

# Taking a pinhole view of the cosmos

CU professor's idea could help find new planets

By Todd Neff  
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Asteroid-eating robots. An elevator to space. A giant pinhole camera hovering a million miles away.

NASA's Institute for Advanced Concepts pays for first-rate science teams to study some far-out ideas like these.

Webster Cash, a professor at the University of Colorado's Center for Astrophysics and Space Astronomy, said the idea for the pinhole camera jarred him awake one night last year.

Cash, Princeton's Jeremy Kasdin and Sara Seager of the Carnegie Institution of Washington recently landed a \$75,000 grant for a six-month

study of his "New Worlds Imager," a space telescope with 100 times better vision than the Hubble Space Telescope. Its purpose: to find planets as many as 100 light-years away.

The imager would consist of two spacecraft. One would carry a black expanse of thin material—the size of a football field with a 30-foot hole at its center.

The second craft would float about 125,000 miles behind, pointing a powerful space telescope at that "pinhole."

Pinhole cameras work by blocking all but a speck of light to slowly expose film. The lens is the hole.

The limited vision of even the best telescopes has meant the 120 or so planetary finds beyond the Earth's solar system have been achieved indirectly.

Scientists have located them either by observing subtle

changes in a star's brightness as a planet passes in front of it, or by watching the star's gravitational "wobble" when a large planet swings by the star.

Direct observation requires massive telescopic power. It also requires a means of separating the light reflecting off a distant planet from the glare of its star. The New Worlds Imager would do both.

The 30-foot hole would act as a near-perfect lens, Cash said. A 30-foot telescope would be more than triple the diameter of the Hubble Space Telescope.

"It's just a very, very large camera," Cash said.

Its components would fly in formation in a stable orbit about a million miles from Earth.

From a distance of 30 light-years — inside of which Cash said there are roughly 1,000 stars — the imager could spot

oceans, polar ice caps, continents and cloud banks, he said. It might all cost about \$3 billion, Cash said.

Despite NASA's interest in finding planets in other solar systems, the New Worlds Imager is a long shot. But that's why it got the grant in the first place.

Ron Turner, senior science advisor to the NASA Institute for Advanced Concepts, said only 5 percent to 10 percent of projects have made it to practical development.

But he said that's part of the game for an institution that distributes \$4 million a year for ideas intended to anticipate the science of 10 to 40 years into the future.

"It's really a grand concept," Turner said of Cash's imager. "But the deployment gets very complex."

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