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5587 or [Send e-mail](#)**Denver Post, The (CO)****Black holes get turned inside out CU astronomer's work with planetarium a scientific thrill-ride**

February 1, 2006

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Katy Human

Denver Post Staff Writer

In a 1992 episode of the cartoon Ren & Stimpy, a black hole sucks up the characters' spaceship and hurls it onto the surface of a very strange planet.

Clouds float by in psychedelic shapes. Ren's eyes slip off his head, Stimpy's nose comes off on his finger.

"It's a beautiful, artistic interpretation of black holes, which warp everything," said University of Colorado astronomer Andrew Hamilton, who studies black holes. "I loved it."

Hamilton's own vision is different.

The physicist started with Einstein's theory of general relativity - a set of 100-year-old equations that suggested black holes could exist - and used mathematics to paint a realistic portrait of the inside of one of space's most intriguing objects.

Exploding stars can form black holes that create such a strong gravitational pull that not even light can escape.

The results of Hamilton's and his colleagues' two-year effort will go on display Feb. 10 at the Denver Museum of Nature & Science, in one of the most scientifically accurate planetarium shows developed.

"Black Holes: The Other Side of Infinity" was produced by the museum, Hamilton and independent director Thomas Lucas, from New York. Actor Liam Neeson narrated the show, which will be offered to international audiences after a Denver debut.

"In the planetarium world, it's a megabuster," said Joslyn Schoemer, a Denver Museum project manager and executive producer of the show.

The 23-minute planetarium production and a related NOVA television show were funded in part by \$1.5 million in grants from the National Science Foundation and NASA.

The show is a vertigo-inducing mindblower, with an astonishingly detailed - and accurate - fly-through of the Milky Way Galaxy. Stars explode in black-hole generating supernovas. Nebulas are born. Kayakers are pulled down a black-hole-like waterfall.

It took weeks to generate sequences on powerful supercomputers, said art director Donna Cox, a researcher at the National Center for Supercomputing Applications at the University of Illinois at Urbana-Champaign.

"We are all filled with anticipation," said Neil deGrasse Tyson, director of the Hayden Planetarium at the American Museum of Natural History in New York.

The Hayden is one of a few dozen U.S. planetariums technically capable of running Denver's new show. The Denver museum has twice leased Hayden-produced shows, Schoemer said, but the opposite has never happened - yet.

Lucas, the show's director, said Hamilton is "completely obsessed - obsessed with general relativity and the equations of Einstein."

What Hamilton did that was new was to ask what Einstein's equations said about black holes' interiors. Many scientists, authors and artists have depicted what it might be like to be caught on the edge of a black hole's relentless pull.

But what happens once space falls inside, spinning faster and faster as it approaches the unimaginably dense interior?

Objects spin around a center generate centrifugal force, Hamilton explained, which eventually counteracts the massive gravitational pull of the black hole's center. That can "fling material back out," where it collides spectacularly with material spinning into the black hole.

"It becomes violently unstable," Hamilton said. "And we believe that huge instability creates extremely hot plasma.

"And so you'd die," he said. "Vaporized."