into their own little boxes. Like the apocryphal savants at Pisa who refused to look through Galileo's telescope, they will not read Scheibe's fascinating and subtle book. The loss is theirs.

A DAY OUT: ASTRONOMY

The Heavens in a Jewel Box

Jay M. Pasachoff

A major planetarium is a thing of beauty for the eye and for the mind. The most famous planetariums in the United States, including the Hayden in New York, the Adler in Chicago, and the Griffith in Los Angeles, were all built in the 1930s. They have since transported numerous children and adults into the world of space and inspired many of today's scientists.

The American Museum of Natural History in New York responded to the new millennium by ripping down the art deco Hayden Planetarium and building a 21st- (or perhaps 22nd-) century piece of architecture in its place. This structure, the Rose Center for Earth and Space, contains the new Hayden Planetarium. The project cost over $200 million, which came almost entirely from private parties. The *New Yorker*'s architecture critic, Paul Goldberger, called the result "a temple of serene geometries, perhaps the purest piece of monumental architecture built in the United States since the Washington Monument."

The architect, James Stewart Polshek, had the idea of extending the planetarium's hemispheric dome into a complete sphere, which now contains the new Zeiss IX projector above a simulation of the Big Bang. The Hayden Sphere, 87 feet in diameter, is visible through the two all-glass walls of the cube that surrounds it. The sphere rests on a ring stand much like those used to hold chemistry glassware above Bunsen burners. The space beneath the sphere houses exhibits on the universe, galaxies, stars, and planets. These include coverage of such topics as comparative planetology and planetary rings, and a whirling black-hole simulation. The 15.5-ton Willamette meteorite has a place of honor, as it did in the old planetarium.

The Rose Center is a hot ticket in New York; 22,000 people visited it on Easter Sunday alone. The management could improve the handling of crowds. They might start by clarifying the alternatives available to visitors and recommending paths through the exhibits. But the experience remains a memorable one, and it impressed the busload of students and friends from Williams College who joined me for a weekday visit.

Rose Center for Earth and Space
American Museum of Natural History
Central Park West at 81st Street, New York, NY 10024. www.amnh.org/rose/

We first went up to the second floor walkway that hugs the center's glass walls. It illustrates the relative scale of the cosmos, with objects at each successive station smaller by a factor of ten. The Hayden Sphere is used repeatedly as a reference scale. For example, models of the eight planets are scaled to the sphere as the sun. (Neil deGrasse Tyson, the director, has demoted Pluto and not included it.) A crowd piled up near the end of the walkway before we eventually entered, in groups, the lower part of the sphere. There, we gathered around a central cauldron for a 3-minute simulation of the Big Bang; we looked down at the explosion while lights flashed and sound thundered around us.

From this show, we proceeded down a timeline ramp that spirals around the sphere.

Sky box at night.

Here the 13-billion-year history of the universe is displayed with photographs that show objects of different "look-back times," arranged in order of decreasing redshift. An introductory plaque explains that the greatest redshifts correspond to the most distant objects. But I feel, as others have noted, that this important discussion should be larger, more prominent, and impossible to escape so each visitor will understand what is shown along the ramp. Dramatically, all of human history is represented by a hair's breadth at the bottom.

Next we waited more than a half-hour for our reserved-time admission to the Space Show—not just a demonstration of the stars overhead but a tour through space from different perspectives. The wait could have been a more pleasant and interesting experience. The information on overhead video screens about astronomy and observatories and the subsequent self-test did not add much, and the inadequate seating and lack of a schedule of actual entry times left the crowd restless. I also missed the orrery that was above the waiting area in the former planetarium.

Soon after we were ushered into the magnificent, 422-seat planetarium theater, the lights were dimmed. The old New York City skyline familiar to Hayden veterans is, unfortunately, gone, but we gloried in the nightfall and the rising and setting pinpoint images of stars. The new Zeiss system's fiber optics provide individual projection for each star, in an accurately graded series of brightness. Tyson later told my group that had we brought binoculars, we could have seen more detail on 82 deep-sky objects, such as the Andromeda galaxy.

In the theater's inaugural show, however, the stars appear as pinpoints for only the first two minutes. The rest of the 20-minute presentation uses the all-sky set of video projectors to explore the size and scale of the universe (the powers-of-ten theme again). Highlights are the journey through the colorful gas of the Orion Nebula and the final trip home through a black hole, during which transducers make the seats vibrate with the accompanying low-frequency sounds. The show is well done for what it is, but the IMAX movie *Cosmic Voyage* did powers of ten better. Although the overall impression is dazzling, the images are just too fuzzy after the fiber-optics stars. Tyson knows that these stars are too good to be so hidden. He plans to add an all-star show in a few months, when the system is further debugged; this might be presented a few times a week. He also promises that the second major space show, to be available next spring, will include more use of the Zeiss system.

Tyson is justly proud of the scientific orientation of the new Hayden Planetarium. A half-dozen research slots have been opened by making the astronomers part of the curatorial staff of the American Museum of Natural History, and some top-notch scientists have been hired. We can hope that Tyson, his staff, and the Rose Center will continue to inspire their visitors. Young people enthralled by visits here in 2001 may grow up to participate in and to support the science of the 21st century.

CREDIT: D. FINNIN/AMERICAN MUSEUM OF NATURAL HISTORY

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