cists, wrote to Yitzhak Rabin, who as head of the Israeli military is responsible under international law for safeguarding the rights of individuals in occupied territory. We asked him several questions and sent a copy of our letter to the Israeli Embassy in Washington. What are the specific charges against Tayseer Aruri? Has he got adequate legal representation? Has he got proper medical attention in prison? When is the hearing, and what is the procedure to ensure that it is fair and proper? Two months later Rabin replied, but not to a single one of our questions. I am therefore particularly glad to see the letter of Israeli Consul General Moshe Aumann, even though it is six months late and not very specific.

In my letter I made no attempt to judge the guilt or innocence of Aruri, because I did not, and do not, know. The accuser declines to present a specific charge, and the accused is not in a position to respond. But I did endeavor to describe what specific actions are counted as crimes in Israeli occupied territory and how they differ from the situation in the rest of the world.

Yehuda Band mentions Sami Kilani. Kilani's situation was brought to the attention of The American Physical Society in 1984 at the request of an Israeli citizen. After enquiries, APS President Robert R. Wilson wrote to the Israeli authorities, and I am informed that Kilani was released from preventive detention soon thereafter, although it was renewed from November 1987 to December 1988. In April of this year, Kilani was beaten up for two hours at an Israeli checkpoint, and then taken to the hospital. Later that night he was arrested again. His friends believe that this was done to prevent his being seen in public with his obvious wounds.

Howard Greyber wants us to understand the extent of Israeli generosity to Birzeit University. It is mainly paid for by the Palestinians themselves. Some capital funding comes from wealthy men who were born in the area but had to leave in 1948. Some of these men I am proud to call my friends. The Israeli generosity seems limited to allowing the university to open sometimes. Birzeit, together with all other educational institutions on the West Bank, has been closed for most of the last two years. Before 1967 Palestinians could travel freely to the American University in Beirut or the University of Jordan in Amman. Now it is not so easy and local institutions are more important. Also, Greyber has not noticed the explosion in Arab education in the last 20 years. For example, the three major new universities in Saudi Arabi, in Jeddah, Riyadh and Dhahran, have over 25 000 students each. Incidentally, the respect that Aruri's fellow prisoners give him could be due to the Arab respect for scholars, and need not be attributed to more sinister motives.

It is hard to compare and prioritize civil rights cases, as Cranberg wants to do. They are all different. All need our attention. I, for example, have personally written about, and when appropriate acted on, cases in Argentina, Brazil, Iraq, Lebanon, Pakistan, Syria and the USSR as well as on the West Bank.

RICHARD WILSON
Harvard University
7/89 *Cambridge, Massachusetts*

Mixing Instructions for Invisible Paint?

Boris Al'tshuler and Patrick Lee's elegant explanation (December 1988, page 41) of the coherent backscattering peak was so lucid that the undergraduates in my laser course understood it perfectly—and that's when the trouble began. As Al'tshuler and Lee explain, time-reversal symmetry ensures coherence between conjugate paths, and hence the constructive interference in the backscattering direction, which yields the peak. My bright undergraduates countered (in effect) that the scattered intensity for a pair of conjugate paths is actually $I = \cos^2(\mathbf{q}\cdot\mathbf{d}/2)$, where $\mathbf{q}$ is the momentum transfer and $\mathbf{d}$ the separation between the first and last scatterers, and instead of a peak in the backscattering direction one gets a series of oscillators spread out over all directions.

That's obviously true, so a few extra words need to be added, namely that in a random system one sums the intensity from many different paths with different values of $\mathbf{d}$. I explained this using the blackboard and some colored chalk, showing how away from the backscattering direction the peaks and valleys of the different cosine-squared terms tend to average to $\frac{1}{2}$, while along the backscattering direction ($\mathbf{q} = 0$) all terms maintain their maximum value of unity, leading to the famous 2:1 ratio for the height of the peak relative to the diffuse background. But I didn't fare any better than did Al'tshuler and Lee, since my students objected, quite properly, to my adding intensities from the different paths, instead of amplitudes. This led the discussion into laser speckle and to the conclusion that one should expect random fluctuations in the scattered light, instead of a backscattered peak.

Soldiering on, I explained how an ensemble average over many systems is needed to get the peak out of this optical "noise."[1] Of course, my undergraduates wanted to know why the latex suspension used in the experiments cited by Al'tshuler and Lee represented an ensemble average, and this led us into a discussion of how the optical fluctuations from many randomly moving scatterers evolve in time, and how the effects of multiple scattering could be quantified using correlation functions and measured using correlation spectroscopy.[2]

It's not every day that undergraduates get to quibble successfully with famous theorists, and so it was clear that there was no way we were going to get back to my original lesson plan on laser flashlamp efficiencies. Instead, I ended the hour by suggesting a homework problem, which readers of PHYSICS TODAY might enjoy tackling: Is there some way to make the conjugate paths discussed by Al'tshuler and Lee have opposite phases, rather than the same phase? If there were, one would get complete destructive interference instead of the more usual constructive interference, and there would be a backscattered null instead of a peak. My students were especially excited about this possibility when it became clear that if this could be done in a practical way, one would have—shades of Stealth bombers and SDI—a form of invisible paint. If you don't quite manage to solve this problem, take comfort in the fact that you're in good company; none of my bright undergraduates solved it either. If you want to peek at the answer, you can look in *Physical Review A* **37**, 1007 (1988).

References

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2. G. Maret, P. E. Wolf, Z. Phys. B **65**, 409 (1987). M. Rosenbluh, M. Hoshen, I. Freund, M. Kaveh, Phys. Rev. Lett. **58**, 2754 (1987).

ISAAC FREUND
Bar-Ilan University
1/89 *Ramat-Gan, Israel*

AL'TSHULER AND LEE REPLY: We appreciate the help of Issac Freund (and his undergraduates) in clarifying the argument that we gave in a rather condensed form due to space limitations. We hasten to add the dis-

claimer that our joint article is not intended to have any military application whatsoever!

BORIS AL'TSHULER
Leningrad Institute of Nuclear Physics
Leningrad, USSR
PATRICK A. LEE
Massachusetts Institute of Technology
Cambridge, Massachusetts
7/89

The Disspirit of St. Louis

I am writing to suggest that the APS keep records of the experience of members at our various conference sites, and refer to them when choosing sites in future.

I am motivated by the poor experience of many of my colleagues at the recent March meeting in St. Louis. For my part I noticed inadequate transport, inadequate hotel accommodation and a surly and unhelpful police force. One of our graduate students required 40 stitches in his head after an encounter with two members of the St. Louis Police Department. This occurred as this rather shy, gentle, nondrinking (but longhaired) member of our department was walking to the zoo!

Was our group unique in these experiences?

STUART LINDSAY
Arizona State University
Tempe, Arizona
4/89

THE EXECUTIVE SECRETARY OF THE APS REPLIES: The American Physical Society keeps excellent records of the history of events in cities in which it holds its meetings.

WILLIAM W. HAVENS JR
American Physical Society
New York, New York
7/89

What Vehicle for Ulysses's Odyssey?

On page 85 of the December 1988 issue it is stated that no shuttle has been designated to carry the Ulysses spacecraft. The Ulysses project offices in the US and at the European Space Agency, and science investigators in many countries, have believed for some time that the Atlantis vehicle would launch Ulysses.

You are no doubt aware that Ulysses has experienced more than its fair share of hiccups over the years and will understand, then, that your report triggered some nervous questions. I believe that the writer of the report was using an old NASA manifest. It might help if you could make clear that Ulysses is firmly established in the NASA manifest, with a flight on Atlantis scheduled for 5 October 1990.

D. EDGAR PAGE
Ulysses Science Coordinator
Jet Propulsion Laboratory
Pasadena, California
1/89

Remember the Third World Reader

It is part of the traditional way of doing science that authors of scientific papers buy reprints to send to colleagues whom they know to be interested and to those who send reprint request cards. It is a tradition of declining importance as photocopiers and computer databases become more widespread and cheaper. However, in some specific cases, it remains of paramount importance. In many third world countries, there are few journals, and resources for photocopying or computer searches are poor or nonexistent. In such cases, the receipt of reprints may be the only lifeline keeping scientists in touch with their fields.

We would like to make an appeal to physicists everywhere, particularly in developed countries. When you receive a reprint request from a developing country, far from discounting it as unlikely to lead to anything positive, please treat it as more significant than those requests that come from major labs. Please make sure you reply quickly, that the reprints go airmail and that you send other, related reprints (even if not requested). You could be saving a life—or at least alleviating some of the frustration of a colleague who is working under difficult conditions.

STIG HAGSTROM
Stanford University
Stanford, California
ALWYN EADES
University of Illnois,
Urbana-Champaign
11/88

Commenting on the column (April 1988, page 9) by David Mermin about irresponsible proliferation of scientific journals, Roger Taylor suggests (November 1988, page 11) that these journals "should be looking to the future and adapting to the electronic age" by storing information on optical disks. This solution, good as it is, would be acceptable only if all the scientific community were working at institutions capable of affording this kind of technology.

Institutions in underdeveloped countries, where making a photocopy is sometimes an odyssey, are surely very far from providing up-to-date services. Let us try to find solutions that take scientists in poor countries into consideration.

FREDY R. ZYPMAN
University of North Carolina,
Charlotte
11/88

The Greenhouse and the White House

Your representation of the state of affairs regarding the greenhouse effect (October 1988, page 66) is misleading. Specifically, the seventh of Irwin Goodwin's questions for the Presidential candidates contains the suggestion that emissions of cars, buses and trucks are the main contributor to global warming. In fact, highway vehicles account for about 10% of the CO_2, for example, generated by fossil fuel combustion worldwide.

While much of what is said in political campaigns may be less than the whole truth (at best), PHYSICS TODAY should be careful not to promote misconception in its discourse with politicians on behalf of the scientific community.

GEORGE W. GRAHAM
Ann Arbor, Michigan
11/88

IRWIN GOODWIN REPLIES: George W. Graham is both right and wrong. The statistic of 10% that he gives for CO_2 emissions from cars, buses and trucks is correct in world terms. But the question posed to the Presidential candidates was clearly directed to what the government might do to limit the CO_2 emissions that scientists currently believe contribute significantly to the "greenhouse effect." In the US, according to the Department of Energy, which keeps tabs on such matters, transportation vehicles are responsible for 32% of the CO_2 produced—roughly the same amount as from electric power generation (35%) and substantially more than from industrial uses (20%) or from heating and cooling (13%). PHYSICS TODAY'S "representation of the state of affairs" was therefore not far off the mark.

PHYSICS TODAY posed the question to the candidates to focus their attention on a real concern with physical implications. The wording obviously was not as careful as it might have been, but I do not believe it promoted a "misconception" in political discourse. ■