Once performed, the calibration need hardly ever be repeated. As a rule, readjustment is only necessary after maintenance work on individual projectors.

**Remote maintenance for powerdome and planetarium projectors**

For some years we offer remote maintenance services at a cost for powerdome systems and optical-mechanical planetarium projectors. On the user's request we access their selected computers for express help in case of questions or problems. We can collect log files from the systems or monitor projectors. Remote service is offered on a variety of levels – from online help in operation and maintenance to regular updating of powerdome and Windows.

Since we introduced this scheme some years ago we have had positive responses from customers. If our specialists can have remote insight into customers' computers it is almost as if they sat right in front of them: They can diagnose and remedy faults, or be well prepared should a service trip become necessary nevertheless – a procedure that saves customers a lot of time and money.

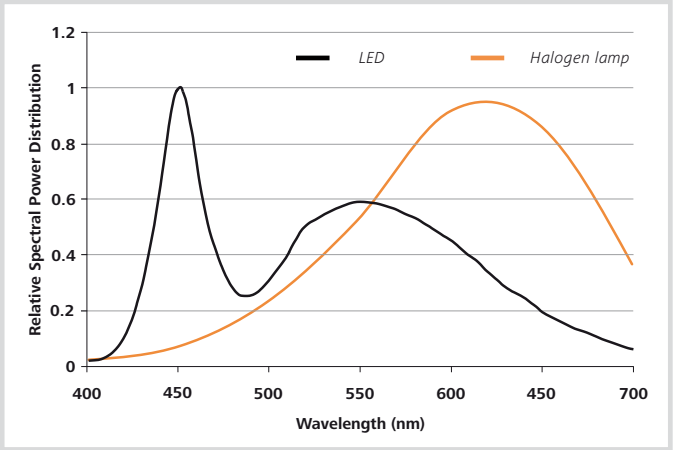
# Stars of the Latest Generation

*Thomas Dannberg*
*Product development,*
*Carl Zeiss, Planetarium Division*

Since the launch of our SKYMASTER ZKP 4 Planetarium, the projection of the starry sky onto small to medium sized domes has gained enormously in brilliance and realism. This is due to the adoption of glass fiber projection principle pioneered in our UNIVERSARIUM and STARMASTER starballs. As a result, the brightness of the stars was stepped up by a factor of ten, while lamp power was reduced to 50 %. Part of the light gain is used to enhance the realistic impression of the stars by making them smaller.

**Yet more brightness and brilliance**

White-light LEDs (light-emitting diodes) have been on the market for a number of years, but it was long before they advanced in performance to a level efficient enough for star projection. Meanwhile, high-output LEDs are available and give good service in the latest generation of our SKYMASTER ZKP 4, adding another marked improvement to star and planet projection. The optical properties of high-output LEDs used instead of halogen bulbs pay off several times over.




*Spectral distribution of the LED compared to the halogen bulb (manufacturer's data).*

**Favorable light spectrum**

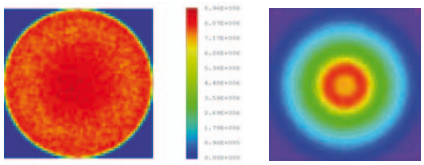
Given the nearly continuous spectrum of the halogen bulb, the lens had to be corrected for the entire visible range. The LED, by contrast, requires a partial spectral range only, which allows the imaging quality to be enhanced considerably. Furthermore, the color temperature of the LED used is 6,500 K, which is substantially closer to the stars' natural whiteness than the reddish halogen light.

**Higher luminance**

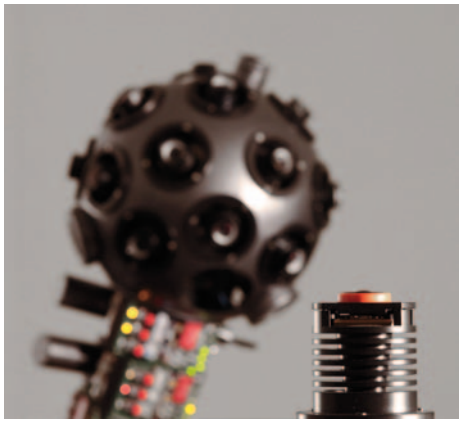
The entire light of the LED (approx. 2000 lm) is delivered by an area of 3 x 3 mm² only. The resulting enormous luminance and a newly designed aspheric condenser system permit us to increase star brightness three times compared to the halogen bulb.

**Better light distribution**

The mechanical structure of the halogen bulb with parabolic reflector causes annular zones differing in illumination and changing with the lamp life. The LED emits its light extremely uniformly over the chip area, which makes for substantially greater efficiency in light utilization.

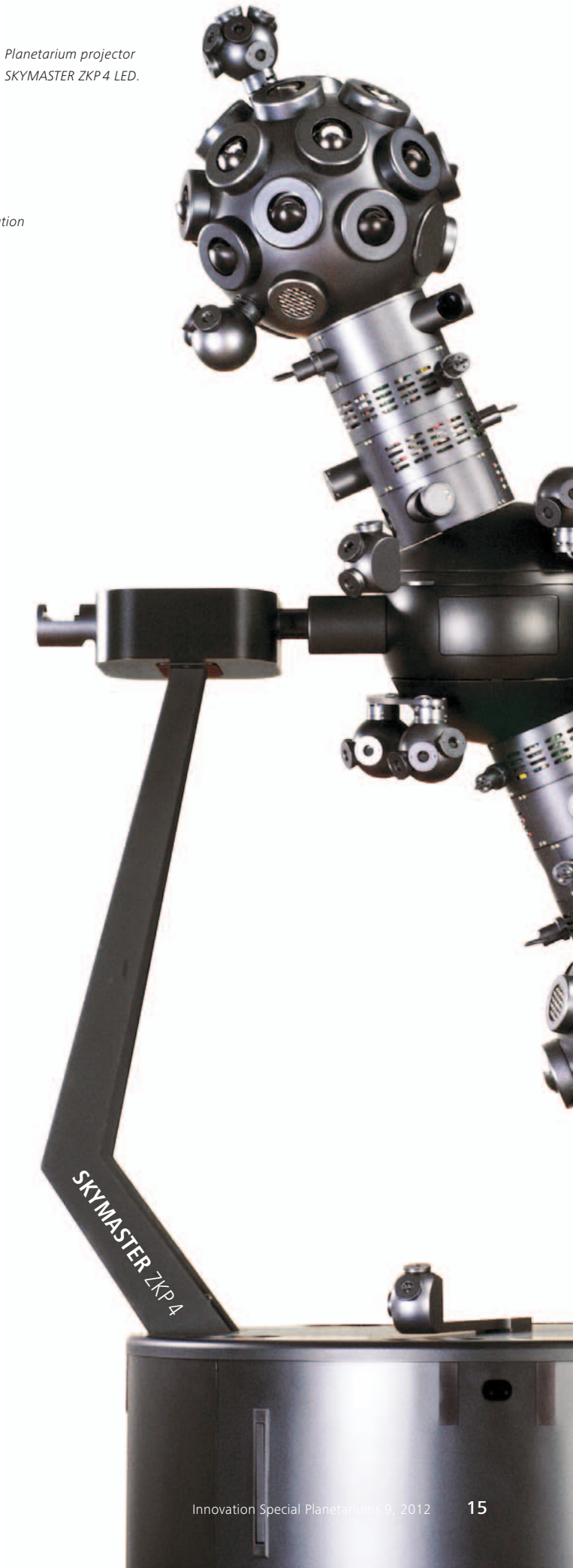


*Light distribution of the LED (left) compared to the halogen bulb (right).*



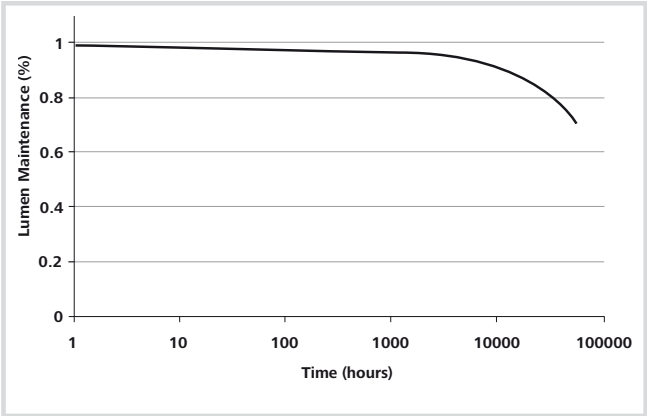
*LED fixed stars illumination device for ZKP 4.*

*Planetarium projector SKYMASTER ZKP 4 LED.*




**Lower operating costs**

For star projection, we have reduced power consumption from 2 x 105 W (halogen lamps) to 2 x 35 W (LEDs). The lower heat load further permits us to use lower-power fans, which give off lower noise. Last but not least this is somewhat friendlier to the environment. A point not to be disregarded is the extremely long life of the LEDs. According to the manufacturer's specs, the luminous flux after 60,000 service hours is still about 70 % of the starting level. By contrast, the halogen bulb has a life of 1,000 hours at maximum. Thus, LEDs appreciably reduce the operating costs of the ZKP 4.




*Light output of the LED as a function of service life (manufacturer's data).*

**LEDs for Sun, Moon and Planets**

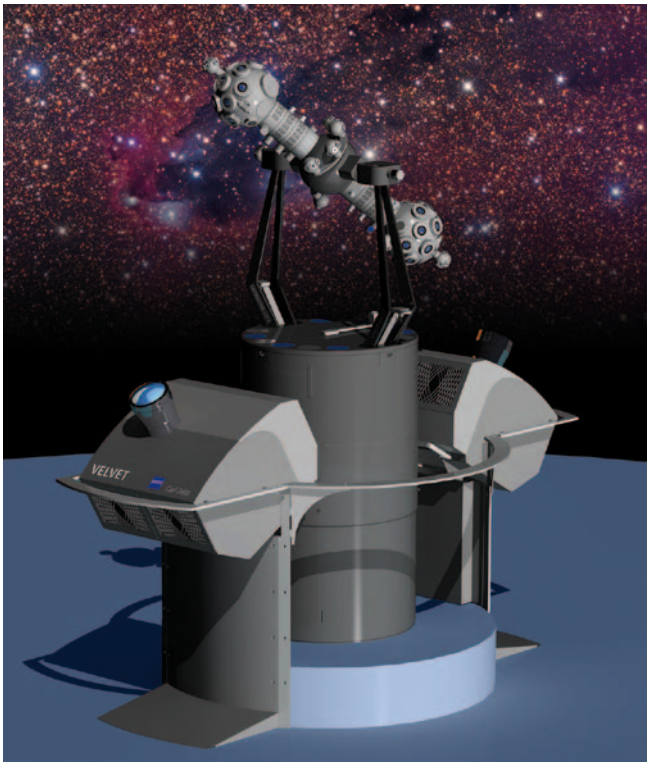
To adapt the projection of Sun, Moon and the planets to the improved quality of the starry sky, LEDs are used also for these celestial bodies. The natural colors of Sun, Earth and Mars are reproduced by means of color filters.

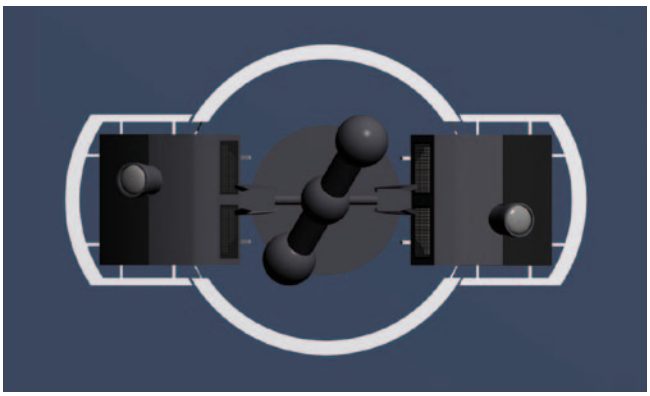
**Retrofitting possible**

To make the advantages of LED illumination available to users of a SKYMASTER ZKP 4 equipped with halogen lamps, we have designed a conversion kit for retrofitting LED lighting.

# VELVET Duo

*Ralf Hasse, Head R&D*
*Carl Zeiss, Planetarium Division*



*Configuration example: SKYMASTER ZKP 4 with VELVET Duo for domes up to 12 m in diameter. Artwork: Klaus Fankhänel.*

In developing VELVET projectors, Carl Zeiss followed its ongoing ambition to offer its customers increasingly better projector solutions for use in planetariums. Thanks to our wealth of experience in making optical instruments and to leading-edge manufacturing technologies, we saw a chance to creating a projector that would remedy the most serious shortcoming of all commercial video projectors. VELVET delivers an absolutely black image background – a prerequisite for unimpaired superimposition of analog star and digital video projection.

Developing such a projector for small-lot production is a commercial risk. Many technological obstacles had to be overcome – which we did, not least thanks to close cooperation with our users. Our sincerest thanks are due to the first purchasers of a powerdome®VELVET system for their confidence in this new technology.

Meanwhile there are six permanent VELVET installations, and three more orders have been landed. The response to the projection quality is exceedingly encouraging. All our VELVET customers report increases in attendance figures.

At present we are pursuing two further advancements: an increase in resolution by employing DLP® chips with WQXGA resolution (1600 lines), and the configuration of systems with two VELVET projectors for small domes (VELVET Duo). The new set of chips will be used in all VELVET projectors ordered from now on. A VELVET system configured with six to eight image channels, as recommended for large domes, achieves an efficient resolution of 4 k; with ten projectors, this figure is pushed to 5 k plus.

For domes up to 12 m in diameter, we can offer a two-channel solution with close to 3 k resolution. The projectors are arranged at the periphery or next to an existing central planetarium projector.

In actual operation, the image geometry has proved to be stable in all VELVET systems installed. In case of a lamp change or projector replacement, corrections may become necessary. For automatic calibration we have designed a camera system to be permanently installed at the dome periphery. It will perform automatic calibration within about 15 minutes.

*VELVET Configuration examples*

| **Dome diameter** | **12 m (40 ft)** | **15 m (50 ft)** | **18 m (60 ft)** | **23 m (75 ft)** | **25 m (82 ft)** |
|---|---|---|---|---|---|
| Channels | 2 | 5 | 6 | 8 | 10 |
| Placement | center / periphery | periphery | periphery | periphery | periphery |
| Resolution (ca.) | 3 k | 4 k | 4.5 | 5 k | 5 k |
| Pixel size (') | 3.9 | 2.3 | 2.2 | 2.1 | 1.9 |

# SPACEGATE Nova

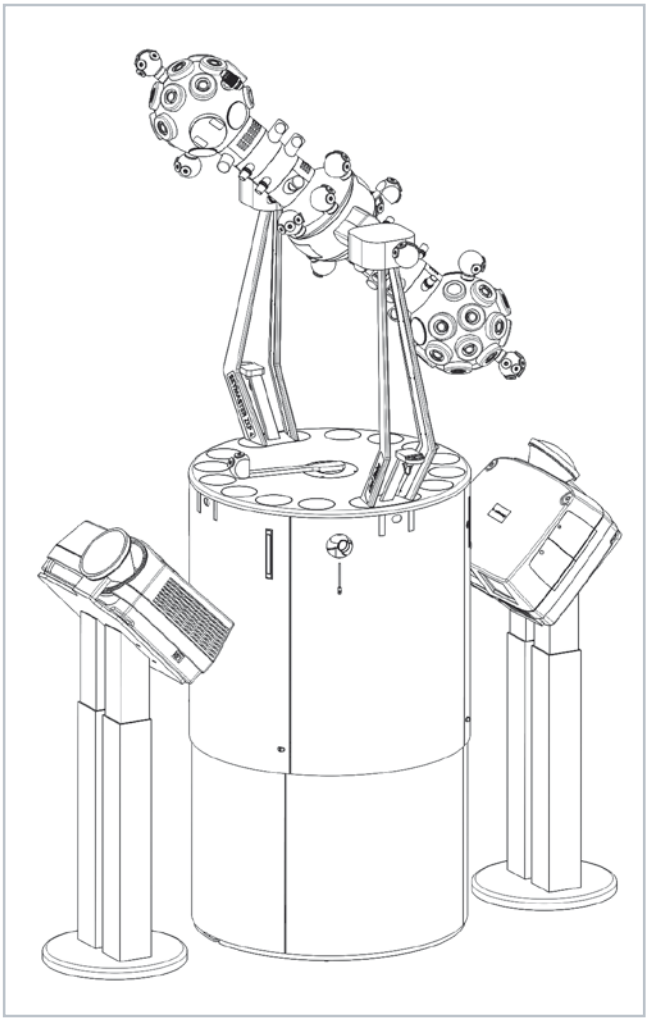
*Ralf Hasse, Head R&D*
*Carl Zeiss, Planetarium Division*

Recent years have seen a rapid development of digital projection solutions for various applications. At first sight, any commercial video projector with a wide-angle lens might be eligible for multichannel dome projection. However, in developing and launching a fulldome system we accept responsibility for the long-lasting quality of image projection, compatibility with optical-mechanical planetarium projectors, suitable control interfaces, and optimum projector arrangement. The merit of a fulldome system is defined by many factors. From the start, Carl Zeiss excludes commercial projectors that have a planned service life of a few years only and whose image quality visibly deteriorates within a few thousand operating hours. We set ourselves high standards with regard to image definition, contrast and brightness.

Our SPACEGATE Nova is a concept for multichannel fulldome solutions based on a variety of video projectors, which we have thoroughly tested for their dome projection capability. With a broad spectrum of possible configurations, we can satisfy individual user requirements. Which projector is chosen depends on dome size, the required brightness and contrast levels, serviceability in the respective country, and, finally, on the budget. SPACEGATE Nova, therefore, is not a system with a one-for-all specification but will be configured for the specific project. Some versions such as the Duo solution with two DLP projectors made by projectiondesign we regard as semistandard, as they can be employed in many dome theaters without major adaptation work.

In most cases, SPACEGATE Nova can be used jointly with planetarium projectors. Its combination and synchronous use with current Carl Zeiss opto-mechanical projectors is made possible by the powerdome software.

For SPACEGATE Nova, too, we offer camera-based automatic projector calibration. It permits automatic correction of the geometry of the fulldome image – a correction that may be needed seldom or more frequently, depending on the projector type.



*Two-channel SPACEGATE Nova with F35 projectors and SKYMASTER ZKP 4 for domes up to 12 m in diameter. Artwork: Carl Zeiss.*

*Selection of projectors suitable for SPACEGATE Nova*

| **Manufacturer** | **proj. design** | **proj. design** | **JVC** | **Sony** | **Sony** |
|---|---|---|---|---|---|
| Type | F32 | F35 | RS55 | T110 | T420 |
| Technology | DLP | DLP | D-ILA | SXRD | SXRD |
| Resolution | 1920 x 1200 | 2560 x 1600 | 1920 x 1080 | 4096 x 2160 | 4096 x 2160 |
| Brightness | 2900 lm | 2900 lm | 1200 lm | 11,000 lm | 21,000 lm |
| Contrast | 7500 : 1 | 8000 : 1 | 80,000 : 1 | 2500 : 1 | 3000 : 1 |

*SPACEGATE Nova Configuration examples*

| **Dome diameter** | **8 - 12 m (26 - 40 ft)** | **12 - 15 m (40 - 50 ft)** | **12 - 18 m (40 - 60 ft)** | **18 - 20 m (60 - 66 ft)** | **20 - 25 m (66 - 82 ft)** |
|---|---|---|---|---|---|
| Channel | 2 | 9 | 6 | 8 | 2 |
| Projector | F32 / F35 | RS55 | F32 | F35 | T420 |
| Placement | center | periphery | periphery | periphery | periphery |
| Resolution (ca.) | 2 k / 2.5 k | 4 k | 3 k | 5 k | 4 k |
| Pixel size (') | 5 | 2.6 | 3.2 | 2.0 | 2.7 |

# SKYMASTER ZKP 3 Upgrade 2012

*Ralf Hasse, Gunter Helmer, R&D*
*Carl Zeiss, Planetarium Division*

*SKYMASTER ZKP 3 (1993-2005).*

Almost 20 years have passed since the first installation of a SKYMASTER ZKP 3 small-dome planetarium – years that have seen substantial improvements in computer hardware, control technology and operating software. Since fulldome systems began to enter planetarium domes, there has been a growing interest to couple them with the optical-mechanical star projector.

**New upgrade 2012**

Several years ago we had developed an upgrade that turned the ZKP 3 into a ZKP 3B with modernized hardware and a comprehensive extension of operating capabilities. The rapid development of electronics prompted us to design a new upgrade for SKYMASTER ZKP 3 and ZKP 3B users, which is based on the software and control hardware of the current model ZKP 4 and became available early in 2012. With this upgrade, users secure the further serviceability of their planetarium control systems and get hold of another extensive supplementation of operating functions. The upgrade cannot, of course, implement all functions of the SKYMASTER ZKP 4, since the analog mechanisms of the ZKP 3 remain unchanged.

**New control technology**

The kit includes a new control computer with modern features and the current SKYPOST operating software, which permits intuitive control of the planetarium projector on the basis of MS Windows®.

The user interface meets up-to-date standards, and simplifies command input and programming. In the Edit mode, control commands can both be entered and executed manually. During live operation, the system automatically logs all commands; playback is possible either with time control or via synchronizing signals.

The software provides analog and digital displays of the current hardware settings. The time of the day and the geographical longitude now are the preferred parameters for projector control. The previous setting in terms of sidereal time is advantageous in certain cases only.

**Digital planetarium**

The new upgrade kit provides all prerequisites for coupling the SKYMASTER ZKP 3 with a Carl Zeiss fulldome system. Both systems are jointly controlled by powerdome. With powerdome, the user gets a comprehensive digital planetarium, suitable for both live operation by means of the operating panel, and programmed playback.

**Installation**

Carl Zeiss service engineers will install the upgrade and brief users about the new operating procedures. As an option available with the upgrade, users can contract Carl Zeiss to perform remote system diagnosis and maintenance, provided the control computer is accessible via the Internet.

# ZKP 3 Upgrade: It's Fun to Work With!

*Jens Kandler, Drebach Planetarium and Observatory*

In mid-March, 2012, the Zeiss Planetarium in Drebach (Germany) had the control system and the software for its SKYMASTER ZKP 3 planetarium upgraded. This was the first step towards preparing the planetarium for the future integration of digital projection systems.

**Live operation**

After we started the new "SKYPOST" control software, the monitor screen welcomed us with a lot of display windows, indicating the many capabilities offered by the new control system. The user interface can be adapted to individual requirements. In the past, there were "only" the current hardware settings for date, sidereal time and geographic latitude, whereas now we have the possibility of monitoring the entire planetarium sky. A very useful item, the illumination control display, shows us at a glance which projectors (e.g., planets) are active at a time.

The control upgrade included a new operating panel. The new button assignment, additional functions, and the possibility for buttons and potentiometers to be assigned other functions make up a new level of operating convenience. Planets can each be controlled separately now, rather than in two groups. With the novel SOSY function, all planets, Sun and Moon can be operated simultaneously. In Drebach we also use the Solar System, Jupiter, Comet and Satellite Projectors. These supplementary projectors of earlier generations are supported by the upgrade as well and can be controlled from the new panel. As an exception, the shooting star projector now runs at a uniform speed according to our specification.

The presenter, who starts his live show with a sunset, used to have a lot of work to execute all functions at the proper times. With the new software, he or she only needs to concentrate on the diurnal motion. By default, the control system automatically operates the dome and horizon lights and controls the brightnesses of stars and planets.

The convenience of the new control system also shows itself in useful links that can be established between several functions. If desired, the map will automatically appear when the operator changes the polar altitude. Manual control of the motions via the potentiometers is much more sensitive now. Complex processes such as the Sun's analemma can be readily demonstrated.

The new control system makes available twelve instead of the earlier eight discrete levels for function control. This took some time to get used to, but after a few weeks we got to know the ropes.

The HOME function is now provided not only for the motions but also for brightness parameters. That way we can define selectable brightness levels, e.g., for the stars or the constellation figures, which also makes for longer lamp life.

**Automatic control**

Thanks to our experience in programming with the old MS-DOS software and to training received from Carl Zeiss staff, we were soon able to cope with the new programming. So far we have had to consult the detailed operating manual in exceptional cases only.

When entering cues at the keyboard you cannot make mistakes. The software checks the syntax and displays all parameters available. An incorrect cue entered will not be taken over by the program.

Setting the time of day is a fundamental improvement. Now you can specify any time on any date for the sky aspect to be projected. A single command will simulate the night sky as seen at the programmed time. In addition to the geographic latitude, the geographic longitude can be used as a parameter. So we can set the starry sky over any location on Earth and for any time.

*Photo credits: Drebach Planetarium.*

Programming is much easier now. Cues, or groups of cues, are arranged on a timeline, on which they can be shifted. Related cues can be grouped. A "finished" program can be inserted into another program as a group.

In the past years we have compiled a lot of program files for our automatic shows. We convert these into the new format by means of software supplied by Carl Zeiss with the upgrade – a measure that makes sense, given the new capabilities.

**Summary**

It is no problem to master interactive operation during live shows or to play back pre-recorded shows. After three months, we do not claim to have utilized the full scope of capabilities of the new control system yet. One thing is certain, though – it's great fun to work with it!

**"Credentials"**

Zeiss Planetarium and
Volkssternwarte Drebach
Milchstraße 1
09430 Drebach
www.sternwarte-drebach.de

ZEISS SKYMASTER ZKP 3
Opening: 1986
Upgrade: 2012
Dome diameter: 11 m
Seats: 70

# First 2-channel Hybrid Planetarium in Europe

*Stefanie Neuhäuser, Carl Zeiss*

The first Hybrid Planetarium comprising a 2-channel fulldome system and an opto-mechanical projection machine in Europe was put into operation in Italy in December 2011. In Cagliari, the largest city of Sardinia, Carl Zeiss installed the first SPACEGATE Nova fulldome system together with a SKYMASTER ZKP 4 star projector.

SPACEGATE Nova designates a dome projection system into which Carl Zeiss integrates selected commercially available projectors. At the Planetarium of Cagliari, two F32 projectors (projectiondesign) are arranged close to the star projector at the dome center. SKYMASTER ZKP 4 and SPACEGATE Nova work in perfect synchronism.

**"Credentials"**

Il Planetario
de L'Unione Sarda
Piazza L'Unione Sarda
09122 Cagliari
ITALY
planetario@unionesarda.it
www.planetariounionesarda.it/

ZEISS SKYMASTER ZKP 4
powerdome®SPACEGATE Nova
Opening: 2011
Dome diameter: 10 m

# Refurbishment of Dome Surfaces in Planetariums

*Adrienne Ruhnau*
*Der Maler Ruhnau, Drebach*

Renewing the paint coat of the perforated projection surface of a planetarium dome must ensure the necessary homogeneity and therefore calls for special knowledge and skill. The surface must be painstakingly cleaned, the perforations must not be clogged with paint, and sheet-metal edges require particular attention.
A company in Drebach known as "der maler ruhnau" is specialized for spray-painting planetarium domes and works as a partner of Carl Zeiss AG.
The company uses a special spraying method for dome surfaces. After cleaning with compressed air, paint is applied in several layers. The paints are free of any solvents and have been tested by Carl Zeiss for reflectance and gloss. The paint is sprayed on obliquely relative to the perforation, at a computed angle. The result is a neat, homogeneous coat system including the circumferential surfaces of the holes.
During these jobs, the equipment in the planetarium must be protected against impacts and dust. Carpeting is covered with dust-proof sheeting. The workers at the dome surface are supported by telescoping working platforms or scaffolding.
Reference jobs carried out by the company include the following:

- Zeiss Planetarium of Drebach, Germany
- Kassel Planetarium, Germany
- Zeiss Planetarium Bochum, Germany
- Planetarium minikosmos Lichtenstein, Germany
- Kreuzlingen Planetarium, Switzerland
- Brügge Planetarium, Belgium

# Quo vadis, Planetarium?

*Wilfried Lang*
*Carl Zeiss, Planetarium Division*

I already wondered about this a few years ago and shared my ideas with all of you at the time. Today, I take the liberty to repeat this question now, after almost 20 years of working in the planetarium and telescope development area at Carl Zeiss and more than 20 years of responsibility for the planetarium business at Zeiss, and after gaining a great deal of experience with digital fulldome systems. I would like to emphasize that these are my personal thoughts, and that each of you is free to reflect on the extent to which they may apply to your own planetarium, or not, or whether you can identify with them at all.

**Fulldome systems and their attributes**

A couple of years ago I was not yet able to realize to what extent fulldome systems would revolutionize planetariums, but today I can come to a clear conclusion: for many planetariums, fulldome systems are more of a curse than a blessing. This conclusion of mine will certainly come as a great surprise to most of you, because particularly we here at Carl Zeiss have offered a great many innovations in this area to planetarium users. However, hidden behind attributes such as modernity, currency, multimedia, flexibility, and interaction, which are generally considered to be associated with fulldome systems, are many facilities of which one could easily say the exact contrary. There, the standard has distinctly dropped. This concerns both the projection quality and also the quality of the planetarium shows themselves, because the purchase of a fulldome system quite often also results in scientific personnel being dispensed with. After all, today a push of a button suffices to "play planetarium". Frequently this follows the sales pitch of our competitors, who would like to make believe that an opto-mechanical projector is today superfluous, and that it can be replaced with digital projectors with ever higher resolutions and ever greater brightness. Of course, the experts among you know that this is certainly not the case. A night sky in which a star that is only just barely visible in nature is represented with a pixel and brighter stars with n times a pixel is after all just a generic sky, which bears no relation to what can really be seen in nature, quite apart from the gray color of the background of all standard video projectors that all our competitors have to make do with. 3D animations and computer clusters with up to 50 individual computers are now supposed to suggest greater modernity. The only thing is that, in addition to a technology that is far too complex, these new systems also involve production costs that climb to literally astronomical heights. Live events and interaction with visitors, as we understand it at Carl Zeiss and as can be expected by visitors in a good planetarium, are barely possible with such technologies.

**A downward trend in spite of a shift in technology?**

Until now I have not said anything about the quality of the planetarium events or performances on offer. Here, too, some people think that the new fulldome technology makes everything incredibly and wonderfully modern, especially if the shift in technology also involves a change of generation in the planetarium personnel. After all, the idea behind it all is to get rid of the old mustiness associated with planetariums once and for all.

Just take a look at the result in the many planetariums of the world: the former planetarium has been remodeled into a dome cinema, in which commercially shows are, at best, voiced over into the relevant country's language. Yes, a big hello from IMAX! And yet the comparison with the IMAX is not entirely fair, as it did, and still does, potentially offer quality in terms of both content and the projection technology. And yet it has not been possible to stop the downward trend.

This downward trend, in reality a slow death, will take place much faster in the planetariums that are operated in this way, because the content of the shows is often more than poor as a result of inadequate production budgets. In the planetariums managed in this way, the interaction or communication with

visitors is limited to instructions as to how they should behave in the dome room, such as switching off cell phones, not using flash cameras, or information about the location of the emergency exits. How, I wonder, are planetariums supposed to be operated in a sustainable manner? What visitor would choose to go to a planetarium of this kind a second time?

**Is there a way out of this dilemma?**

From my point of view, it is necessary to go back to the unique characteristics of a planetarium. This has nothing to do with a "fusty image" – on the contrary, the planetarium must serve its assigned niche market, no more and no less. It needs to be a place in which knowledge is communicated, a feel-good place, a quality experience. This starts with the highest possible image and show quality, continuing via the overall ambience, all the way to the appropriate seating. The visitor must feel personally invited, as if he or she were a guest at somebody's home. Guests who would be welcome back, whether at home or in a planetarium, want to be personally greeted and entertained, and should also be able to ask questions or make contributions for personal interaction. For this, pre-produced shows are not enough – what is needed are people who have something to share in their special area of knowledge, people from whom we can learn something. Live shows and interaction are the best tools to achieve this purpose. The communication of knowledge does not need to be limited to astronomy – there are many other interesting topics. Musical shows, for example – why not? Anyone who like it will return. Live events under the night sky – poetry readings, concerts – should be more frequently used to highlight the unique position of a planetarium. A renowned scientist or artist who would agree to participate in such an evening event costs a fraction of a purchased show. Of course, there is no objection to pre-produced shows with scripts developed within the planetarium team and implemented by means of the appropriate technique. That is what autonomy means to me – but it is an autonomy that cannot simply be multiplied or reproduced. Also, in the meantime there are good, professional, commercially available shows that can by all means provide a high added value to a planetarium's program offering.

**What makes a Planetarium out of a mere planetarium?**

It is the mix of all these components that turns a planetarium with a lower case "p" into a Planetarium with a capital "p". Show me someone who would not love to go there and return again and again – the word must get around that a planetarium is something different from a mediocre cinema. When digital fulldome systems are understood this way, when they contribute to creativity, they are a blessing for any planetarium.

In any event, the general idea that, compared to fulldome systems, star projectors are too maintenance-intensive and therefore too expensive to keep up can clearly be rebutted, in particular when every effort is made to keep the quality of the dome image from the fulldome system at approximately the same level. Aside from the adjustment effort, the opinion concerning costs will in certain circumstances have to be revised after as little as two years, when the video projectors have to be replaced because the quality has significantly dropped or because there are no more spare parts or exchange projectors. Each year, the manufacturers of such projectors swamp the market with new products without considering how they can be incorporated into an existing fulldome system. That is not what they are made for. These costs in particular can be decisively minimized with VELVET, but if the planetarium operator wishes to take advantage of all updates and upgrades of the imaging system manufacturers, and here I explicitly include Carl Zeiss, then this is combined with new computer algorithms every two years, and this becomes more expensive in direct proportion to the number of image channels to be operated.

**Modernity needs to be firmly rooted in history**

When it comes to modern Planetariums, Carl Zeiss walks the talk without losing sight of its roots. We are the only ones from whom you can get all the technology in a one stop shopping approach. You get instruments that project a night time sky that is very close to what is seen in nature, and that still generates real emotions, as well as devices that are able to communicate astronomic phenomena in a memorable way through a live operation and presentation. For this purpose, you get a fully synchronized digital fulldome system that does not in the least compromise the contrast of the night sky in joint projection, but which, instead, helps visualize natural, invisible, and unimaginable processes. You get a system with which you can produce your individual programs in the simplest possible way, with which you can keep your own three-dimensional space travel and also play back shows produced by third parties.

In fact, from Carl Zeiss you get sustainability and a partnership that will accompany you throughout the life of your ZEISS technology.

# Worth Visiting: the World's Largest Planetarium Dome in Nagoya

*Dr. Manabu Noda*
*Chief of Planetarium, Nagoya City Science Museum*

The Nagoya City Science Museum was renovated and reopened on March 19th, 2011. The main feature of our museum is the world's largest planetarium dome at 35 m in diameter. Images are projected by UNIVERSARIUM Model IX (an optical planetarium) and the SKYMAX DS II-R2 (a digital planetarium). The whole system was unified and installed by Konica Minolta Planetarium Co. Ltd.

**History**

The Astronomy Building with a planetarium in the Nagoya City Science Museum opened in honor of the 70th anniversary of Nagoya city in 1962, followed by the Science & Technology Building in 1964 and the Life Science Building later in 1982. It is one of the best comprehensive science-museums in Japan. We had been using a Model IV large-dome planetarium projection machine from Carl Zeiss since 1962. However, it had been almost 50 years since the Astronomy and the Science & Technology Buildings were built, there were many problems such as deterioration aging and luck of earthquake resistance. So Nagoya city planned to reconstruct the Nagoya City Science Museum (except the Life Science building) as a long-term city development plan and announced the brief outlines of the basic project.

As for the planetarium:

- Project stars as close to natural starry sky as possible on the largest 35 m dome screen
- High quality immersive projection over the whole sky make us feel like traveling space
- Improve comfort by separated reclining seats
- Project astronomical events such as eclipse, meteor and aurora scientifically correct.

**The feature of the new planetarium dome**

Seeing from the outside, you will notice that our museum has an external appearance of landmark design featuring the enormous spherical shape. The upper part of it is the planetarium dome, the largest dome in the world. We desired to make it as large as possible to reduce distortion of the shape of the constellation or parallax of stars looked up from the seats.

The dome manufactured by ASTRO-TEC has an internal diameter of 35 meters. It was made up about 700 high-spec punching panels that are seamlessly joined together to provide a truly high-definition viewing experience on a perfect sphere.

Inside the dome, it installed 350 separate reclining seats, arranged in concentric circles around the star projector, which are able to rotate 30 degrees to the left and right. It is easy to look up in any direction wherever you are seated.

We think it is important for our visitors not only to enjoy planetarium show but also to look up at the real sky and find the stars or constellations.

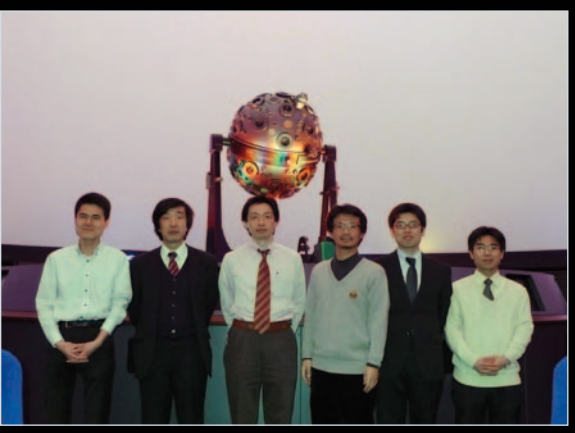
Inspiring visitors to look up at the real sky, we needed to show stars as close to natural starry sky as possible and provide an interesting scientific theme with a live commentary, not recording for every single show (not very common in Japan).

**Two projection systems**

To project the beautiful starry sky and the realistic pictures on a big dome, a projector needs high quality. But it is impossible to judge from catalog specification. So we finally decided which model of projectors we would use after repeating trial and error.

We have both opto-mechanical and digital planetarium in the dome. The starball, UNIVERSARIUM Model IX from Carl Zeiss is installed exactly in the center of the dome. The new projector equipped with fiber optics that makes it possible to show the beautiful stars with high brightness levels and small size. We were able to negotiate Zeiss engineers to adjust the brightness and color tone of stars. They were so cooperative that we were able to order digital controlled shutters for the stars and Milky Way, special constellation outlines and Japanese characters. We visited their factory in Jena three times and discussed trial products such as interfaces for manual operation again and again to work closely.

The number of visible stars (6.5th magnitude) to human eye is about 9,100. It depends to sensitivity of the human eye. There are some starballs projecting more than millions of stars now but we are not willing to project invisible stars. About 9,100 are as many stars as we



*The planetarium team: Mr. S.Kobayashi Mr. K. Hattori, Dr. M. Noda, Dr. K. Mouri Mr. T. Ohnishi, Mr. D. Mochida (from left to right).*

can see under the best observation conditions and in space. We thought that designing a planetarium truthfully would lead people (especially children) to the impressive starry sky.

The digital planetarium can project computer graphic pictures using some video projectors. SKY-MAX DSII-R2 made by Konica Minolta Planetarium Co. Ltd. delivers high quality images (8000 x 8000 pixel) created by 24 computers to 6 video projectors, which enable to project smoothly on the whole dome. As well as displaying stars and planets, this system can project videos of space travel and other celestial scenes and all sky map by not only a visible light but also other wavelength such as radio and X-ray. It is a very effective tool for science education.

**Looking back on this year**

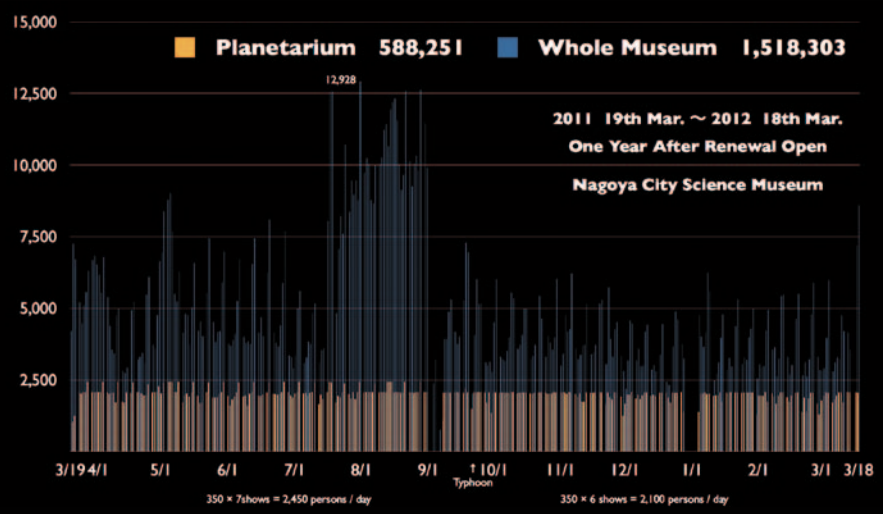
Since we reopened on March 19th last year, planetarium tickets have been sold out every day. On average, we had about 250,000 visitors annually under the previous dome but this year, about 600,000 visitors coming from all over Japan.

On November 2nd, for the 100th Zeiss Japan anniversary about 300 employees of Zeiss Japan and their families got together at our planetarium. We had a special guest, Dr. Michael Kaschke, President and CEO of Carl Zeiss, came all the way from Germany to make a speech. It was such a great pleasure and honor for us to welcome him on that special occasion.

Our regular shows are 50-minute long and held 6 times a day. They are in Japanese only due to live presentations. However we are sure that (hopefully) the UNIVERSARIUMs starry sky on the biggest dome with stunning visual effects makes it worth visiting.

You are welcome anytime. If you have any technical questions or anything, do not hesitate to ask us after the show. We look forward to seeing you at our planetarium.

*Photo credits: Nagoya City Science Museum.*



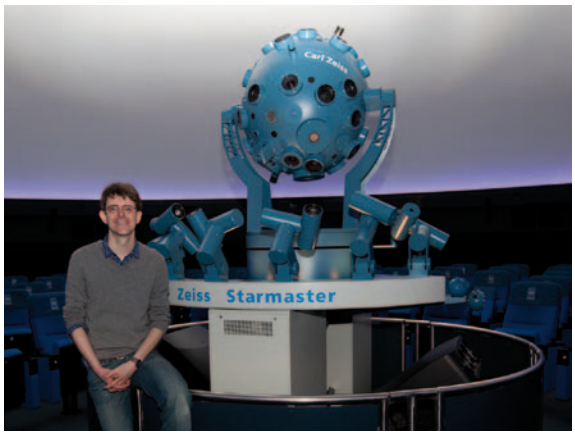

**"Credentials"**

Planetarium
Nagoya City Science Museum
17-1, Sakae 2-chrome, Naka-ku
Nagoya, 460-0008
Japan
http://www.ncsm.city.nagoya.jp

ZEISS UNIVERSARIUM M IX
Opening: March 19, 2011
Dome diameter: 35 m
Seats: 350

# A Strong Team in Wolfsburg: Opto-mechanical Starball and digital VELVET projection

*Dirk Schlesier*
*Director Wolfsburg Planetarium*




Since March of 2010, in addition to the STARMASTER Star Projector, the Wolfsburg Planetarium has also had a fulldome video system by Carl Zeiss. Using the Planetarium's glass fiber optics, we project a realistic night sky onto our 15 meter dome. Six VELVET projectors complement the traditional star projector and impressively show images and videos that fill out the entire dome. Both systems are synchronously coupled to each other. The STARMASTER software can also be used to control digital image contents belonging to the firmament feature.

In this function, the synchronicity between the analog and digital systems is highly advantageous. Digital constellations or planets enrich the brilliant starry background created by the opto-mechanical projector, and follow its motion patterns, such as the diurnal and annual motions.

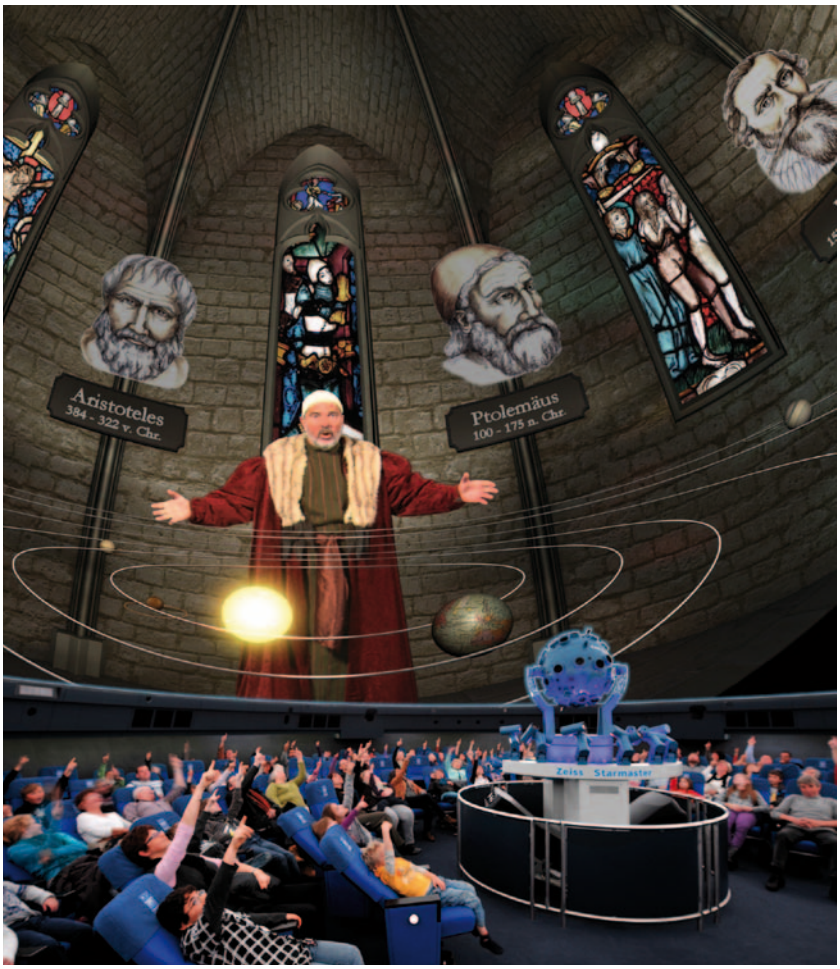



*Photo credits: Wolfsburg Planetarium.*

Many automatic astronomy programs were adapted at the Wolfsburg Planetarium in a manner such that, instead of the digital stars, the sharply resolved, point-structured stars of the STARMASTER shine in all their glory. Experience tells us that the visitors like the sight of the true-to-nature night sky produced by the STARMASTER. "Pixel stars" betray the artificial nature of the celestial bodies and rob visitors of the illusion that attracted them to the planetarium in the first place.

The team formed by the analog and digital systems has become irreplaceable in the live events at the Wolfsburg Planetarium. Zooming into faraway celestial bodies that at first appear inconspicuous when seen with the naked eye always triggers a Wow! effect, especially in youngsters.

The digital contents are first entered in the powerdome®ShowManager. Its user interface is optimized for the playback of complete shows, but also enables production of live shows. Electronic elements such as a digital planetarium, flat and dome filling images, and clips or also audio files are imported from the (live) performance.

By using the combined systems, the planetarium can more effectively design and present sophisticated live events. In this process, we have frequently reached the limit of the systems. At the moment, the Wolfsburg Planetarium does not have a real-time system, for example UNIVIEW, that could supplement the strong hardware combination.

**"Credentials"**

Planetarium Wolfsburg gGmbH
Uhlandweg 2
38440 Wolfsburg
www.planetarium-wolfsburg.de

ZEISS STARMASTER ZMP
ZEISS powerdome®VELVET
Opening: 1983
Reopening: 2010
Dome diameter: 15 m
Seats: 140

# The new Planetarium in Radebeul

*Ulf Peschel, Head of Radebeul observatory and planetarium.*

When the sun sets in the planetarium, slowly sparkling stars and the softly shimmering band of the Milky Way populate the dark blue sky, and the beholder is immersed in a world far away from the shrill and hectic routine of everyday life. It is the peace and quiet of a night in the mountains or in the endless expanse of a lonely desert, or the fairy-tale ambience of a Scandinavian forest. The planetarium shows us a sky that amazes and surprises us with its magnificent beauty.

**The Dome Matadors**

I first saw the Radebeul Planetarium from the inside in 1976 as a member of the Young Astronomers' Working Group. At that time, at the center of the dome there was an ZKP 1 projector by Carl Zeiss. For us guys it was enormous fun when, unobserved, we could turn the daily cycle onto full speed, lean back in our seats, look up, and literally get butterflies in our stomachs. That went on until a little man in his mid-seventies came into the room, gave us a reprimanding look, and then got down to brass tacks, or, more accurately, to the stars in the sky of the evening in question. From this moment on we were totally spellbound and listened attentively to his every word, for he explained things with such devotion and such knowledge, with highly accurate wording that described the celestial bodies and their motions to the fullest possible extent. Everything about him perfectly matched a presentation about the stars, and nothing was reminiscent of today's planetarium shows. I wonder whether today he would still find his public in the Planetarium. That first projector was followed by a ZKP 2 with a reasonable night sky and significantly expanded representation options compared to its predecessor. Operation was simple and clear. After 27 years of service, the instrument was literally worn out, and a new one had to be acquired. It was clear that the replacement should be an opto-mechanical projector, as digital systems are unsatisfactory, especially when it comes to star representations.

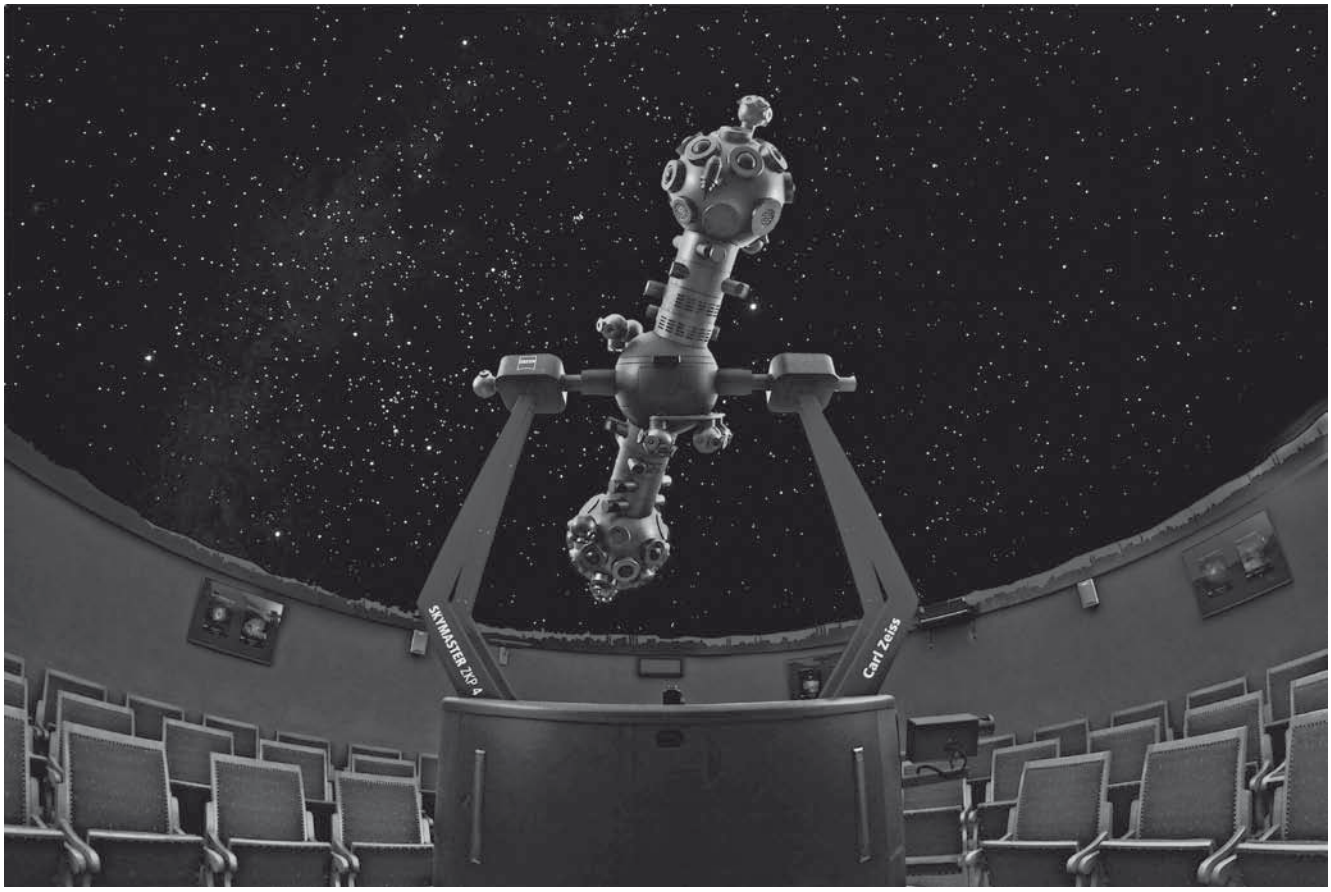
**Night sky par excellence**

For the last six months, a SKYMASTER ZKP 4, the latest development from Carl Zeiss, has been operating in the dome of the planetarium. The first impression of the sky dome is overwhelming. The stars appear to be small points, sharply imaged over all areas of the projection surface onto a jet-black background. The celestial bodies get their light only from a high performance LED. The instrument at Radebeul is the first worldwide to be equipped with this technology. The brightness gradations are very fine. Many important stars are shown in their natural colors. What is very pleasant is that the colors can be clearly identi-

fied, but are not exaggerated. The light reserves are enormous. Thus a night sky shown with the full power of the lamps would clearly appear exaggerated. In our dome, 65 % of the light output has been found to give the ideal impression, most closely resembling the sight of a natural sky under the most favorable conditions. Some visitors feel that they are looking at many tens of thousands of stars and regret not being able to get their bearings in the throng; but to show a lit up city sky for this reason alone can of course not be our goal. To help with orientation, it is possible to project very beautiful images of the most important constellations, whose appearance frequently results in enthusiastic ooh's and aah's from the public.

**Planets where they should be**

Unlike the previous system, the planets are shown without details. This sometimes makes the correct allocation difficult for constellations that lie in the past or in the future. Because of the LEDs used for illumination, the light of the planets currently appears to be a little too cold. What is outstanding, on the other hand, is the positioning accuracy.



Every celestial body is exactly where it belongs. This enables accurate representation of special constellations in the past or in the future. Moreover, every planet projector can also be assigned a completely different role, e.g. as a comet. By means of a slide changer, it can project a comet and position it together with its exact orbit, which is stored in the software.

**Software helper in the background**

The software controls motion and brightness in the ZKP 4. Fortunately, operation can be dual. On the one hand there is a control panel which, with its control dials and keys is reminiscent of earlier analog control units. Everything looks very tidy and enables full manual operation of the projector during live presentations. More complex processes can also be preprogrammed on a time line. On the one hand, this removes pressure from the presenter, who can concentrate on the contents of his or her presentation, and on the other hand enables programming of planetarium shows that can run automatically. The software communicates with programs that e.g. drive digital Fulldome systems that project dome filling image and video contents. Simple processes can easily be learned by means of the control system. This is highly advantageous if the instrument is to be operated by an assistant. Digging a little deeper, things quickly get more demanding. This is principally due to the countless options offered by the projector. Thus, some practice time is required until operating the system becomes routine.

**Tailor made equipment**

The Radebeul projector was delivered fitted with all options. Thus, for example, the celestial equator and the ecliptic can be shown separately, which is an enormous advantage in the communication of astronomic coordinate systems. The entire instrument can be turned by means of azimuthal motion. Thus, the public can remain seated at the "wrong" place and will nonetheless get to see the things that are important. A display continuously provides information about the time, date, and other parameters of the sky as represented. The elevator removes the instrument from the field of view during pure video projections and facilitates any required maintenance. The only component I consider to be expendable is the map that comes into view with pole elevation changes. It looks nice, but is hardly necessary for the communication of content.

**Summary**

SKYMASTER ZKP 4 is an instrument that leaves virtually nothing to be desired and in which further technical improvements hardly appear to be feasible. Its applications range from instructionally prepared scientific presentations to emotionally engaging planetarium shows. And, it shows us and our children a night sky that can virtually no longer be seen today, a sky that seems to belong to a time in which the stars over our cities were not yet drowned by a sea of countless lights.

*Photos: Radebeul Planetarium.*

**"Credentials"**

Radebeul Observatory and Planetarium
Auf den Ebenbergen 10a
01445 Radebeul, Germany
www.sternwarte-radebeul.de

ZEISS SKYMASTER ZKP 4
Opening: 1969 (ZKP 1)
Reopening: 2011
Dome diameter: 8 m
Seats: 60

# The new starfield is spectacular!

"I used to say that the starfield on the ZKP 4 was the closest to the real sky that any planetarium instrument had ever achieved. Then we upgraded to the new LED lighting and I'm nearly at a loss for words. The new starfield is spectacular!! The richness, the magnitude differentiation, and the positional accuracy were already unparalled, and with the incredible brightness of the LED light sources it is very simply the best planetarium sky available on our planet today, better than the best natural sky that can be found in my home state of Illinois, and rivaled only by the real sky as seen from the most remote locations on Earth.
I can't wait for our move to our new 40-foot dome in the Peoria Riverfront Museum this summer. Even with the larger dome, the brightness of the LED stars will still be exceptional, and the larger dome size will just make the starfield seem that much more realistic."

Sheldon Schafer
Peoria Lakeview Museum of Arts and Sciences


New Peoria Riverfront Museum

# A Day of "Space Experiences" at the Planetarium Am Insulaner

*Dr. Monika Staesche, Scientific Director, Planetarium of the Wilhelm Foerster Observatory, Berlin.*

Friday, 09:45 a.m.: When he sees a shooting star, Tim makes the wish to be able to fly to the moon. His big brother just laughs at him – suddenly the sky starts turning at a dizzying speed, and then a glaring white light appears high above them. The light comes closer, enveloping the entire sky – and suddenly, the Earth, complete with all its continents and veiled by clouds appears above their heads. A large metal structure approaches at terrific speed – its upper portion gets bigger and bigger, already filling in half the dome... Stifled cries are heard from the auditorium, increasing in volume, as the walls of the metal structure disappear and the children suddenly find themselves among the blinking consoles and large viewing windows of a space station.
Iskender, 7, a student at a Berlin school, slightly loosens his grip on the armrests of his seat, to which he had been holding on ever so tight. Next to him, Leonie finally breathes out. Their teacher, who had been following the entire process from two seats further away, smiles a little at the children's excited whispering around her as they point out the details of the moving image on the walls of the dome to one another. But even she flinches when, 10 minutes later, the ice and rock fragments of Saturn's rings noisily hit the windows of the space station. And when, finally, the space station is almost sucked into the sun due to a computer malfunction, and the entire dome shakes violently above them, she too tightens her grip on to her armrests. "The ABC of the Stars", the children are learning is a lot of fun, quite unlike a classroom lesson and much more like what Erich Kästner, the author of "Emil and the Detectives" and of the story that was made into the film "The Parent Trap" had once described in his "Flying Classroom": "The world will be our classroom". There is thundering applause at the end of the show, and then the children rush out of the dome, out into the real sunlight and on to the observatory on the hill.

The next groups of students are already waiting, for the show will go on at 11:00 a.m. The older children want to know more about the "Spaceship Earth", for example, why there is day and night and how the seasons come about. This is a live presentation; the presenter first uses the traditional planetarium instrument at the center of the room in order to show and explain the view from the Earth, and then, with a quick click of the mouse, switches to the perspective from the outside. Suddenly, a gigantic, slowly and majestically turning Earth hangs from the dome over the children's heads. There is a "Wow!" from the ranks. "It looks really real!" And that is certainly right. You could swear that there is no dome wall, but that it all "continues" beyond it: The Earth floats in the "space" of the dome. The borderline between day and night is clearly visible – and when the presenter adds the projection of the Earth's axis, it becomes clear how "askew" the Earth's position actually is, and that people living near the South Pole do not get any sunlight at all, so that there it's "night time" all day long.
But that is not all. With a few mouse clicks, the scenery begins to change. For a moment, the stars turn at lightning speed, the Earth disappears into the distance, and a red dot appears, which quickly increases in size to reveal itself as the planet Mars. Details become apparent, including two tiny dots that circle around the planet – the two moons of Mars. In the end, the children are so close to Mars that it fills out the entire dome. No matter how beautiful it looks, the children learn that Mars is not a very hospitable environment for humans. Nor would any of the other planets of the solar system be a "second home" to move to if the Earth should ever become uninhabitable… In fact, humans liter-


ally live in a paradise on Earth. And they should make sure it stays this way.
At the end of the presentation there is even a little cherry on the cake – a flight from the solar system through the stars and out of our home galaxy. The previously stationary stars move in a thick swarm, ever faster, until the Milky Way becomes recognizable in its wonderful spiraling shape. Countless little dots around the sky form the neighboring galaxies. The children get a short glimpse of infinity, even if only on a virtual basis. The data, though, are real. The "Uniview" program enables the two dimensions of the "flat" planetarium to add a third dimension, to give depth and perspective to the space and to better explain relationships in this way. Finally, and to the children's great regret, everyone comes back to Earth. Many will remember this class for a long, long time to come.

06:00 p.m., the first evening performance. The program promises "Voices in the Dark". No astronomy this time, but a voyage into the realm of fantasy, through a paradise landscape towards a mysterious villa and then into it…
The viewers dive into chessboards and land in a black and white, Cubistic landscape – and a night sky suddenly emerges from a plunging shaft. Change of scenery: A sunken cathedral turns up under water. Indeed, with this technique the visitors literally "plunge". The term "immersive medium", which means exactly that, suddenly becomes self-explanatory. The dome projection enables a three-dimensional experience without any need for cumbersome glasses.

The strong contrast of the VELVET projectors also makes it possible, as in the next program, which is the "Heavenly Stroll", to continually change from the conventional night sky to fulldome sequences without the basic brightness of the beamers, which are then not required, disturbing the view of the stars. This is another live presentation, and the presenter is now explaining that the constellations that are so familiar to us really bear no relation to the actual stars, but that they are arbitrary patterns instead. To clarify things, the public suddenly flies towards the Big Dipper, sketched out by means of stick figures that connect the stars, and then around it. The shape of the image becomes distorted and unrecognizable. The stars constituting the Big Dipper are in actual fact positioned at different distances from Earth. The stars that are close by and those that are further away whirl around the viewers as if they were sitting in a spaceship. This is also a very enjoyable feeling for many people.
By means of examples, fulldome explains facts clearly, but the system can also generate emotions that amaze both children and adults and make them dream – and this is ultimately at least as important as the pure communication of knowledge. It is certainly possible to go through daily life without any knowledge of astronomy. The ultimate task planetaria can and should accomplish is to provide people with a perspective of their world and to broaden their inner and outer horizons, and the fulldome "space experience" can certainly help in this process.

*Fotos: M. Staesche.*

**"Credentials"**

Planetarium of the
Wilhelm Foerster Observatory
Munsterdamm 90
12169 Berlin, Germany

ZEISS powerdome®VELVET
ZEISS Modell VB
UNIVIEW
Opening: 1965
Reopening: 2010
Dome diameter: 20 m
Seats: 291
www.planetarium-berlin.de

# SKYMASTER ZKP 2 and powerdome – the Successful Union of Unlike Brothers

*Dipl. El. Ing. HTL Daniel Schweizer, President*
*Dr. Ekkehard Stürmer, Programmer and Presenter*

SIRIUS, an observatory-cum-planetarium complex in the Swiss town of Schwanden high above Lake Thun, opened its doors to an expectant public on October 14th, 2000.

**The beginnings**

The original equipment of the 8-m dome planetarium, consisting of a SKYMASTER ZKP 2 planetarium projector then 17 years old and second-hand Allsky slide projectors, was operated by hobby astronomers on a voluntary basis. While the presentation of the night sky and the planetary motions was highly satisfactory in general, weak points were that time-lapse runs covering several years could not be presented, that a free-hand projector was needed for the constellation figures, and that few slides only were available for the Allsky system. When, on top of that, we ran out of spares for the latter, it was high time for some major conversion.

**The aim**

Because of the high quality of star imaging, it was no question that the ZKP 2 was to be kept for the time being and to be replaced with a ZKP 4 at a later stage. In addition, it was desirable to be able to show fulldome stills and movies, for the purpose of education and training rather than mere entertainment. To ensure that voluntary staff could continue to operate the equipment as easily as possible, we aimed at a combined control of the fulldome and ZKP 2 systems.

**The procedure**

The Astronics company replaced the ZKP 2 drives with stepper motors, a prerequisite for digital control. They also installed an electronic lamp control system. When SPACEGATE Quinto was installed a year later, an interface card was all that was needed to control all ZKP 2 functions via the powerdome®ShowManager. There was nothing then to stop reopening in October, 2010.

*Observatory and Planetarium SIRIUS in the "Berner Oberland".*


*Observatory-cum-planetarium complex "Sirius". Photos: Observatory-Planetarium Sirius.*

**New mode of operation**

Now as before, the ZKP 2 can be controlled manually. What is new is that show sequences can be programmed. For this, the ShowManager makes available a list of control commands, which can be called up via "external command". The command selected is entered into the timeline, sometimes together with a parameter, e.g., in order to set a certain sidereal time. For the diurnal and annual motions, positions can be set in relative or absolute terms (in the latter case, within a year).

To start a show sensibly, the ZKP 2 is manually set to the desired date, after which the sidereal time is entered as the parameter of diurnal motion. All further motions, as well as control of the ZKP 2 lamps, are executed by powerdome.

**Positive experience**

Our experience with automatic control of the ZKP 2 and its integration in shows with powerdome is extremely positive. Practically all functions of the star projector can conveniently be controlled by means of the ShowManager. Some shortcomings are inevitable, of course. For example, the stars of the ZKP 2 cannot be made to register with those of the digital planetarium; and when the shutters of the beamers are open, the faint ZKP stars cannot hold their ground against the light smog. For these two reasons we find it hardly useful to present the constellation overlays, or line figures, of the digital planetarium together with the ZKP sky.
Nevertheless it is noteworthy that, with the measures described, it is possible for a device based on analog technology to be controlled digitally in a manner for which it was never designed – and with great success at that.

**"Credentials"**

Foundation Obervatory-Planetarium SIRIUS
Lindenmattstrasse 68
3065 Bolligen, Switzerland

ZEISS SKYMASTER ZKP 2
powerdome®SPACEGATE Quinto
SKYPOST
Opening: 16. Oct. 2000
Reopening: Oct. 2010
Dome diameter: 8 m
Seats: 70
www.sternwarte-planetarium.ch

# The New Cultural and Educational Center with Planetarium in Yaroslavl

*Ilya Klyagin, Architect*
*Ludmila Gileva, Project Manager*
*Andrey Lobanov, Technology Advisor*

The "Valentina Tereshkova" Cultural and Educational Center was inaugurated on April 7th, 2011. The city of Yaroslavl thus received the first planetarium built in Russia after the end of the Soviet era.

**The architecture**

The architecture is determined by two given facts: the center's unique function and its unique situation. The site is surrounded by architectural masterpieces of past centuries.

To adapt the building to this environment, we based the project on a "monastery" principle, with units of various styles from different eras being united by a common function and harmonized by some specific spatial elements. The complex is composed in a manner that resembles the architecture of the surrounding buildings and harmoniously blends in with the outstanding specimens of traditional Russian architecture in the immediate vicinity. Thus, the new edifice pays tribute to the history of the place rather than dominating it.

The planetarium building consists of four characteristic elements:

- The observatory tower is a separate unit, rising out of a stepped substructure in a way similar to the bell tower of an old Russian cathedral.
- The main façade of the administration building features two levels of white concrete and glass, which contrast superbly with the white textured stucco surface of the tower.
- The glass dome covers the projection dome, leaving a space between the two domes that is used as a gallery. It is particularly evocative at night when the inner dome is lit by LEDs in various colors and adopts the futuristic shape of a sphere of light floating in space.
- The stepped substructure with the foyer is partly set back.

Despite its complex spatial composition, the building looks homogeneous, impressive and well arranged. It has already become a popular venue and recreational site for many residents and visitors.

**The functions**

The Cultural and Educational Center serves education as well as recreation for families. It comprises a modern planetarium, a museum of space travel, an observatory, and a café.
Visitors enter the foyer, where they can get familiarized with the structure of the center and its program of events, and buy tickets and souvenirs. From the foyer, all functional areas of the center are accessible.

**The planetarium**

The planetarium has a horizontal dome 12 m in diameter. The auditorium is designed to serve several functions; the seats are aligned to face a small stage. The projection equipment comprises a SKYMASTER ZKP 4 and a powerdome fulldome projection system with six JVC projectors, both systems from Carl Zeiss. The multichannel sound system, the lighting and the interior fittings were provided and installed by Svensons Project Company, Russia.

**The observatory**

The observatory with its 5 m dome accommodates an 8" MEADE telescope with accessories. It affords visitors in-depth glances into the sky above Yaroslavl.

**The space travel museum**

The museum presents outstanding events in the history of astronautics, from the first artificial earth satellite to Gagarin's pioneering flight to modern spacecraft and space stations. The flight by the first woman astronaut Valentina Tereshkova, who gave her name to the center, is a main topic of the exhibits.

**The Trans-Force media café**

The media café is designed as a crew's lounge of a spacecraft, with one of the walls covered by a giant 3D panoramic screen. Therefore, a visit to the café can become a fascinating virtual trip, during which the Earth can be observed as from space.

The café is also used for interactive events with children, including shows in which virtual persons interact with professional actors. During the trip, the "crew" is confronted with surprising encounters, insidious traps, search and rescue operations, and tasks putting the travellers' level of knowledge to the test. Exciting contents, contests, prize games and a discotheque are apt to captivate every kid.

*Photos: the authors*

**Crowned with success**

From the very first day, the center has been very actively pursuing its educational mission. Within nine months, it counted 206,000 visitors, among them more than 140,000 children and high-school pupils. Several times, renowned Russian astronomers appeared in the planetarium. In many live talks, visitors got informed about the latest achievements of astronomy all over the world. In almost every clear night, the observatory is open to the public for observation. So far, close to 2000 people have enjoyed this.

The planetarium team has created four shows that explain the starry sky and its multiple facets for each of the seasons. The center has made ambitious plans for the future. In 2012, three new shows will be launched, covering the history of Russian space travel, the solar system, and astronomy in Russian folklore (for children).

We wish our friends and colleagues every success.

**"Credentials"**

Cultural and Educational Center
"Valentina Tereshkova"
Tchaikovsky str., 3
150000 Yaroslavl, Russia

ZEISS SKYMASTER ZKP 4
powerdome®EDITION
Opening: 2011
Dome diameter: 12 m
Seats: 95

# New Stars for Laupheim's Milky Way

*Sebastian Ruchti*
*Chairman, Public Observatory Laupheim e.V.*

The Planetarium of Laupheim is run by a registered society that also runs the local public observatory. After 22 years of successful operation and with a total attendance of 800,000-plus in 60 self-produced shows, the planetarium equipment will be completely modernized in te summer of 2012.

The existing equipment with the ZEISS M 1015 main projector had grown organically in the course of the years. Finally, apart from the star projector there were around 50 slide projectors and various video systems, among them one with 3D capability for presenting stereoscopic content, and a system able to fill slightly more than half the planetarium dome with video imagery.

The forthcoming modernization will make the Laupheim star theater one of Europe's most advanced medium-dome planetariums. It is intended that shows will continue to be created and presented by the members of the society.

Therefore, in selecting the components of the new equipment, we were intent on getting again a star projector capable of delivering a realistic, brilliant night sky, which in the foreseeable future cannot be achieved with the projection methods of digital video technology. The star projector will be supplemented, however, by a digital fulldome projection system intended to replace all existing video and slide projectors. Its integration with the opto-mechanical projector will result in many new ways for the presenter to demonstrate and explain complex relationships and phenomena in the sky in a vivid and comprehensible manner. The new equipment will permit us to show, in an all-live mode, things which would, with the existing equipment, require several weeks of production and testing.

The decisive factor in our opting for a combined ZEISS projection system consisting of SKYMASTER ZKP 4 and powerdome®VELVET was that Carl Zeiss is presently the only supplier in the market offering an opto-mechanical star projector as well as a fulldome projection system whose projectors deliver a perfectly black background. Especially the attempts of the clever members of the observatory society to work out and install their projection systems of their own, using conventional projectors, have shown how important it is for such systems to harmonize with a star projector. We would not want that the audience's illusion of viewing a realistic sky were spoiled at any time by gray frames and backgrounds.

*Northern lights above the planetarium, shot on November 21st, 2003.*

*"Long Night of the Stars" in Laupheim: Start of the balloon flight contest.*

**"Credentials"**

Laupheim Planetarium
Public Observatory Laupheim e.V.
Milchstraße 1
88471 Laupheim

ZEISS SKYMASTER ZKP 4
powerdome®VELVET Duo
Opening: 1990
Reopening: 2012
Dome diameter: 10 m
Seats: 60
www.planetarium-laupheim.de

Installation of the new projection systems will take place in August and September 2012, together with a renovation or renewal of seats, carpeting, projector shelves and the lighting cove.

The modernizing project is possible thanks to generous grants by the city of Laupheim, the district of Biberach, the Biberach Savings Bank, the Oberschwäbische Elektrizitätswerke OEW, and countless private sponsors. The observatory society will contribute more than 10 % of the project funding in the form of self-generated funds and voluntary work.

The new stars are scheduled to illuminate the sky in Laupheim's planetarium from mid-October, 2012.

*Photos: Public Observatory, Laupheim*

# The New Reims Planetarium

*Philippe Simonnet*
*Directeur d'Etablissement*
*Planétarium Municipal Reims*

*The new Reims Planetarium.*
*Rendering courtesy of JP Bonnemaison, Architecte.*

The Reims Municipal Planetarium was officially opened on February 28, 1980. The City of Reims was a pioneer in this field as at that time there was only one other planetarium in France, in the Palais de la Découverte, which was opened for the Universal Exhibition of 1937.

**The Planetarium History**

Equipped right from its opening with a ZEISS SKYMASTER ZKP 2 planetarium projector, the Reims planetarium has been a consistent success with the public with an average of about 30,000 people per year involved in its activities, 26,000 of whom visited the Planetarium's site itself. However, because of its age and the fact that the planetarium is located in the old Jesuit College, which although very charming is out-dated, the present configuration of the Reims Planetarium has more than its fair share of inconvenience – the number of seats is limited (6 m dome with only 40 seats) no development possible because of the space available at the site, the planetarium projector at the end of its working life (33 years old), low level of comfort for the public, limited site functionality due to architectural constraints imposed by the premises and poor visibility.

A project involving the expansion of the planetarium and possibly moving it to another site has therefore been on the cards for many years but without taking any specific form.

In 2008, the City of Reims took the decision to establish the "Euro-American Campus of Sciences Po" in the Jesuit College which meant that a new site had to be found for the planetarium. The opportunity was therefore taken to prepare plans for a larger building, improve the facilities for the public and replace the obsolete planetarium projectors. The teaching project was also updated in order to take account of the possibilities offered by the new structure, particularly in terms of facilities for new sectors of the public e.g. handicapped persons, young people from disadvantaged areas etc.) as well as of opportunities for cooperation with the Centers of Scientific, Technical and Industrial Culture of the region.

**General project objectives**

The current activities of the Reims Planetarium have been gradually developed based on the experience gathered during its operations over the last 30 years. It had not been possible to develop some of its activities to their full extent because of the constraints associated with the location of the planetarium in non purpose-built premises and the lack of space available for use.

*The new Reims Planetarium – reception and exhibition area. Rendering courtesy of JP Bonnemaison, Architecte.*

The main project objectives were therefore

- To improve the visibility and attractiveness of the structure
- To increase the number of people it could accommodate
- To improve accessibility
- To replace the planetarium projector
- To modernize the existing digital projection systems
- To improve the running of the planetarium
- To optimize the running costs

The construction of the new Reims Planetarium was not about a simple relocation of its existing activities. The improvements in terms of space, functionality and comfort will allow the planetarium to offer better quality services befitting its regional influence and to accommodate new sectors of the public. The project, with a total cost of approximately € 3.4 million, is being managed by the City of Reims Public Works Department working closely with the Culture and Heritage Directorate and the planetarium team in what is a good example of a cross-departmental project at the municipal level and which also draws on a range of different skills in a very specific area. The experience of running the Reims Planetarium over many years is a very major plus.

**Location of the new planetarium**

The location chosen for the new Reims Planetarium was an old school which was closed in 2010. This site covers an area of approximately 12,000 m² and is located on the edge of the city center. It is served by a tram route, two bus routes and a train station, all of which are within a radius of 50 meters around the future planetarium. The neighborhood also contains buildings for other cultural, leisure or sporting activities. The new planetarium will be built on the site of the gymnasium of the former school which will be demolished. The new building will cover a total area of 650 m² of which 400 m² will be accessible to the public; it will also be surrounded by a 2,000 m² lawn.

**Exterior architecture**

It was essential that the planetarium was visible and immediately identifiable from the avenue which runs alongside. The building is located about opposite the tram stop. The architecture, designed by the architectural practice JP Bonnemaison, was inspired by the solar system – it is elliptical on plan and includes a sphere which is visible from outside and therefore reinforces its character as a planetarium. The overall impression of the building is reminiscent of rockets taking off to explore space – foot-bridges used as links, the building is elevated on stilts, its bright surface… To complete its unique architecture but still with references to the world of stars and their exploration, cladding made from glass tiles imitating the heat shield of the space shuttles and positioned to reflect the sky has been proposed. The cylinder under the building which contains the building services (air-conditioning, IT hardware, storage etc.) will be clad with wooden panels. Public access will be by means of a footbridge. The grassy space surrounding the planetarium will be accessible (also to handicapped persons) during public opening hours. This space will be also used for teaching activities and for open air exhibitions.

**Internal layout**

All the public area of the new planetarium will be on the same level. The visitor will first enter a 50 m² reception area. From there he will move to an exhibition hall covering 150 m² where the lighting will be very dim to allow the visitor to become accustomed to the darkness needed for the displays under the dome. The exhibition hall will contain a range of models used for teaching, an astronomical clock and temporary exhibitions. The old ZKP 2 projector will also have a place of honor in this room in tribute to its 33 years of good and faithful service without any major breakdowns.

A 40 m² room will be used for complementary teaching activities during workshops. The room, which can accommodate 30 people (a school class) will be equipped with an inter-active white board and will also have a detachable partition allowing the area of the exhibition hall to be increased from 150 to 190 m² if required.

The planetarium dome will have a diameter of 8 meters and will hold 50 seats including two places for handicapped persons. It will also have a peripheral gallery for technical equipment where supplementary projectors can be installed. Visitor comfort will be considerably improved compared with the comfort offered by the old planetarium – very comfortable seats with reclining backs, air-conditioning, multiple screens for video projection and the latest generation planetarium projector. A special piece of equipment will also enable certain programs to be transmitted to persons who are hard of hearing or foreign language-speaking visitors.

**The new planetarium projector**

As the current, very reliable ZEISS ZKP 2 is well past its initial working life and is incompatible with an 8 meter dome, the City of Reims issued a tender for the purchase of a new-generation opto-mechanical planetarium projector for the new planetarium.

Their choice was the ZEISS SKYMASTER ZKP 4 planetarium projector equipped with LED star projectors and fiber optics. A large part of the options suggested by Carl Zeiss were incorporated. The result was the retention of all the functionalities which had given so much pleasure to hundreds of thousands of visitors to the old planetarium but with significant improvements. Thanks to this new planetarium projector, the public will rediscover all the magic and magnificence of the night sky in the countryside but with even more realism. It will also increase the flexibility in the presentations as a result of the vast range of possibilities it offers, particularly in terms of movement combinations.

The ZEISS SKYMASTER ZKP 4 projector will be complemented by three DLP high definition projectors for presenting the images and videos. First and foremost, what we will have here is not just a system showing the vault of the night sky but the whole group of the instruments will be coordinated and synchronized by a computer system using Wings Platinum software. The ability to control the ZKP 4 projector in combination with the video equipment using this program was one of the features which determined our choice.

Make a date in 2013 for the opening of the new Reims Planetarium.

**"Credentials"**

Planétarium Municipal de Reims
1 place Meseux
51100 Reims, France

ZEISS SKYMASTER ZKP 2 / ZKP 4
Opening: 1980
Reopening: 2013 (planned)
Dome diameter: 6 m / 8 m
Seats: 40 / 50
www.ville-reims.fr

# Modesto Science Community Center Opening Fall 2012

*Ken Meidl*
*Sandra Vanwey*
*William Luebke*

The Science Community Center located in Modesto, California on Modesto Junior College's West Campus will integrate college instructional facilities with the Great Valley Museum, a planetarium, an observatory, and an outdoor educational area with Native American exhibits, native plants, and a pond ecosystem. The Science Community Center is an 110,000 square feet three-story building with a fourth floor observation deck. A water feature dresses the front of the building and includes numerous physics lessons. Designed by Lionakis, this facility will be used for the instruction of college students, elementary students, elementary school teachers, and will allow MJC to provide the leadership needed by the community in science education, literacy, and outreach. The sciences at Modesto Junior College offer a comprehensive program that allows students to transfer to four-year universities and vocational programs, complete associate degrees, and offers general educational core requirements in the physical and life sciences.


MJC SCIENCE COMMUNITY CENTER
GREAT VALLEY MUSEUM

*Drawings from Lionakis Architects.*

**The Museum**

The Great Valley Museum (GVM) is a comprehensive learning center established in 1970 to further the understanding of science and natural history, especially of the Great Valley region of California. While operated by Modesto Junior College, the museum is open to the public, and is utilized greatly by local K-12 schools, as well as college students. The GVM educates the public with educational exhibits, displays, programs, activities, and other forms of information and communication. Approximately 40,000 students a year participate in the GVM's programs. We expect this number to grow considerably with the added capabilities of a planetarium and a professional observatory.

**The Planetarium**

With a 40-foot dome and a hundred seats the planetarium will accommodate large science classes as well as bus-loads of visiting smaller students. The planetarium will enrich our already popular astronomy courses by simulating the night sky and demonstrating complex concepts and allow MJC staff to help convey requirements of the California Science Framework to neighboring elementary students. Some of the planetarium seating will be removable allowing intimate tables to be placed under the dome for those who may enjoy A Night Under the Stars with friends and family. The heart of the planetarium will be the ZEISS SKYMASTER ZKP 4 projector system. It creates beautiful and realistic views of the night sky with its star projector. Furthermore, with modern digital projectors, the ZEISS system can also display planets or comets or overlay traditional outlines of constellations and asterisms. Running Uniview software, the digital projection system will allow students to navigate the solar system or explore the surface of Mars in remarkable 3D detail, making the planetarium experience a dynamical and memorable one!

Dressing the circumference of the planetarium are twelve well known constellations laser etched into steel. MJC Art Professor Dr. Richard Serros provided the superb art work. LED lights will illuminate the panels at night in the star pattern found in that constellation.

**The Observatory**

The roof of the Science Community Center will be an observation platform for astronomy lab courses and public viewing. Student imaging will be done with a 12-inch PlaneWave Corrected Dall Kirkham telescope. The observatory will be accessed from the roof and will house a PlaneWave CDK 700, a wonderful 28-inch telescope designed for imaging and public viewing. The CDK 700 will be piggy-backed by a 4-inch Takahashi imaging telescope and a Santa Barbara Instruments high resolution spectrograph. Images from the observatory telescope can be viewed in a lecture room and the planetarium, opening the study of the night sky up to a larger audience.

The installation of a Foucault pendulum, located on the first floor below the observatory, will entertain while teaching science and math concepts and demonstrating that the Earth rotates!

**"Credentials"**

Modesto Junior College
Science Community Center
435 College Avenue
Modesto, CA 95350
USA
ZEISS SKYMASTER ZKP 4
powerdome®VELVET Duo
Opening: 2012
Dome diameter: 12 m
Seats: 100
http://www.mjc.edu

# Zeiss Stars in Brazil

*Luiz Sampaio*
*Director Omnis Lux – Astronomia & Projetos Culturais, Brazil*

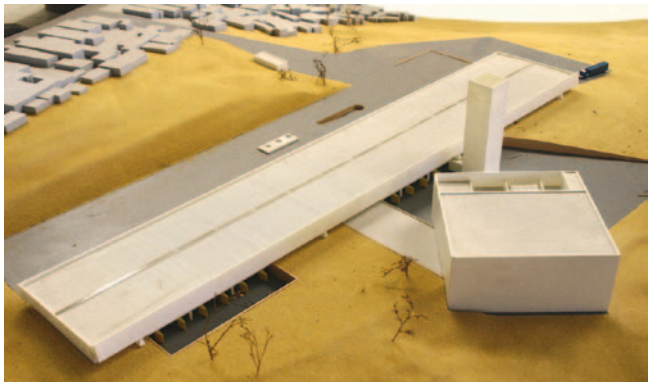
The great majority of Brazilian planetariums are equipped with systems from Carl Zeiss. Ever since 1954, when the first large-dome planetariums was installed in the Ibirapuera Park of São Paulo, ZEISS planetariums have stood for star projection of superior quality as well as for reliability and longevity. "Celestial hours" in the planetariums made by Carl Zeiss have become part of Brazilian culture.

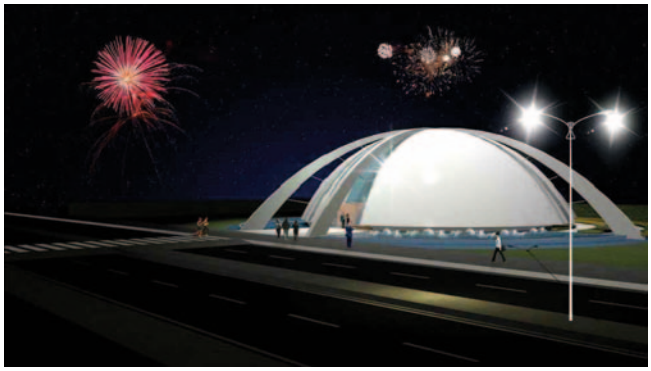
The tradition goes on: The Planetarium of the University of Juiz de Fora in the state of Minas Gerais is under construction. It will boast an optical-mechanical SKYMASTER ZKP 4 projector, combined with a powerdome®SPACEGATE Quinto fulldome system. Opening is planned for 2013.

At the beginning of 2012, the SABINA 18-m dome planetarium in Santo André was equipped and inaugurated. Again, use is made of a combination comprising, in this case, a STARMASTER starball and a powerdome®4DOME system.

Also in 2012, the Planetarium of Sobral in the state of Ceará will be opened. A powerdome®SPACEGATE Quinto fulldome system and a SKYMASTER ZKP 3 projector will provide vivid educational experiences.

The city of Caucaia is planning its new planetarium to be equipped with a powerdome®VELVET fulldome system. It will be the first star theater in Latin America to feature the fabulous VELVET projectors. We congratulate the city of Caucaia and the government of Ceará for having opted for technological excellence that gives them the edge over other planetariums in Brazil.





*Planetarium project of Juiz de Fora, Minas Gerais (top); the planetarium in Santo André; new planetarium project for Caucaia, Ceará (bottom).*

Carl Zeiss has succeeded in integrating opto-mechanical and digital planetarium systems. While optical fibers deliver the world's best artificial night sky, VELVET projectors furnish unequalled contrast. The systems excellently complement one another – testifying to the technological leadership of Carl Zeiss in the planetarium business, not only in Brazil.

# 6th Jena FullDome Festival

*Micky Remann, Bauhaus University, Weimar*
*Jürgen Hellwig, Jena Zeiss-Planetarium*
*Volkmar Schorcht, Carl Zeiss, Planetarium Division*

Close to a thousand visitors came to the Zeiss Planetarium in Jena, host of the 6th FullDome Festival, a key event devoted to multimedia productions for dome-filling projections. From May 8th to 12th, 90 different shows, short films and clips were presented and assessed, among them 29 productions by students. With contributions and guests from 18 countries, the FullDome Festival once more confirmed its status as the biggest international festival of its kind.

Eleven of the 16 prizes awarded went to German students and producers, which was less due to Germany being the host country than to its high media competence.

The high point of the festival was the Festival Gala with the presentation of prizes. Following a cherished tradition, Carl Zeiss AG for the fifth time donated three student awards with prize moneys of €500 each. An independent jury of seven experts chose the winners of the Creative Award and the Performance Award. The 2012 Creative Award for the best idea went to Rose Generazio, a student at the Ringling College of Art and Design in Florida for her contribution "Pressure". The Performance Award for the best design and implementation was given to Sönke Hahn, a student at the Bauhaus University of Weimar for his production "breakFAST" inspired by the film noir. The winner of the Audience Award, also endowed with €500, was picked from the finalists shortlist by the Festival Gala audience casting a ballot. The majority of the audience voted for "Listen Carefully", a film by Sebastian Hilgetag and Marie Havemann of the Potsdam University of Applied Science. The film also won the two students the "Dissolving Space" special prize named after this year's festival theme. Donated and endowed with €500 by Sky-Skan, this prize pays tribute to the masterly manner of dissolving the dome into a virtual space with the devices of the cinema. Two female Chinese students of the Bauhaus University were happy to receive another prize donated by the festival organizers themselves and endowed with €100. Jiayao Chen and Jie Wang convinced the jury with an animation in blue and white, which, inspired by traditional Chinese porcelain art, reflects elements of Chinese culture in a modern version.

A panel of planetarium and media experts selected the best professional fulldome shows of those shown on the first three days of the festival. Most of the productions touch upon astronomical topics, but also take up questions of protection of the environment or entertain with music and animation.
An honorary prize in this category was awarded to the film "The Future", which deals with the future of air transportation, exemplified by the visions of aircraft manufacturer Airbus. This feature surprised the experts as much as the audience. For the first time, the fulldome medium was employed to treat a corporate theme in a manner both informative and entertaining. Further honorary awards went to the production "Planet Earth – Life between Ice Age and Hothouse" of the Hamburg Planetarium, and to the fulldome film "Life: A Cosmic Story" by the California Academy of Sciences in San Francisco. The American fulldome show was convincing thanks to the best translation of original scientific data into the language of fulldome imagery, and to an outstanding script. The contribution from Hamburg brings the topical issue of global climate change home in an exciting and convincing way.

Finally, eight more honorary awards went to new professional and artistic short films. Most of these, too, came from German producers, not a few of which won their fulldome spurs at the leading universities in Weimar and Kiel.

The fulldome medium is still young and far from explored comprehensively. The FullDome Festival contributes to sounding out the potential of the medium, trying out new ideas, approaches and technical tools, and pushing back frontiers. The work-in-progress presentation of the "Kepler Project" of the American performance artist Nina Wise was a striking example. In a collaboration with the California Academy of Sciences and the Morehead Planetarium in San Francisco, she visualized the life story of the astronomer Johannes Kepler in a dramaturgy combining fulldome projection with stage play. Some of the animations were contributed by the Jena artists Jan Zehn and Stephan Berge, award-winners at last year's FullDome Festival.

The FullDome Festival provides an internationally recognized platform for creative people and a forum for planetariums and fulldome theaters. In the many workshops, presentations and discussions during the festival, the participants got to know each other and exchanged their experience. Getting kindred spirits into contact, inspiring new ideas and promoting collaboration is not the least of the strengths of this festival. In that respect, too, the 6th FullDome Festival was a complete success.

*"Blue" from Jiayao Chen and Jie Wang is inspired by traditional Chinese porcelain art and reflects elements of Chinese culture in a modern version (Photo: V. Schorcht).*

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