

sist on such growth being restricted to what the taxpayers are willing to fund.

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Solar Irradiance: A Force to Be Reckoned with, a Story to Tell

It is surprising that none of the discussions of changes in Earth's climate that have appeared in *PHYSICS TODAY* over the past year or so have included coverage of the role played by solar irradiance variations. Since it was first noted 20 years ago that the Little Ice Age coincided with the Maunder Minimum,¹ evidence has been steadily accumulating that such variations do indeed affect Earth's climate significantly. As of 1996, the Sun's signature had been seen in the global temperature record of the last few centuries, in ocean basin temperatures of the past 50 years and in ice cores.² The correlation between the reconstructed solar irradiance and the global temperature of the last 400 years is particularly striking. A 1996 study even claimed that during the period 1880–1993, the solar irradiance variations dominated carbon dioxide variations in altering the global temperature.³

The history of solar irradiance research during the 20th century is at least as interesting as the history of the greenhouse effect presented in your January 1997 issue (page 34). Although it is true that the concept of solar forcing came close to extinction in the 1950s, it is clearly experiencing a resurgence at present, and its story deserves to be told.

References

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2. R. A. Kerr, *Science* **271**, 1360 (1996).
3. W. H. Soon, E. S. Posmentier, S. L. Baliunas, *Astrophys. J.* **472**, 891 (1996).

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The Mbone's Connected to the School Zone

The physics community is plagued by low morale amongst faculty members and by a substantial reduction in the number of students entering undergraduate physics programs. At major universities, the reduction in grant monies has adversely affected research facilities and graduate programs. At smaller universities, faculty members are usually isolated

from new developments and current activities in the field of physics. Such isolation has a negative effect on how well faculty members perform in the classroom, as well as on their ability to convey to students the exciting work now going on at the frontiers of physics.

I propose that major research universities use the Internet-based interactive conferencing service known as the Multicast Backbone (Mbone) network to disseminate seminars, conferences and other events that take place on their campuses.

The existence of such programming on the Internet would certainly facilitate and enhance the recruitment of students into our dwindling physics programs. Faculty members would benefit considerably from viewing well-known physicists reporting on their own research and giving seminars on current fields of interest. Such seminars could also stimulate the research efforts of other physicists.

I believe the cost of Mbone dissemination would not be great and the fruits of such efforts would greatly enhance general interest in and knowledge of physics.

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Oscillator Discussion Reflects Laser-Faire Attitude to History

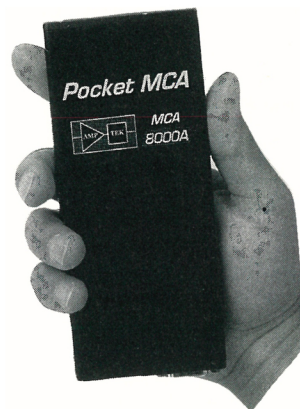
I enjoyed Daniel Kleppner's light-hearted but informative piece, "A Beginner's Guide to the Atom Laser" (*PHYSICS TODAY*, August, page 11), and appreciate his effort to address the knotty issue of what defines a laser.

He states that "a host of devices such as klystrons and magnetrons can produce radiation in the coherent state. In fact, all oscillators produce radiation in the coherent state. Nobody would dream of calling these devices lasers. . . . [A]nyone who can't tell a laser from an oscillator should not be giving scientific advice to neighbors."

The relationship of masers and lasers to other oscillators was also of interest to the inventors of those systems. Maser inventors Charles H. Townes and colleagues coined the acronym "maser" in 1953, and laser inventor Gordon Gould coined "laser" in 1957.¹ At a 1959 conference, Gould made the following observations: "Professor Townes has mentioned an early electron maser, the triode. The Barkhausen-Kurz oscillator is more easily understood. Electrons oscillate ap-

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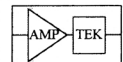
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proximately harmonically in a one-dimensional potential well between plate and cathode. . . . Similarly, in the magnetron type of maser, stimulated emission of radiation takes place as the electrons undergo transitions to states of lower angular momentum quantum number."² Thus the founding fathers recognized masers as oscillators and were also drawn to consider other oscillators (including magnetrons!) using maser/laser language.

While extending laser concepts to include atom lasers, it may also be appropriate to mention other nonelectromagnetic lasers. They include at least the widely studied phonon masers first discussed by Townes and Nicholaas Bloembergen and the recently reported exciton lasers, as well as the neutrino lasers that are postulated to have been important in the early moments of the universe.³

References

1. See, for example, M. Bertolotti, *Masers and Lasers: An Historical Approach*, Adam Hilger, Bristol, England (1983), p. 80, on the maser, and J. Hecht, *The Laser Guidebook*, McGraw-Hill, New York (1992), p. 14, on the laser.
2. G. Gould, in *Quantum Electronics: A Symposium*, C. H. Townes, ed., Columbia U. P., New York (1960), p. 291.
3. C. H. Townes, N. Bloembergen, in *Quantum Electronics: A Symposium*, C. H. Townes, ed., Columbia U. P., New York (1960), p. 405. A. Mysyrowicz, E. Benson, E. Fortin, *Phys. Rev. Lett.* **77**, 896 (1996). N. Kaiser, R. A. Malaney, G. D. Starkman, *Phys. Rev. Lett.* **71**, 1128 (1993).

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Planned ITER Study Is Deferred, not Nixed

The well-done story by Irwin Goodwin entitled "National Research Council Studies Operate Under New Openness Rules" in your August issue (page 48) states that the Department of Energy "canceled an NRC study of the controversial International Thermonuclear Experimental Reactor," adding that the NRC had already chosen the committee to do the work. Strictly speaking, DOE has deferred rather than canceled the study, pending resolution of the legal issues. And the NRC has not selected a committee.

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Socioeconomic Factors, Not EMFs, Put Children at Risk for Leukemia

After studying the potential links between electromagnetic fields and cancer and other health problems, the National Academy of Sciences' National Research Council panel concluded that the only possible reason for concern was the "weak but statistically significant association" between people's proximity to high-voltage power lines and childhood leukemias, as reported in PHYSICS TODAY (January, page 49).

However, I am sure that the British epidemiologist Leo J. Kinlen and his collaborators would advance other prime suspects as risk factors for childhood leukemias—specifically, certain socioeconomic factors. In a series of reports prepared between 1990 and 1996,¹ Kinlen *et al.* revealed that seven specific population mixes each lead to significant increases in childhood leukemias, and sometimes also in childhood non-Hodgkin lymphomas, in the UK. "Significant" here means that the probability that the given relative risk values are caused by purely statistical fluctuations is less than 5% or even less than 1%.

Kinlen *et al.* found relative risk values of 1.58 in new towns (planned post-war communities); 1.41 in rapidly growing towns and villages; 1.65 in rural areas with many drafted soldiers; 1.53 in rural areas with many oil workers; 1.61 in rural areas with many construction workers and rich parents; 1.50 in towns in which the number of commuters had increased strongly; 1.76 in villages that had many urban evacuees during 1947–49 as a result of World War II air raids. They also determined that parents having a high socioeconomic status is often a further risk factor for both childhood leukemias and non-Hodgkin lymphomas.

Kinlen *et al.*'s findings for the UK have been confirmed in part by Pierluigi Cocco and his colleagues² in Italy. Looking at a small cluster of childhood leukemia cases in Carbonia, Sardinia, they came up with some relative risk values that were remarkable: 0.3 for high socioeconomic status of parents (in contrast to Kinlen's results); 4.1 for parental birth outside Carbonia (in agreement with Kinlen); 4.0 for having a well in the backyard; 4.0 if pregnant mothers had taken anti-nausea medicine; 2.7 for a family history of cancer.

According to Cocco *et al.*, other risk factors associated with lower relative risk values, in the range 1.5 to 1.9, are maternal smoking, paternal drinking of at least 60 grams of alcohol per day, electrical substation within 300 meters and solvents at the paternal workplace. Other situations, like the presence of pets or radon daughters, are even less important. For policymakers, journalists and epidemiologists, it would certainly be fruitful to take into account the Kinlen and the Cocco studies.

References

1. L. J. Kinlen *et al.*, *Br. Med. J.* **310**, 763 (1996), and references therein.
2. P. Cocco *et al.*, *Arch. Environmental Health* **51** (3), 242 (1996).

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Up with IPCC Climate Report; Down with per Capita Energy Use

Fred Singer continues to disseminate incorrect information about the climate change issue (PHYSICS TODAY, "Letters," August, page 84).

He claims that the "discernible human influence" statement given in the "Second Assessment Report" (SAR) of the Intergovernmental Panel on Climate Change (IPCC) was based