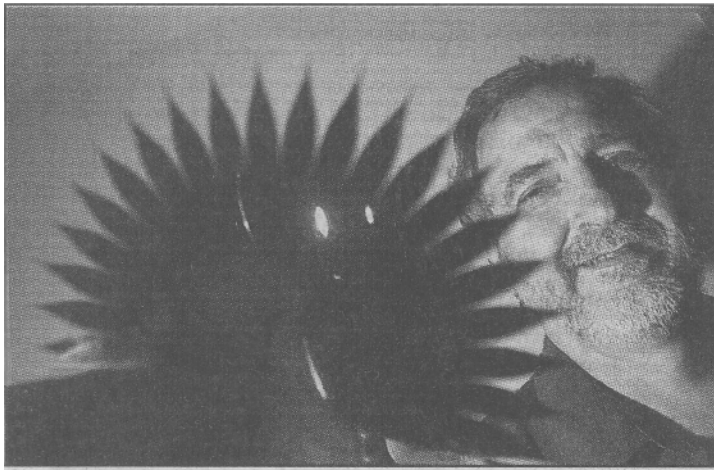


# Starshade a twinkle in prof's eye



SAMMY DALLAL / Daily Camera

University of Colorado astronomy professor Webster Cash holds up a 1/500th scale model of a starshade that he hopes could help find distant planets.

Space umbrella would block light from stars and aid in planet hunting

By Todd Neff

Camera Staff Writer

Webster Cash's planet-finding starshade was an idea as far-out as space elevators and antimatter harvesters just eight months ago.

Now, the University of Colorado astronomy professor's proposal is so realistic that NASA is considering a \$400 million mission that could launch early in the coming

decade. His space umbrella, which graces the cover of today's journal *Nature*, would block light from distant stars that overwhelm far-fainter planets.

Cash has proposed the New Worlds Discoverer mission under the auspices of NASA's Discovery Program, which paid for the Ball Aerospace & Technology Corp.-built Deep Impact spacecraft that struck the comet Tempel 1 last year. Ball Aerospace is working with Cash on a proposed mission that would launch the starshade aboard a modified version of the Deep Impact craft

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## Starshade would aid planet search

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to block starlight for the James Webb Space Telescope.

NASA is expected to announce its decision on the mission in September.

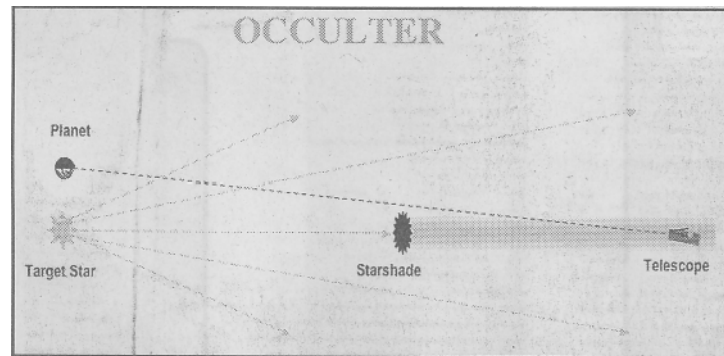
New Worlds Discoverer would take planet hunting to new heights, allowing the detection of planets orbiting stars trillions of miles away.

"This is the technology that we think is going to open the field of direct studies of planets around nearby stars and has the highest potential for finding a new Earth," Cash said Wednesday.

Here's how it would work. In 2013, when the James Webb telescope is scheduled to launch, a second rocket would carry a spacecraft with a folded-up, flower-shaped umbrella 35 meters in diameter when unfurled. Northrop Grumman would make the starshade.

Both telescope and starshade would settle into orbit about a million miles away, the starshade floating between 6,000 and 15,000 miles from the telescope.

Stars are about 10 billion times brighter than their plan-



Graphic courtesy Webster Cash

A daisy-shaped starshade could be used to block starlight so the James Webb Space Telescope could spot planets in other solar systems.

ets, Cash says. The starshade would block the glare of a distant star so the space telescope could detect the far fainter light reflecting off its planets. James Webb's 6-meter composite mirror, currently being tested at Ball Aerospace in Boulder, will make the telescope 100 times more sensitive than the Hubble Space Telescope.

Scientists believe that 80 percent of stars have planets. But stars are so bright that the roughly 175 extrasolar planets discovered since 1995 have been found through indirect means.

Those methods have included watching for changes in a star's brightness as a planet crosses it and detecting subtle gravitational wobble from a planet's gravity. Such approaches tend to spot large planets too close to their stars for life to evolve.

Cash's previous plans included a dedicated space telescope. But John Mather, the James Webb senior project scientist at NASA's Goddard Space Flight Center, suggested using his telescope for the job.

Mather said other scientists had proposed starshades, but

none had dealt with light diffraction that would blur any chance of planetary discovery. The starshade's floral pattern is a child of physics, not aesthetics.

"Web Cash did find a solution," Mather said Wednesday. "When he came by to show me, I said, 'That's pretty exciting.'"

About 5 percent of the space telescope's time would be devoted to planet hunting with the help of the starshield. Searching for habitable planets will be part of the telescope's job anyway, Mather said, and Cash's mission would require no changes to James Webb — it simply would point toward the starshade on occasion.

A stripped-down version of Deep Impact would carry the starshade. Its precise maneuverability, critical to the success of the comet mission, would orient the starshade.

"Anytime we can take something that already exists and leverage it for new and exciting science for a fraction of the cost is a good deal," said Dave Murrow, Ball Aerospace's manager of business development for civil space systems.

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