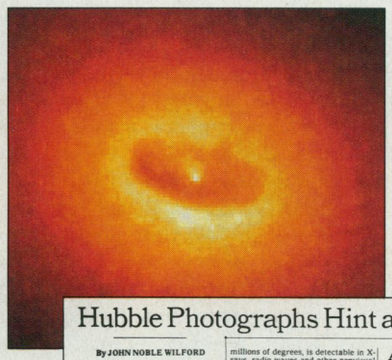
NASA PR: Hype or Public Education?

A series of spectacular images and bold astrophysical claims have appeared in leading newspapers and magazines in recent years; some researchers complain that NASA is overselling its satellites' products

Last November, the front page of *The New York Times* featured a picture of a fuzzy blob that could easily be mistaken for a photographic blunder or a close-up of a dirty cotton ball. But read the caption—"First Look at a Black Hole?"—and the mind transforms it into something magical: a dust ring that shrouds an astronomical wonder like mist around a fairy-tale castle. More stories and reproductions of the image, from the National Aeronautics and Space Administration's (NASA) Hubble Space Telescope, ran in other publications, including *Science*, spreading the excitement of the finding to people around the country.



NASA

Hubble Photographs Hint at Presence of Black Hole

By JOHN NOBLE WILFORD

New photographs by the Hubble Space Telescope have given astronomers their best view yet of a huge disk of gas and dust being sucked into what they think is a black hole.

Although astronomers have observed such disks before, the photographs are the first to show details of a disk's size, behavior and other characteristics. While the new photographs do

millions of degrees, is detectable in X-rays, radio waves and other nonvisual wavelengths.

Dr. Walter Jaffe, an American astronomer at Leiden Observatory in the Netherlands, announced yesterday that the disk in the photographs was tipped about 60 degrees. This was enough to give astronomers an especially revealing view of the nucleus of a bright galaxy in the Virgo Cluster.

A space telescope offers a glimpse of a galaxy's core.

The nucleus is probably the home of [illegible] mass 10 million

Washington. The photographs of the galaxy, NGC 4261, were taken by wide field-planetary camera on the Hubble telescope, which has been operating in Earth orbit for more than two years. [illegible] may be the most interesting [illegible] yet to come [illegible] Hub-

for tracking the material orbiting in the disk. If the mirror can be repaired, as planned by shuttle astronauts in about a year, the Hubble might yet produce the "smoking gun" for black holes.

Such disks near the center of galaxies had been photographed before, scientists said, but never in such detail or at an angle permitting a clear view of the region toward the core. This particular galaxy was selected for study because it is one of the brightest in Virgo Cluster and is also one [illegible] radio astronomers have [illegible] pair of jets emar

RELEASE: 92-208

HUBBLE DISCOVERS A DISK FUELING A LIKELY BLACK HOLE

Astronomers using NASA's Hubble Space Telescope (HST) have gotten [illegible] look yet at the disk of material that surrounds and is being pulled in[illegible]

You might think astronomers would have been ecstatic to see one of their objects of study in the popular press, but many of them grumbled. As one astronomer put it: "It's NASA hype." There were some caveats given in the press release and at the press conference announcing this finding, but nothing compared to the skepticism that came from members of the community, who say they've seen other black hole candidates, and this one was nothing special. That this dust cloud signals a black hole is "largely wishful thinking" on the part of the observers and the backers of the space telescope, says one expert. Says another, Roger Blandford of Caltech, "Hubble Space Telescope has not told us whether or not there are black holes." Even one of the researchers responsible for this observation, Holland Ford of the Space Telescope Science Institute, agrees that it will take a repaired Hubble Telescope to pin down any black hole.

Over the past year, NASA and the scientists who depend on it have succeeded in getting a succession of spectacular astrophysical claims based on images from NASA satellites into the headlines: other black holes lurking in distant galaxies, evidence that the universe will expand forever, evidence that the universe will collapse, and even clues to how the universe was born. In the process of getting these findings into the popular press and TV news, NASA's publicity machinery has served a vital public service, in the view of those who are part of it, by bringing people a taste of the excitement and wonder surrounding the findings their tax dollars have bought. "People have a right to see what their investment is returning," says Hubble Space Telescope program scientist Edward Weiler of NASA headquarters, who has taken an active role in publicity for the telescope. "If all the Hubble Telescope does is fill in the *Astrophysical Journal* and *Astronomical Journal*, that's a failure."

A decade ago, NASA often failed to reach the press or the public, adds NASA astronomer Steve Maran, who handles publicity for the American Astronomical Society (AAS)—which is why he has tried to make the impact of astronomy and astrophysics clearer to the press. Though he publicizes a full range of astronomical discoveries for the society, the ones that get big play often come from NASA satellites.

But researchers suspect that something else is also driving NASA's publicity efforts. "It might be nice to enlighten the public but that's not the driving force," says physicist Robert Park, a spokesman for the American Physical Society (APS). "They want to keep the public interested so people don't criticize their congressmen for supporting these projects." Indeed, often good news coverage can make or break a big project, says one former congressional staffer. He says members of Congress and staffers alike show a gaping ignorance of matters scientific, and are therefore easily influenced by any support that might come from good press. They use newspaper stories to help them make decisions, he says, and if publicity gets people back in the home state to call or write, even better for the project.

In the process, some astronomers say, NASA is going too far. "I feel these NASA programs are being oversold," says one. "The science is exciting, so why oversell it? I think all of us would like to see some more humility, honest, and careful enthusiastic presentation of the science done by NASA." Says another astronomer: "What annoys me and other practicing scientists is that they [NASA] exaggerate otherwise interesting results." Caltech's Blandford adds: "The public deserves better."

In the case of the dust cloud, Space Telescope Science Institute publicity director Ray Villard notes that the release included all the necessary caveats. But some researchers thought the results simply didn't deserve all the publicity. Other astronomers complain that NASA, together with the press, sometimes publicizes confirmations of established ideas as new findings, and presents incremental results as answers to deep-running debates. "There are very few final answers," says Princeton cosmologist James Peebles. "[NASA] should get away from emphasis on final answers, most of which are so wrong."

The emphasis is not just misleading, says Cornell University sociologist Dorothy Nelkin, it can also be self-defeating. After a succession of headlines all touting the discovery of a black hole or a finding that reveals the ultimate fate of the universe, she says, "[readers] don't even notice anymore." And the ones who do notice may end up baffled. *Washington Post* columnist Charles Krauthammer wrote, after a spate of such reports: "Front page physics is noteworthy less for the new knowledge it imparts the layman than for the invincible ignorance it which it leaves him."

How the publicity machine works

Though the papers may make NASA's announcements appear spontaneous, spurred by the excitement of a result, everything is carefully planned. Even now, one astronomer says, people involved with the Hubble Space Telescope are already mapping out press conferences for observations to be made after December's repair mission is carried out.

"The stories are all packaged," says Park.

To help do the packaging there is a publicity machine at NASA headquarters in Washington, D.C., where a staff of 60 people spends $4 million a year to choose findings to highlight, generate press releases and glossy photographs, and summon reporters to press conferences. The various NASA centers also have their own public information departments, such as Goddard Space Flight Center, which employs 23 people and spends more than $1 million a year.

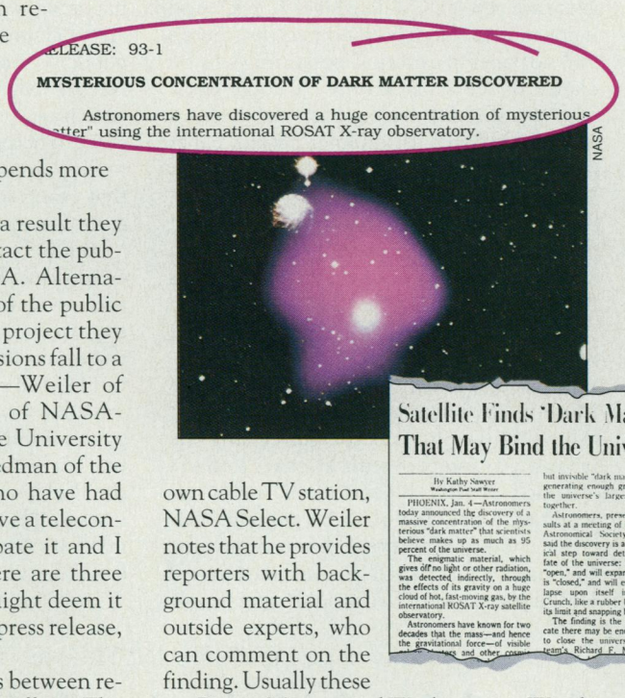
NASA scientists who have a result they want to get publicized can contact the public information office at NASA. Alternatively, Maran, Weiler, or one of the public information officers may spot a project they see as important. Publicity decisions fall to a small coterie of astronomers—Weiler of NASA headquarters, Maran of NASA-Goddard, Bruce Margon of the University of Pennsylvania, and Dan Weedman of the University of Washington, who have had close ties with NASA. They have a teleconference, says Weiler. "We debate it and I make the final decision." There are three possible fates for a result. He might deem it worthy of a press conference, a press release, or no publicity at all.

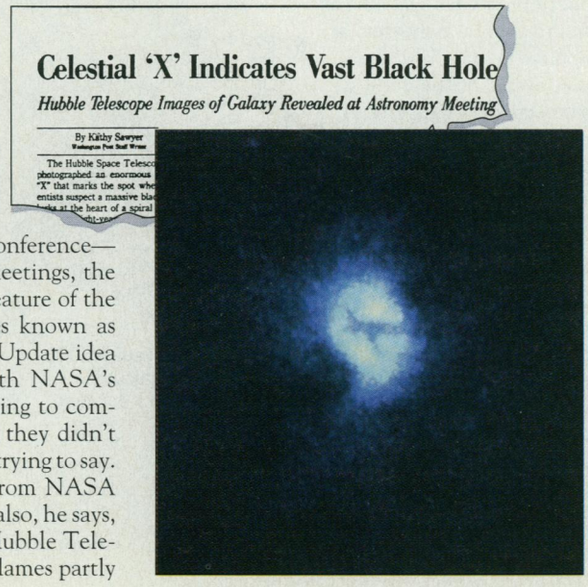
Press releases are joint efforts between researcher and public information officer. The researcher has final say over the end result, so any hype is also a joint creation. To draw extra attention to the releases, the publicity officers have been known to turn the scientific data into glossy color pictures created specifically for the press. Data on a cloud of x-ray emitting gas discovered around a clutch of galaxies, for example, had taken the form of a contour map, says the Space Telescope Science Institute's Villard, who helped promote this result. But "that would have looked dull," he explains. So his photography staff converted the data into an image of a glowing pink cloud enveloping the galaxies, which quickly showed up in a number of magazines, including *Science*.

The things that get big headlines, this cloud included, generally get launched with a press conference—either at the AAS's biannual meetings, the APS's Spring meeting, or as a feature of the newly created press conferences known as Space Astronomy Update. The Update idea originated just 2 years ago with NASA's Weiler. He says he was responding to complaints from reporters who said they didn't understand what scientists were trying to say. The idea was to make results from NASA programs more accessible—and also, he says, to correct the notion that the Hubble Telescope is useless, which Weiler blames partly on scientists who talked to the press while still distraught about the telescope's misshapen mirror.

These updates take place at NASA headquarters, and from there the program propagates around the country through NASA's own cable TV station, NASA Select. Weiler notes that he provides reporters with background material and outside experts, who can comment on the finding. Usually these are Penn's Margon and Washington's Weedman, who also take part in reviewing the results to be presented.

But for a reporter, that format can make solid reporting difficult, says science journalist Thomas Siegfried of the *Dallas Morning News*. "I prefer results to be presented at scientific meetings where you can discuss results with other people," he says. He often watches the televised version of the press conferences, but there, he says, "it's hard to get perspective." Sure, they have experts on hand, but they are always the same people. "They are not necessarily the most expert on the topic being presented." Phil Schewe, spokesman for the American Institute of Physics (AIP), agrees that meetings give the press a better chance to do critical coverage. "You can ask a loudmouth in the audience about a claim."





Publicity expansion

Outside astronomers often bring up some scathing criticisms of the coverage that results. Take a case in January 1992, when headlines in *The Washington Post* and other publications followed NASA's lead and told the world that a new Hubble Space Telescope measurement gave us evidence that the universe was going to expand forever.

The actual scientific finding, presented at the AAS meeting, was a measurement of the relative abundance of deuterium atoms—a heavy version of hydrogen—compared to atoms of ordinary hydrogen, helium, and lithium in the thin interstellar gases, using the high-resolution spectrograph aboard the Hubble Space Telescope. From the relative abundances of deuterium and other light elements, scientists can calculate how dense the universe was in its first moments, when these elements formed. What they conclude is that the universe has too little mass, at least in the form of ordinary matter, to halt its expansion. That had been known since the 1970s, says Ohio State astrophysicist Gary Steigman. The new finding "wasn't a fundamental new discovery—the quality of the data was much better but it was a confirmation of results that are 15 years old." But the press release from NASA presented the result as a new discovery.

What's more, some of the statements made at the press conference had led people to believe that this result had swayed the long-running debate over whether the universe will collapse or expand forever. Outside the press-room, however, it was hard to find any astronomer among the hundreds present at the AAS meeting who agreed with that interpretation of the findings. As Princeton's Peebles explains, these observations "are not relevant to the openness or closedness of the universe," because that revolves around another issue—the amount of unseen "dark" matter lurking throughout the cosmos.

That same tendency to overstate the significance of results, say critics, was on display again a year later, at the same meeting in 1993. This time around, headlines based on a new result from the x-ray satellite ROSAT invoked dark matter and suggested the universe was likely to collapse instead of expand, but the story fared no better with cosmologists. They instantly grumbled that the re-

sult, while interesting, was once again insufficient to settle the question of the universe's fate, as was implied in the press release. "This is incredibly far-fetched," says one.

The ROSAT observations in question had revealed x-rays that appear to come from an otherwise invisible gigantic cloud of gas 150 million light-years away. The cloud encloses just three galaxies—not nearly enough mass to anchor it—so there must be some invisible form of matter holding the cloud together. Richard Mushotsky of the NASA-Goddard Space Flight Center and David Burstein of Arizona State University calculated that the cloud had to contain about 20 times as much dark matter as visible.

Extrapolated to other clusters of galaxies, the result implies that the universe contains more than enough dark matter to eventually pull it all back into one giant, collapsing reverse of the Big Bang. That's the extrapolation suggested by the press release. "If small groups of galaxies all have comparable ratios of dark to ordinary matter," it said, "...there might be enough mass in space to 'close the universe'...." And it's the extrapolation many press reports picked up on, though many astronomers considered it a weak link in the argument. Says one, "While the presence of hot gas in the region can be a signpost of a deep gravitational well, to go further is dangerous."

Even the principal investigators admit they don't have enough evidence for the kind of sweeping conclusion presented in the press reports. "Our results are as consistent with an omega of .4 [an expanding universe] as an omega of 1 [in between an expanding and collapsing universe]," says Mushotsky. "But that's not what the press wanted to hear."

Premature publication

Besides overselling legitimate findings, astronomers say, NASA's publicity machine sometimes promotes results to the public before other researchers have had time to evaluate them—and even before the investigators themselves know what they are seeing. Mushotsky says his team caught a mathematical error that forced them to change their claims by a factor of two just days before he was scheduled to announce them to his colleagues and the public. Luckily, he says, his recalculation didn't alter his conclusion enough to call off the press conference, though at the time, Mushotsky admitted to having trouble sleeping at night.

Complaints about premature announcements resounded after the 1992 AAS meeting in Atlanta, following media coverage of a striking Hubble Telescope image of a galaxy that looked like a huge black X. The researchers, led by the Space Telescope Science Institute's Ford, who also reported the dust disk mentioned earlier, guessed that the X might represent gas and dust surrounding a black hole—and that's how it was billed in the press release that went with the image. But most astronomers considered the image a mystery. "It's another interesting observation," says Caltech's Blandford, who studies such unusual galactic centers. "But there are better candidate black holes." And many months later, astronomers say, there's still no paper in a journal explaining why he claims to see a black hole. "I don't know what his [Ford's] evidence is that there's a black hole," says astronomer Sandra Faber of the University of California, Santa Cruz. "It's frustrating."

Steigman and other astronomers don't think the publicity process bears all the blame for what thesse researchers view as hype. NASA is simply catering to media tastes and public apathy. "NASA may be underestimating the public's taste by relying on spectaculars," says Steigman. Agrees Mushotsky, "Sometimes you have to hype it a little—how else can you get closing the universe to compete with Michael Jordan's sprained ankle?" Nevertheless, many researchers argue that NASA's publicity machine should be throttled back, or at least that more effort be put on explanation and less on promotion. "We should bring people along, not bring the word down from on high," says one astronomer.

But sometimes the current system of press conferences and news events is the only way to get science in the news at all, says AIP's Schewe. "If you let information pour out in a haphazard way you get less coverage," he says. As for claims that the system tends to lavish publicity, on results that don't deserve it, NASA's Maran calls some of the researchers' criticisms "press envy." "Whenever a result gets publicity, other scientists say it's wrong—they are expressing a general resentment that others in their field are getting press or getting quoted and they are not."

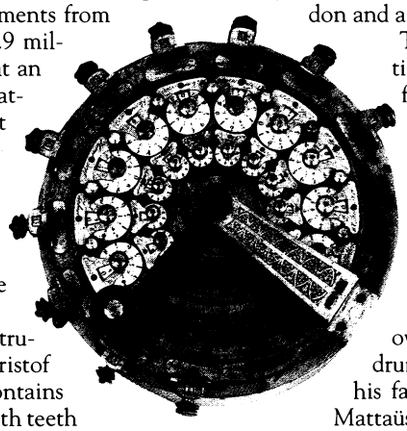
But Schewe and Weiler agree with their critics that however the job of informing the public about science is done, it's important to do it right. "When you get a new result you fill your heart with joy and you want to tell people," says Maran. That takes some hard work on the part of researchers, public information specialists, and journalists. "It behooves us," says Princeton theorist Peebles, to get the public honest information. "I try to tell the truth as well as make it comprehensible," he says. "It isn't easy." But it can be done.

–Faye Flam

SCIENTIFIC INSTRUMENTS

Calculator Adds Up the Dollars

Few modern-day scientists would care to have a Schuster-brand calculator in the lab. As big around as a dinner plate and heavy with metal gears, the Schuster can handle nothing but basic arithmetic—and that only when the operator turns a hand crank. But the Schuster's unwieldiness didn't stop a dealer in scientific instruments from paying £7.7 million ($11.9 million) for the instrument at an auction 2 weeks ago. The attraction: The Schuster, at approximately 170 years old, is one of the earliest versions of an ingenious type of calculator known as a step-drum—and is the only one of its type outside a museum.



CHRISTIE'S

Record breaker. 170-year-old calculator fetches $11.9 million.

Crafted by German instrument maker Johann Christof Schuster, the calculator contains unusual "stepped" gears with teeth of nine different lengths, each representing a number between 1 and 9. Schuster spent 2 years building the intricate machine, which includes a lacquered and gilded brass case outfitted with 20 dials to display the numbers.

An unknown astronomer-mathematician who worked for a prince in India once owned the calculator, which was passed down through the family to the unidentified seller, according to the auction house, Christie's of London. The astronomer probably got little use out of it, though, because "it was not particularly accurate or successful," says Gerard Turner, a professor of the history of science at the University of London and a consultant to Christie's. The price, which Christie's says is the highest ever for a "non-fine or applied work of art," surprised auction officials, who priced the Schuster at $23,000-$31,000 in the auction catalog. But no similar machine has hit the market in 70 years, and European museums own the four other step-drums made by Schuster or his father-in-law and master, Mattaüs Hahn. A bidding war with a German museum representative eventually forced the buyer, Edward Mannheimer, to shell out a sum Turner terms "ludicrous. The fact is, it's not novel, it's not from the [time] when mechanical calculators were particularly successful." Still, he concedes, for the fancier of calculating history, "it's a nice thing to have."

–Tracy Watson