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FOCUS ADLER PLANETARIUM

Countdown to 'wow'

Revamped Sky Theater boasts the world's highest-resolution projection system — and a new show designers are racing to finish

Planetarium visitor Luis Coto, 32, walks through the new theater entrance portal, part of the nearly yearlong renovation.

By Steve Johnson
Tribune reporter

Planets do not, in the normal order of things, attack.

But when you see Earth projected onto the dome at the Adler Planetarium's revamped and renamed Grainger Sky Theater, it seems almost to be coming at you.

As it is made larger by an astronomer manipulating a mouse at the theater's control console in the back of the room, the planet seems a physical presence that might soon knock you back in your seat — or that you could step right onto.

When the hidden and wholly soul-stirring sound system kicks in — the Beatles' "Get Back" made the sonic case for the new Grainger during a recent demonstration — any child of the 1970s might find himself wishing for an updated version of those Pink Floyd laser light shows of late-night planetarium fame.

The Sky Theater, soon to reopen after almost a year of a $14 million gut rehab and re-envisioning project, is not, technically speaking, a 3-D theater. But it doesn't need to be. What it will offer when it opens to the public July 8 is what Adler claims is the most detailed, sophisticated and immersive imagery of any space museum in the world.

It also represents a forceful step into the 21st century for an institution that is sometimes overlooked in the city's cultural pantheon.

"It has a 'wow' aspect that was sort of lacking in what Adler had before," says Rocky Kolb, chairman of the department of astronomy and astrophysics at the University of Chicago (and an Adler board member). "You walk into Adler (before the rehab), it's like you're walking into a museum. Here, it looks like you're walking into the future."

Gone is the Zeiss Mark VI "starball," the iconic, antlike projector that since 1970 occupied the center of the theater and used light and photographic emulsion plates to cast a realistic, sharply focused simulation of the night sky against the rounded walls. Zeiss machines — the Mark II preceded the Mark VI — had been in place since the Adler opened in 1930, the first planetarium in the U.S.

chicagotribune.com/newadler

See video of the renovated Grainger Sky Theater.

In its place is something from an ultimate-man-cave scenario: an array of 20 high-end, wall-mounted projectors digi-


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New Sky Theater almost ready for liftoff

tally combined to cast one seamless image on the dome's interior, itself now nearly seamless thanks to a new surface made up of "nanoseam" perforated metal paneling. The projection system has the clarity of the old Zeiss and the capability not only to portray the celestial view from here but also to carry visitors into the universe and to show real-time news footage, movies and, yes, Pink Floyd-style shows of the future.

"Bar none, these projectors give one a deep, profound sense of being in space," says Carter Emmart, director of astrovisualization at the Rose Center for Earth and Space at New York's American Museum of Natural History. "They closely replicate the 2-D night sky and give us the ability to fly through the charted 3-D space of stars and galaxies — the closest we will ever get to actually experiencing that."

A key is their ability to create "deep black," elusive in video technology, says Emmart, who attended a recent demonstration at the Adler and whose own institution's Hayden Planetarium has installed 12 of the projectors. "The dominating factor is the bold punch of the image, which, I'm proud to say, both our institutions are now achieving," he adds in an email. "For a decade now, video and projection technology has had to catch up to our graphical capacity to fill domes with authentic three-dimensional depictions of what scientists have mapped of the cosmos."

Although it is labeled a "Digital Starball" by Global Immersion, the U.K.-based company that crafted it, the projection system might well be nicknamed the "McCain." During the 2008 presidential campaign, Sen. John McCain, the Republican nominee, chastised his Democratic rival, Sen. Barack Obama, for having backed a budgetary "earmark" to the Adler for what McCain called a "$3 million overhead projector."

Three years later, this is, very broadly speaking, that projector. At the time, the Adler and the scientific community quickly rallied to contest McCain's portrayal of planetarium improvement as frivolity.

"It felt a little uncomfortable," Adler President Paul Knappenberger says now of the controversy. "On the other hand, we got a lot of attention nationally. So people are aware of our project."

In the end, "in a way, McCain won," says Knappenberger: The planetarium did not win that $3 million in federal money and is paying for its improvements — which also include the building overhaul and a new, white-fabric-lined theater entrance "portal" — from a broader $40 million fundraising campaign and $750,000 from Illinois. Funding does include a smaller earmark, $900,000 for improving Illinois cultural institutions that Knappenberger credits to then-U.S. Rep. and now-Chicago Mayor Rahm Emanuel.

DAVID PIERINI/TRIBUNE PHOTO

The Adler Planetarium's Patrick McPike, left, and Mark Paternostro fly through the rings of Saturn as they test a sequence of images on the new projection system.

But although its 444,000 visitors in 2010 make it considerably less popular than fellow Museum Campus attractions Shedd Aquarium (2 million) and Field Museum (1.2 million), the Adler has not been able to completely escape political attention.

The planetarium's recently announced plan to hike basic admission fees by $2 — to $10 per Chicago adult, $7 per Chicago child — drew criticism last week from powerful Ald. Ed Burke, 14th, who labeled the proposed raise, in a tough economy and with summer arriving, "uncaring." The Chicago Park District, which subsidizes the Adler's budget and the land it occupies, postponed a vote on the fee increase.

According to Knappenberger, however, in a private meeting with Burke last week, the two men reached a compromise: "We've agreed to hold the price steady for the children of Chicago," he says. "We'll go back to the Park District for approval of the $2 increase for (all) adults" and for non-Chicago children.

"It's a good compromise," says Burke. "I can understand the pressures on an educational institution like the Adler."

The proposed price hike is independent of the theater makeover, says Knappenberger, attributing it to rising operating costs, no increase since 2007 and a series of new exhibits that have brightened up the museum portion of the Adler.

"We've focused most of our efforts on upgrading our exhibit galleries and educational programs, but our calling card is to see a show, and that's where we've been falling behind," he says.

The first show at the upgraded Sky Theater, the 22-minute "Deep Space Adventure," will transport up to 220 visitors on an imaginary voyage through time and space, from visualizations of the universe's creation to exploding supernovae to life on imagined distant planets. Visitors will now sit facing one direction, rather than in the round, and in a sphere that has been lowered to place viewers within it, rather than below it, looking up.

"People around the world will look at it as a new benchmark for this kind of immersive scientific visualization theater," says Martin Howe, Global Immersion's CEO.

"It creates a very 3-D-like image without the need for 3-D glasses."

Each projector has its own graphics card and a dedicated computer feeding it from a server bank crammed into a small, highly air-conditioned room that used to house the back-end workings of the Zeiss device. And feeding them is the museum's new data center, another bank of servers.

All that computing power is essential. A cutting-edge digital show is a data hog, so much so that a crucial part of the planning for the new show was allowing for enough raw computational time both to create the visualizations of cosmic events and to feed the data from one location to another.

Its creation takes place in a room thick with computers and astronomers, grinding away down in the Adler's basement. A 16-foot-wide minidome, used to test images out before transferring them to its 71-foot big brother upstairs, hovers over the room like the UFO from a 1950s sci-fi film.

Doug Roberts, an astronomer and chief technology officer at the Adler, manager of the Grainger project, heads a team he admits is scrambling to get the show ready on time.

In March, he recalls, as the rebuilt Sky Theater was ready, "our technical director calculated, 'OK, if we have all of our blades (computers) running full-out, it's going to take until "N" to populate the show,' where 'N' was a date in November. 'OK, that's not going to work.' "

So to a greater degree than originally planned, the Adler enlisted the help of its peers in astronomy and astrophysics. Individual scenes in the show are coming from other research centers and from such computational powerhouses as the Advanced Visualization Laboratory at the National Center for Supercomputing Applications at the University of Illinois at Urbana-Champaign.

Science fiction writer Nick Sagan, son of 1970s TV astronomy popularizer Carl, has written the show's script. Actor Billy Crudup voiced the narrator, a sort of sage alien guide. A score was commissioned from Italian composer Andrea Centazzo.

And it will all, somehow, be blended together, imagery, music, lights, narration, in the final weeks before the show — and the theater — make their public debut.

It's a process that Roberts says will involve "camping out" in the Grainger to finish. He doesn't mean it literally, like with sleeping bags and campfires. But if an astronomer were to unroll a sleeping bag on the theater's rubberized floor, there would be a pretty convincing way to make it feel like the out-of-doors.

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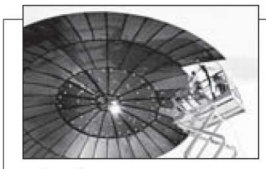
Inside Adler's new star theater

On a bright day in May 1930, men in suits and women in hats and dresses swarmed the steps in front of the new Adler Planetarium, the country's first. A similar scene, with wardrobes from 2011, will be expected to play out July 8 when the lakefront institution reopens its Grainger Sky Theater. The update, equipped with a fleet of high-resolution projectors, a seamless, dome-shaped screen and dozens of computer servers, is a far cry from the Zeiss projectors used since opening day.



The dome

New domed projection screen built inside the Adler's existing exterior dome is constructed of perforated aluminum pieces, hand-joined by workers to minimize the visibility of any seams. The holes allow sound to pass through from speakers located behind the screen. And the whole interior dome has been moved down to floor level to make the experience more immersive; the sphere of the old dome began at nine feet above viewing level.

The computers

More than 40 computers serving the Zorro projectors reside in an air-conditioned room downstairs, amid the Adler's "Universe in Your Hands" exhibit. Each of the 20 machines, with 5 terabytes of useful storage each, serves data to one individual projector. Another bank of 20 is a "digital sandbox" for Adler technologists to use for experimenting with new visualizations.

If you go

What: "Deep Space Adventure"

When: Opens July 8

Where: Adler Planetarium's Grainger Sky Theater, 1300 S. Lake Shore Drive on Chicago's lakefront Museum Campus

How much: $28 for a "Deep Space Adventure" Pass for adults ($21 for children), including general admission and access to additional Adler attractions

adlerplanetarium.org

The projectors

Rockwell Collins Zorro 2015 HC is notable for its high contrast ratio of 1 million-to-1, more than five times the ratio achieved by high-end consumer projectors, which allows for very deep blacks and helps the system achieve a stunning 8,000-pixel resolution. The suitcase-size devices — 20 of them are in use in the theater — have graphics cards, backup projector lamps and are self-diagnosing in the event of problems.

Adler's projectors

ZEISS MARK II
Installed: 1930
Size: 16 feet at full height
How it worked: Gears and motors moved the device, which projected more than 5,000 stars and five planets through 32 photographic plates

ZEISS MARK VI
Installed: 1970
Size: 16 feet at full height
How it worked: Worked the same as the Mark II but with more stars and special effects, including a comet

DIGITAL STARBALL
Installed: 2011
Size: 20 suitcase-size projectors
How it works: Powerful computers knit together high-resolution, high-contrast digital images on the dome screen

SOURCES: Adler, Global Immersion and Tribune reporting

PHIL GEIB, STEVE JOHNSON AND JONATHON BERLIN/TRIBUNE

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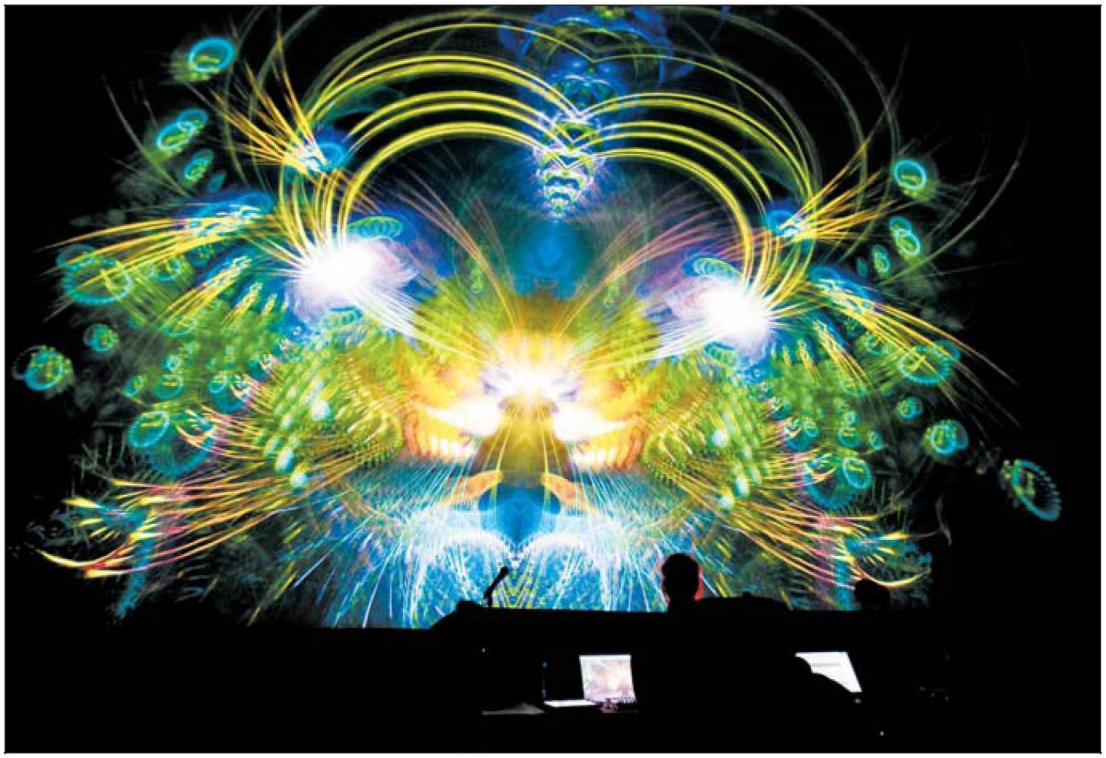

ZBIGNIEW BZDAK/TRIBUNE PHOTOS

Mark Webb, director of theaters at the Adler Planetarium, runs a test show at the Grainger Sky Theater projecting "Alien Presence," an interpretation by artist Scott Draves. The Sky Theater is to reopen July 8 after a $14 million renovation and re-imagining.