

# Science

## Cut the Communications Fog, Say Physicists and Editors

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**CHICAGO**—It's an opening sentence that seems designed to put off even a physicist: "The need to obtain adequate ELMy H-mode energy confinement simultaneous with operation near the neoclassical tearing mode beta-limit and at/above the Greenwald density limit suggests that careful optimization of plasma performance will be required to obtain the desired fusion power performance, and that 'active means' to control or inhibit the onset of neoclassical tearing mode activity—a common precursor of plasma energy collapse or disruption in present experiments operating near the beta and/or density limits—will be required."

Take a breath, and don't worry if that quote from a recent physics journal seems as impenetrable to you as ancient Mayan script. In the past, physicists have fretted over their inability to communicate with the lay public. Now, the flood of unexplained acronyms, cryptic symbols, endless sentences, and nightmarish graphs has risen so high, say some leaders in the field, that physicists can no longer understand each other.

No one is claiming the problem is unique to physics. "My impression is that the state of communication is about the same in astronomy, chemistry, and biology," says Mitio Inokuti, a physicist at Argonne National Laboratory in Argonne, Illinois. But it has become especially painful in physics, in part because of the humbling example of the great writers and lecturers in physics of decades past, such as Enrico Fermi and Richard Feynman. And it's gotten so bad that a band of reform-minded physicists and journal editors has decided to take action. Their first step was a meeting here last April, organized by Inokuti and Ugo Fano of the University of Chicago, to discuss what they see as a fog of poor writing and ideas about how to dispel it. Since then, meeting participants have settled on what Fano hopes is "a gospel that can be accepted in the community"—a set of guidelines for clearing the fog.

The written guidelines will be presented in November to the publications board of the American Institute of Physics (AIP), which publishes many physics journals, in hopes that the AIP will consider officially adopting them. The guidelines suggest that journal editors make clarity of presentation "an [explicit] condition of acceptance of an article," that abstracts be made more generally intelligible and that the best-written articles receive special recognition by the journals. In short, says Steven Rothman, chief editor of the *Journal of Applied Physics*, he and others intend to tell authors: "I can't make you do anything, but I can sure make you wish you had."

Along with cajoling authors, the largest physics organizations are taking steps of their own to mend the communication lines in physics. *Science* has learned that AIP and the American Physical Society (APS) are quietly seeking an editor for a new electronic publication, tentatively called *Highlights*, which would aim to report on selected journal articles in a form comprehensible to physicists in any specialty. The publication, which

has secured initial funding but has no firm publication date so far, would likely employ a staff of several science writers and be loosely patterned after the online *Physics News Preview*, now written by AIP's Phillip Schewe and Ben Stein. "The idea is to make a small dent in this loss of general understanding," says Martin Blume, editor-in-chief of the APS. "It is very much along the lines of the [Chicago] conference."

How effective any specific measure will be is a matter of open disagreement among editors, physicists, and science writers. Even the agreement on the "gospel" of good writing didn't come easily. But there's little dispute about the severity of the problem: The state of physics communication was universally deplored at the April conference, held on the campus of the University of Chicago.

"We had a disastrous colloquium here yesterday," grumbled Fano, a quantum physicist who has worked with Werner Heisenberg and Fermi. "[The speaker] lost me after three or four minutes." The sin was compounded, said Fano, because unlike departmental seminars, such colloquia are supposed to be tailored for a general audience of physicists. Ben Bederson, the previous editor-in-chief of the APS, added that the colloquia in his own department at New York University are often so bad that he wonders whether it is counterproductive to encourage young students to attend. Instead of kindling their interest, said Bederson, the ordeal "sometimes turns them off from physics."

As the discussion turned to journal papers, the complaints multiplied quickly. "There are papers one-third of which are acronyms," said John Light of the University of Chicago and editor of the *Journal of Chemical Physics*. Obscurity begets more obscurity, said Anthony Starace of the University of Nebraska, Lincoln, and an editor at *Reviews of Modern Physics*, since poor communication between subfields often leads researchers to invent new jargon for slight variations on existing physics. The physics of many-body interactions is similar in chemical, atomic, nuclear, and condensed-matter physics, for example, but each field has its own terminology, said Starace. And since some of the most fertile areas of physics are interdisciplinary, those kinds of barriers may do disproportionate harm.

Starace and others observed that the weakening humanities background of many physicists may be contributing to the trend. Major universities in the United States, for example, have eliminated most literature and language requirements—even foreign languages—for the physics Ph.D. The preponderance of foreign authors—many of whom don't have a full command of English—in journal submissions may also be a factor. Sometimes, though, the reasons behind obscure, techie writing boil down to "basic psychology," said AIP's Schewe: "You lose all your readers, but at least you can't be accused of being an idiot. Instead, the readers are made to feel like they're the idiots."

No one at the meeting saw a quick way out of this communications miasma, but there was no shortage of ideas. Schewe suggested rethinking the role of journal abstracts. Instead of serving as a telegraphic summary that only specialists can follow, he said, an abstract could act as a prose "invitation," or short introduction, to the subject of the paper. Argonne's Inokuti put forth the notion of formally recognizing well-written

papers—either by publishing them in a special section of a journal or by issuing periodic awards. “It becomes a line in your curriculum vitae,” said Inokuti.

Others focused on catching physicists-to-be as undergraduates, before poor writing habits have become irreversible. Christopher Fasano of Francis Marion University, a liberal arts college in Florence, South Carolina, described a recently instituted requirement that all physics majors take a minimum number of “writing-intensive” courses there. That category includes certain offerings in the physics department itself, such as lab courses in which reports are stringently graded not just on content, but also on clarity, organization, and style. “Students get better [at writing],” said Fasano. “Practice helps dramatically.” If such programs ever find acceptance at the large research institutions that produce most future physicists, Fasano thinks, the journals could see that same dramatic improvement.

What's needed most is “basic training,” agreed Argonne's Nghi Q. Lam, editor of *Applied Physics Letters*. “We should have some kind of standardized textbook so that every [physics] student—not only in the United States, but also in other countries—receives the same fundamental training in this area.” The text would cover everything from sentence structure and style to the proper organization of a good paper, said Lam.

The group has now distilled these discussions into a set of written suggestions for reform—watering down their recommendations in some areas of persistent disagreement, such as the proper role of journal abstracts. Although they expect a sympathetic hearing from AIP's publications board in November, any proposal that requires new resources could face an uphill battle. For writing awards, for example, “there's simply not enough staff, not enough people to be able to judge,” says Peter D. an increasingly complicated field is unrealistic, Fano responds: “People are very much looking for this kind of guidance.” A word from physicists who have seen better days, he says, could make all the difference. Adams, editor of *Physical Review* and the board's chair. Meanwhile, *Highlights* won't be launched until the right editor turns up, says Blume. “The best we could do is get started by the beginning of next year,” he says.

To skeptics who say that the reformers' goal of markedly simplifying communication in an increasingly complicated field is unrealistic, Fano responds: “People are very much looking for this kind of guidance.” A word from physicists who have seen better days, he says, could make all the difference.

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This article appeared in *Science* in August 1997. Since then, unfortunately, the writing skills of American physicists and other STEM professionals have continued to decline.