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letters

continued from page 15

of the Jovian atmosphere are not well represented by an Earth model.

In addition, in 1875, Henry Rowland demonstrated that a rotating insulator (he used ebonite) with an electrical charge on it behaves exactly as does a conductor carrying a current; thus counterrotating insulators may develop large voltages and associated currents.

Finally, the night-side photographs of Jupiter reveal a large amount of electrical activity in the form of auroral and lightning displays.

It seems clear that our understanding of the Jovian atmosphere will be better when we have obtained more high-resolution data in the form of direct measurements, and it may then be more meaningful to evaluate the use of the Navier-Stokes viscous fluid equations on the similar Chapman-Cowling magnetohydrodynamic equations to understand this atmosphere.

Our next opportunity for direct measurements will be the flight of the Galileo spacecraft, and those measurements are eagerly awaited. I hope that all of the members of the scientific community will pressure NASA to ensure that there are no unnecessary delays in the flight of this spacecraft. If there are problems with the primary launch vehicle (space shuttle) which may not be ready as scheduled, a more traditional launch vehicle would do.

LEONARD LARKS
West Covina, California

MIS solar cells

I enjoyed Henry Ehrenreich and John H. Martin's article "Solar Photovoltaic Energy," (September 1979, page 25). The authors have addressed several important questions, which are of great importance in the ultimate commercialization of photovoltaics. However, in my opinion the authors could not bring to the attention of readers a very important photovoltaic device, namely the metal-insulator-semiconductor (MIS) solar cells.^{1,2} Such cells rely on an ultra-thin interfacial layer (approximately 10–30 angstroms) between the top conducting contact (metal or oxide semiconductor or their combination) and the base semiconductor. These cells have advantages over conventional p-n junctions:

- ▶ device processing at lower temperature results in longer minority carrier lifetimes
- ▶ the collecting junction is located right at the surface of the base semiconductor
- ▶ elimination of heavy doping effects.

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has been reported for any other p-n junction solar cells.⁴ These developments are very encouraging and offer one of the best prospects for the production of cheap photovoltaic electricity.⁵

References

1. M. A. Green, F. D. King, J. Shewchun, *Solid State Electron.* **34**, 860 (1974).
2. R. Singh, J. Shewan, *Appl. Phys. Lett.* **28**, 512 (1976).
3. R. B. Godfrey, M. A. Green, *Appl. Phys. Lett.*, **34**, 790 (1979).
4. *Solar Age*, September 1979, page 13.
5. R. Singh, K. Rahkhanan, "An Outlook for Automated Conductor-Insulator-Semiconductor (CIS) Solar Cells Factory," Accepted for presentation in the 14th IEEE Photovoltaic Specialists Conf 1980, San Diego, California.

R. SINGH
Colorado State University
Fort Collins, Colorado

10/16/79

Incident at IAU

As an invited participant of the US National Committee at the General Assembly of the International Astronomical Union last August in Montreal, I am shocked and outraged by the actions and attitudes of certain officials of the Canadian Organizing Committee in connection with an incident that occurred on Monday 20 August. In a truly multinational effort I and my colleagues Leo Goldberg, Gerhard Herzberg and Arno Penzias were collecting signatures on a petition of support for two of our Soviet colleagues, Jacob Alpert and Vladimir Dashevsky. Alpert and Dashevsky were fired from their positions after applying to emigrate some years ago, and now find themselves in the untenable position of being allowed neither to emigrate nor to continue their scientific work, in contradiction to the Universal Declaration of Human Rights, the Helsinki Final Act, and all principles of scientific freedom. Dashevsky in particular is in a very precarious situation, facing possible charges of "parasitism" and its attendant prison term. We felt that a direct expression of concern by the world's astronomers meeting in Montreal, would help alleviate their plight.

I would like to stress that our efforts during the IAU meeting in collecting signatures for the petition were not sponsored or endorsed by either the IAU or the Canadian Organizing Committee. This was solely an action taken by free individuals during breaks from the scientific meetings. It was conducted in such a way as to cause no embarrassment to either the Canadian Organizing Committee or any of the conference participants. On Friday 17 August I put copies of the petition on a table outside the cafeteria near the meeting rooms so that conference participants, of their own free will, could see it and sign it if they wished to do so. Goldberg and Herzberg had been assured

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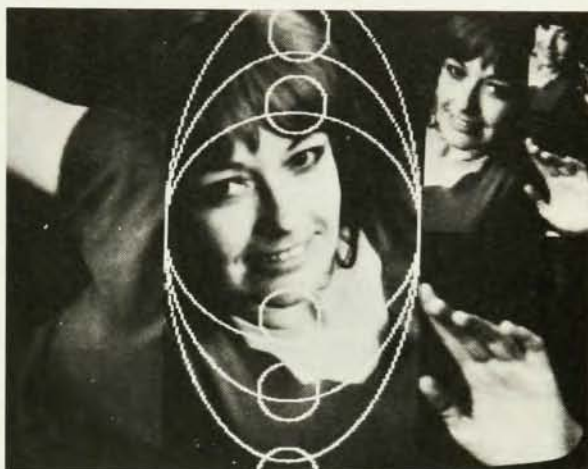
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the previous day by the chairman of the Canadian Organizing Committee that the Committee, although not endorsing our actions, would "look the other way" and would not interfere with us if we did this. I manned the table from about 12:30 pm to about 4:00 pm on that day. I did this again on Monday 20 August for about two hours over the lunch break. At that time I was approached by two officials of the Canadian Organizing Committee who told me that an official protest of our actions had been lodged by the Soviet government, through the Soviet Consul General in Montreal, and we were ordered to stop our activities. I was further told that if I did not remove the petitions the police would be called and I would be arrested. The two Canadians also informed me that the Soviet conference participants were threatening to walk out of the conference. I would like to make absolutely clear to you just what happened. A conference participant was *threatened* with arrest and expulsion from this international assembly essentially on orders from the Soviet government! Furthermore, officials of the Canadian Organizing Committee capitulated to demands of the Soviet government.

I was so enraged by what had happened that the following day I wrote a letter that I planned to distribute to all members of the IAU Executive Committee. On Wednesday 22 August, however, the chairman of the Canadian Organizing Committee, Gilles Beaudet, sought me out to offer a formal apology. This he did with Goldberg present also. Beaudet was clearly embarrassed by what his colleagues had done, assured me that they had been admonished and that they did not speak with full authority, and that he was interested in trying to accommodate our needs. I accepted his apology, and, on the advice of Goldberg, did not proceed further with the letter. By this time the conference, and the petition effort, were nearly at an end.

Reflecting back on the incident after the conference was over I felt that a very important concern was illuminated by this incident, and that issues much larger than that of the incident itself are involved. It seems to me, therefore, that it is a mistake not to make this known to a wider audience. So, despite the assurances I gave to Goldberg to drop the matter, and despite the apology from Beaudet, I decided to send a revised version of my letter for publication in *PHYSICS TODAY*. My intention is not to embarrass Beaudet or any of the IAU officers, but simply to ask other scientists to think about what is in store for us if we allow, even in very small measure, our necessary efforts on behalf of scientific freedom to be stifled for any reason.

I think that free peoples everywhere, and especially people concerned with the

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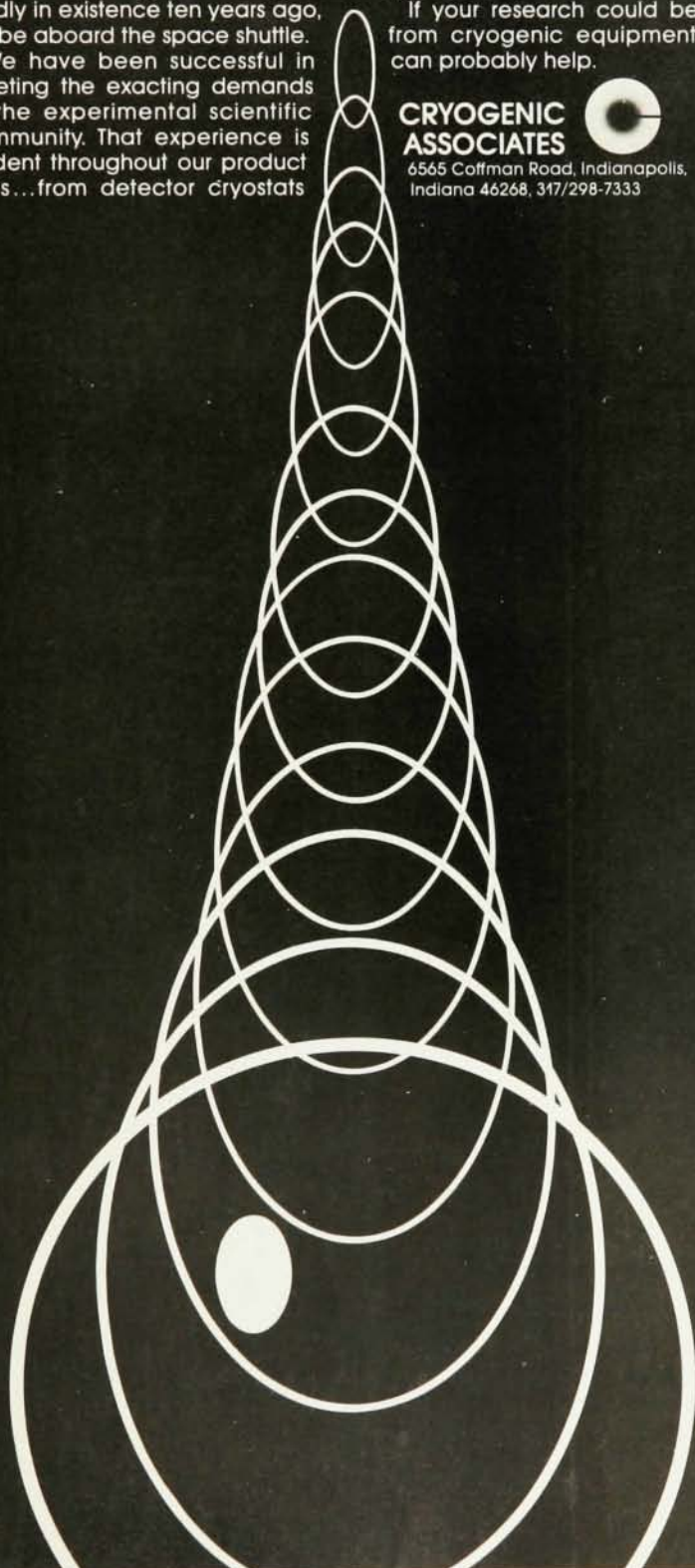
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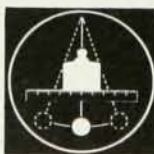
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freedom of the scientific endeavor, should be very worried, as I am, when a totalitarian regime can intimidate the citizens of a free society. The Canadian officials were certainly intimidated by threats and demands made by the Soviet government. If free peoples allow themselves to be threatened like this within the context of an international scientific meeting, what is the value of our freedom? What is the value of our science?

JEFF COLVIN

Los Alamos, New Mexico

IAU CHAIRMAN COMMENTS: Jeff Colvin solicited signatures for a petition when he was a guest on private property. Notwithstanding his own statements, the location he chose to do this, and his placing of a notice on the same stand as an official poster, did embarrass both the National Organizing Committee and members of the IAU, by conveying the impression that Colvin was acting with our authority. We deliberately did not interfere with him on the first day, but when complaints—which were explicitly addressed to the appearance of our own involvement—were received, we decided that if Colvin solicited further signatures in the building where the meetings were being held, we would ask him to stop. Accordingly, when I became aware that Colvin was active again, I asked him, in the presence of a representative of the owner of the property, not to seek further signatures inside the building. I explicitly told him that we would not interfere with him if he continued to solicit signatures outside the building. Colvin appeared unwilling to accept this solution, and enquired what we would do if he refused to comply with our request. At this point he was told that the police could be called and asked to escort him from the building. We did not threaten him with arrest, and never thought of doing so.

ALAN H. BATTEN

Chairman

National Organizing Committee

IAU Montreal

More on ERA

In his letter (October, page 13) Robert H. Good correctly stated, "It is the business of APS to facilitate discussion of physics; decisions should be the prerogative of individual people." Precisely for this reason APS should not be party to decisions that systematically exclude half the population from equal opportunity to participate in discussions of physics. The ERA is designed to facilitate discussion, including discussion of physics. The APS should not support decisions to continue to exclude women from equal opportunity to participate in discussions.

PAUL A. SMITH

Coe College

Cedar Rapids, Iowa □

11/2/79