

GETTING PHYSICS INTO THE PAPER

Covering physics in the daily press often pushes reporters to the limits of their intellectual abilities, and yet it remains one of the most exciting aspects of the job.

Charles Petit

Few newspaper reporters have a formal grounding in physics. Yet most who cover hard science rate physics as among the most enjoyable and rewarding parts of the beat.

In 1990 physics may not have the popular snap it had in the optimistic, nuclear-intoxicated 1950s, when cyclotron operators were naming new particles and elements every day, or so it seemed. The growing ability to manipulate genes and study disease processes at the molecular level has given to the biological sciences much of the glamour and sheer intellectual challenge that the physical sciences had pretty much to themselves through most of this century. Nonetheless, supernovas, the Super Collider, superconductors, superstrings, supersymmetry and other super stuff keep the diet steady. We do get plenty about physics and physicists into the daily news.

Rating physics in the daily news is not an exact science. Recently, during a meeting at Cornell University sponsored by the Council for the Advancement of Science Writing, Tom Siegfried, science editor for the *Dallas Morning News*, circulated a questionnaire asking other science reporters to rank the top science stories of the 1980s.

The poll excluded disasters and accidents, such as Chernobyl, Bhopal and the Challenger explosion. This left the field open to scientific discoveries. The top ten in order were:

1. AIDS and its many ramifications
2. The Antarctic ozone hole
3. Genetic markers for human disease

4. Transgenic animals
5. The planetary missions of Voyagers 1 and 2
6. High-temperature superconductivity
7. The first commercial products developed through genetic engineering
8. DNA fingerprinting
9. Extraterrestrial impact theories to explain dinosaur extinction
10. Supernova 1987A.

Physics is prominent in numbers 2, 5, 6, 9 and 10. This is half the big science stories of the decade. Of course a different group of reporters, or the same reporters on a different day, might produce a different list, but probably not by much. Physics also did well among the also-rans: cold fusion; global warming; nuclear winter; the W and Z particles; superstring "theories of everything"; arguments over a fifth force that counters gravity; dark matter, inflation and the large-scale structure of the universe; and the opening movements of the Super Collider ballet were also cited as top stories of the 1980s.

What makes good news?

What makes science news is not necessarily scientific elegance. News of any kind means what is different, dramatic, exciting, important, frightening, sexy, celebrity-endowed or just entertaining. As one NASA public affairs man said recently, the space agency makes the news based on the following criteria, in declining order of importance: death, disaster, and discovery.

There are no recipes to make a good news story. This is the case for all beats. Adding to the uncertainty of science news is the fact that science writers tend to choose their own stories, unlike general reporters, who are

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typically handed their assignments by their editors. Large annual meetings, such as those of the American Association for the Advancement of Science, American Physical Society, American Geophysical Union and American Astronomical Society, generate news used by many reporters, as do papers in major journals. However, idiosyncrasies of reporters, tastes of editors and sheer whim may be all that explains why a story appears where it does when it does.

Such uncertainties aside, several factors ensure continued attention to physics by the nation's science reporters, particularly those who work for newspapers and who largely set the tone of media science coverage.

For one, the budget deficit puts science policy debates into the center ring. Physics attracts some of the sharpest attention, the Superconducting Super Collider being the prime reason. Because the SSC is a big money issue, one can expect that every move between final completion—or abandonment—of the project will get prominent play in newspapers and broadcasts. The same goes for the space station, which NASA backs partly as a good place for microgravity research.

Wide fear that Americans are becoming scientific illiterates paradoxically bodes well for science news. Where there are Congressional hearings and proclamations of the nation's impending decline, there will be reporters listening. As the most historically glamorous of

the sciences (a legacy of both Einstein and the atom bomb), physics is a handy benchmark of mental fitness. Hopes that kids will be inspired to study science and thereby enhance competitiveness have touched even those who don't get much native joy from science itself, a class of person that includes many assignment editors. They may lean toward more science coverage simply out of a sense of social responsibility.

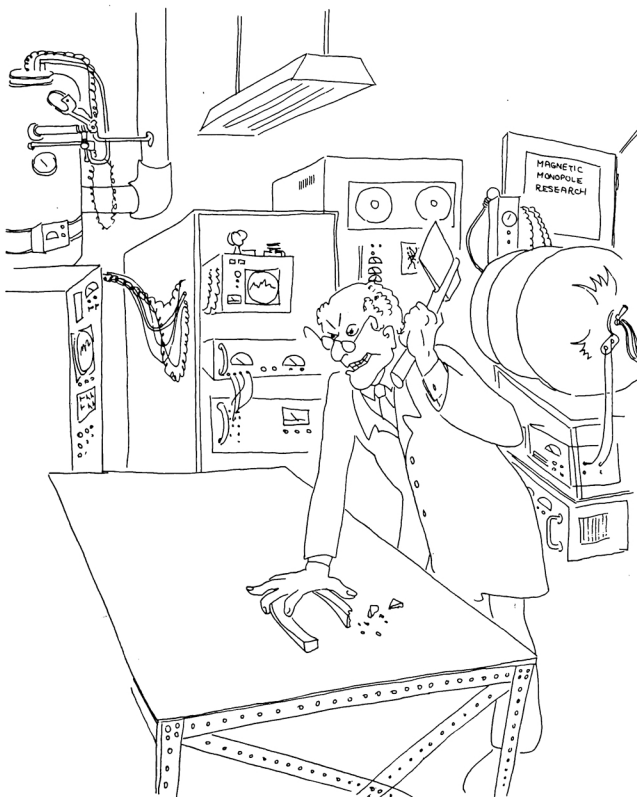
Further priming the pump of physics news are real and perceived public hazards, which are suffused with technical and scientific issues. Radiation dangers inspire interviews with authorities on nuclear and medical physics. Fears of global warming and earthquakes attract geophysicists. New weapons of war become showcases for recent discoveries by physicists.

Scandal and ineptitude in high places will always make the paper, and science is hardly immune. The precisely bad mirror on the Hubble Space Telescope is a juicy item, inspiring dyspepsia in Congress and heavy digging by investigative reporters, whose stories inevitably refer to the telescope's role in advancing astrophysics. The near-euphoric coverage given the Space Telescope in the media just before the mirror problem emerged parallels the uncritical and hopeful coverage NASA got in the years before the 1986 shuttle explosion. In both cases, partly out of chagrin at being surprised by a story, partly from a sense of betrayal, reporters quickly turned on NASA with a vengeance.

Science is, to be sure, a journalistically dangerous field. Confronted by thickets of equations and jargon on one hand and the raw excitement of new discoveries about the bare rules of existence on the other, a science reporter is forever juggling the risk of serious error should he or she try to be too precise on deadline with the temptation to fall back on overwritten simplifications and empty metaphors. How many times have my colleagues and I kissed off subatomic particles as "the building blocks of matter"?

Quantity of news on physics and other sciences, clearly, is not the only issue. A recurrent theme heard from scientists, as well as from many science reporters, is that something is wrong with how the major media handle science news. Criticism comes even though today's science reporters are generally more educated, experienced and dedicated than ever, and despite there being general support by editors for regular science coverage (as seen by the more than 80 newspapers that have regular science sections). Researchers often assert that most of the deeply exciting events of their fields don't make the papers, and for those that do, the emphasis is off base. Sometimes the facts are mashed, too.

These critics are too often right. Take, for example, the incomplete and skewed coverage of fundamental physics. Several years ago, Stanford's Blas Cabrera received wide media attention with his apparent observation of a magnetic monopole. But his later concession that neither he nor anybody else could replicate the observation got hardly a mention in the popular press. On an intellectual plane, both ends of that story are compelling, but a null result can never attract the reporter like something sensationally new. Of course, if Cabrera's



Hubble Telescope to offer best view yet of the universe

By MAX GATES
Hawthorne, N.J. (UPI)—The Hubble Space Telescope, launched from the space shuttle *Discovery* this week, will look 50 times farther into the universe than has ever been before.

Telescope poised to focus eye on galactic mysteries

The New York Times
CAPE CANAVERAL, Fla.

Hubble Telescope may help rekindle our frontier spirit

By L.K. Brown
Cape Canaveral, Fla.

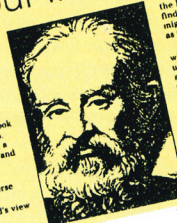
Cape Canaveral, Fla. (UPI)—Congratulations, taxpayers. Your \$2 billion telescope is about to be launched into orbit.

What's in it for you? That depends on how you assess value.

The first time a telescope about a century was about 500 years ago. The scientist, Galileo Galilei, got a stern warning to cease his work and was put under house arrest.

His crimes: Finding and publicizing evidence of a universe not centered on Earth.

He helped shift the world's view from medieval to modern perspectives, a view that has



Astronomers do not know what the Hubble Space Telescope will find, but they realize historians might view it as a milestone as big as Galileo's work.

"I do not know what Hubble will reveal about the origin of the universe and our place in it. But I am very confident that it will be as profound in its effect on our perception of who we are as such previous revelations of astronomers," said Leonard Fisk, chief of NASA's space science department.

The potential rewards cannot be measured in dollars or new technology.

"There are no practical applications of the space telescope

hay is the \$1.5 billion telescope, a 94½-inch mirror enclosed in a 45-foot-long spacecraft weighing more than 12 tons.

After 45 years of dreaming and almost 20 years of planning, development and delays, the Hubble is ready to be taken to orbit.

Some scientists say the orbiting telescope promises to be the greatest leap in astronomical technology since the first "optical sticks" used by Galileo in 1609.

The Hubble's

Telescope Is Jittery, Confused

Hubble Project Is Facing Complex Problems, Engineer Says

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ALBUQUERQUE, N.M. — The Hubble Space Telescope problems plaguing the Hubble Space Telescope are far more complex than the nagging troubles it initially suffered. If not resolved, the flaws will undermine the effectiveness of the \$1.5 billion instrument, engineers say.

Glitches hobble Hubble telescope

By JOHN MORLE WILFORD
N.Y. Times News Service

ALBUQUERQUE, N.M. — Seven weeks after its launching, the Hubble space telescope is giving controllers and engineers fits as they struggle to overcome difficulties with antennas,

Westphal and other scientists noted that it takes months to

of a new ground-based should not be surprised that long to fix

Telescope, which April.

Engineers also that they do not while trying to

of Technology, one of the telescope's principal scientists

from "night" to "day" as it orbits the Earth. The sudden change in temperature causes the long solar panels of the spacecraft to vibrate the entire vehicle.

Vibration rendering Hubble useless

Experts: Telescope will be fixed

By LEE DYE
Los Angeles Times

glitches and the spacecraft 300 miles above earth would be "kind of like changing a spark plug while driving down the road."

That is, he explained, one must be extremely careful in maintaining control of the vehicle and not causing

Ducetto predicted that the observatory, with its 94½-inch mirror, the powerful ever put in orbit, will pre-launch performance and efficiency goals.

Dr. F. Ducetto Macchetto, chief scientist for the faint-object camera

integrity were in question, which it isn't, then the growth industry of scientific fraud news would gobble him up.

I've been guilty of such selective, non-follow-up reporting. In early 1988, I got a tip and a subsequent scoop on measurements by a Japanese-launched satellite—built largely by physicists at the University of California, Berkeley—that seemed to show a large excess of flux on the blue side of the cosmic black-body microwave spectrum. Because the finding implied all sorts of exotic possibilities for the nature of the early universe, and because I had it first, it was a natural and naturally exciting story for me to do.

Then the other shoe dropped. In January of this year, the Cosmic Background Explorer satellite showed those measurements to be spurious, but I didn't follow up. I should have, I might have, and the story would probably have made the newspaper. The *Chronicle* did, of course, report that COBE discovered such a remarkable uniformity in the cosmic background radiation that it challenges most standard ideas of how galaxies are formed. But the refutation of the earlier rocket measurements went unmentioned. As I saw it, there was no scoop, the essential elements of a good story (surprise at a new phenomenon, for one) were gone, and there were other, more compelling stories to do. It remains a tale half told in the *San Francisco Chronicle* and many other newspapers.

It is worth noting that not all such "oops" stories are neglected. When astrophysicists discovered that supernova 1987A did not, after all, bear a submillisecond pulsar but rather that their detector was talking to the telescope, the instant obsolescence of piles of theorists' papers written to explain such a pulsar was just too good a story to miss—but the story wasn't about physics. It was about some very smart scientists who had fooled themselves. It was a story about embarrassment.

Trying not to get flummoxed

Most of the hurdles to good science writing reflect the shortcomings of newspapering of all sorts. It is a frantic

business. A daily reporter may wake up one morning knowing zip about a subject, and the following morning see his or her byline over a front-page explanation aimed at edifying a million people. A science writer may jump from pesticides to AIDS epidemiology to earthquake fault mechanics and on to neutral weak currents, all in a week. Reporters stretched thin just covering the big stories cannot give everything the balanced attention it (and the reader) deserves.

In mid-1987 I was among a gaggle of reporters, many of us full-time newspaper science writers, at a high-temperature superconductivity conference near the Berkeley waterfront. This was in the first, euphoric year after ceramic oxides leaped to the front pages. Our stories typically included predictions of levitating locomotives and coils that would store vast amounts of energy practically forever. Newspapers, television news and weekly magazines produced dazzling graphics showing planes and lanes of copper atoms within revolutionary crystals, which could, we assured readers, be baked in the kitchen stove from a few dollar's worth of ingredients.

At one point, John Bardeen, a high guru of physics and a Nobel Prize winner twice over—which gets any reporter's attention no matter the topic—presented a fine summary of how the standard BCS theory of superconductivity might, or might not, provide an explanation for what these layered compounds of copper, aluminum, barium and whatnot were doing to provide such perfect pathways for electric charge.

It was, I am fully prepared to believe, a wonderful summary. Most of the summaries that day were probably wonderful. The viewgraphs and slides, full of data that revealed important resonances and absorptions, impressed greatly, and the scientists supported and interpreted the data with handsome equations loaded with multiple integrals and differentials. But you will have to take the word of those who understood what Bardeen was saying. For it occurred to me, if there existed a machine to measure confusion—a device one might call a flummox meter—and one had carried it about that room, I'm sure it

would have revealed some extraordinarily tall spikes. With regrets to my colleagues, the flummox meter would have been a good way to find the science writers—the ladies and gentlemen charged with the job of telling the rest of the world what had happened that day. But as this instance proved, reporters are often at the raw limit of their power of comprehension when they file stories.

As for the coverage of high-temperature superconductivity overall, despite the inescapable hyperbole of that first year of breathtaking news and the perplexity of reporters, the media have performed reasonably well, I believe. Mankind is discovering new behaviors of matter. Dramatic practical applications may yet come. Its legitimacy as a story is clear.

Then there is cold fusion. No recent event better illustrates the difference between how reporters and scientists view research than the protest by some physicists over the award the American Institute of Physics gave to *The Wall Street Journal's* Jerry Bishop for his series of stories on cold fusion.

In the opinion of the six-member awards committee—half of whom were newswriters—Bishop deserved the prize because his prose was clear, he displayed a grasp of the subject, and he largely set the stage for the rest of the media. There were no egregious errors in the stories; the quotes and accounts were accurate and from a wide range of sources. It was just plain good news writing.

To many physicists, assertions of positive evidence for cold fusion had the credibility of Elvis sightings, but to their dismay many reporters such as Bishop continued to recognize the affair as a valid story. By late this last summer, following bitter retorts by some physicists that Bishop's writing had been too generous to the cold fusion camp, AIP's executive committee had ruled that future decisions by the awards committee would be subject to review. Reporters who previously had been honored to serve as judges threatened to resign over the infringement on their independence.

Ben Patrusky, a free-lance science writer who is executive director of the Council for the Advancement of Science Writing and a member of the AIP public information committee, says the dustup reveals a basic failure by many scientists to understand the posture and job of reporters. "There is this feeling among scientists that we [reporters] are supposed to be allies or advocates for science," Patrusky says. "We're not. We cover science, and we look for great stories. Jerry told some great stories, and he did it well and honorably."

Victor McElheny, director of the Knight Fellowships in Science Writing at MIT, recently analyzed the case of a science writer brought under bitter attack by an advocacy group (in a field other than physics), and he made a cogent point about how reporters regard the vicissitudes and occasional missteps of daily news: "On the assertion of error, the professional answer should be relatively simple. If the errors appear significant enough, they can be knocked down in the second-day stories of competing reporters—or the erring reporter himself or herself. It is clear that a newspaper is not engraved on tablets on Sinai. It prints what it can determine to be the facts on a particular day. If other facts emerge, they can be printed on succeeding days."

Understandably, such an approach to reporting grates on many scientists, particularly those who may be embarrassed by media accounts, written in an hour or two, that aim to summarize work they have carefully pursued for years. No one, in the business or not, should tolerate deliberate or knowing error, but the imperfections of daily journalism are manifest. From the point of view of the American Institute of Physics, strict oversight of its

journalism award may well make sense; after all, it is AIP's award. But the irrefutable lesson is that scientists and science reporters view science news differently.

The art of daily journalism is to understand what one can, quickly, and write it out, plainly, in a manner that people (starting with one's editor) will read, willingly. Journalists who write for magazines or who write books have more time to develop their stories and hence have time to appreciate their subjects to a much greater depth. But science reporters, unlike those who cover crime or politics or sports, seldom fully comprehend their sources.

George Johnson, a reporter for *The New York Times*, recognized this problem in his introduction to his book about artificial intelligence, *Machinery of the Mind*: "No matter how much you read or how many people you interview, you are always in the frustrating position of knowing less than the people you are writing about—experts with PhDs and years or decades of experience."

"How then is science writing possible?" Johnson continues. "By using the tools of analogy, metaphor and example, and by viewing the key concepts from several different angles, it is possible to home in on the subject through a sort of literary triangulation." This could be an elegant way of saying that by asking a sufficient number of dumb or naive questions, the reporter can grasp the point and describe it simply. To go beyond Johnson's thoughtful conclusions, false pride or unwillingness to appear stupid in an interview (or before colleagues at a press conference) disqualifies one from a career as a newspaper science writer.

All of the above is a concession, of course, that it is risky for a scientist to submit to a newspaper interview. Why then should he or she do it anyway?

One answer comes from chemist Roald Hoffman. His remarks are aimed mainly at encouraging scientists to make public lectures, but they apply equally to talking to reporters. "Think of the alternative to not trying to explain what we are doing, not just the technological end or the medical benefit, but the hard (and sometimes soft), beautiful logic that fascinates us. The alternative, not really far down the road, is a cutting off from the society that supports us, and from those close to us; a sinking into still more jargon; the alienation of just those young people whom we want to join us."

Most scientists and reporters agree that an open society, one with a free flow of information, is essential for a vigorous and intellectually rich society. The benefits of a free press include a rapid dissemination of news, varied points of view and only the slimmest chance that large secrets can remain untold for long. A free press is also, by definition, an irresponsible press—responsible to no one but itself (and, in the United States at least, the provisions of libel law).

Despite the risks and errors of the daily press, scientists in general and physicists in particular have not walled themselves off from reporters. Aside from a recent trend toward official restriction of access to sources by some government institutions, the stereotype of the aloof and arrogant scientist who refuses to mix with the press is a lie. Calls are returned, silly questions endured, and often some shining and inspiring popularizations of science result.

Many of us persist in science writing because it offers a highly rarefied brand of news—truly new news, not just new names on old plots of crime, catastrophe, romance or politics. We write about ideas and events new to human experience. Between stories about epidemics and toxic spills, an occasional chance to share with readers new conclusions about particles, fields, forces, the arrow of time and the meaning of it all is a privilege and a tonic. ■