

Detecting gravity waves

Jonathan Logan has written (March, page 44) a very interesting summary of the gravitational-radiation experiments and has made a thorough search of the literature.

Logan has correctly reported the *incorrect* impressions of a number of physicists concerning the calibration and sensitivity of the gravitational radiation detectors operating at Maryland and at the Argonne National Laboratory.

The gravitational radiation detector sensitivity has been discussed (see for example, Varena Lectures, J. Weber, 1972, University of Maryland Technical Report 73-037). Noise due to the Brownian motion of the lowest compressional mode of an aluminum cylinder was observed here in 1962 and a photograph displaying it was published in 1966 (Phys. Rev. Lett. 17, 1228, 1966). J. Sinsky calibrated a gravitational-radiation detector by observing the dynamic gravitational field from a harmonically driven cylinder source (Phys. Rev. Lett. 18, 795, 1967). Another procedure has involved raising the input circuit temperature by means of a calibrated noise generator and observing the change in output. This then enables the input noise temperature to be computed. Most recently, a Maryland student, G. Rydbeck, has calibrated gravitational-radiation detectors by injecting a known amount of mechanical energy into the lowest frequency compressional mode. These three methods are in reasonable agreement. The single detector sensitivity during the period 1969-1970 was $kT/7$ and the present single detector sensitivity is $kT/100$.

Finally it is noteworthy that three physicists—V. B. Braginski, J. A. Tyson and R. Drever—have at various times observed two-detector coincidences—and for different reasons regard their results thus far as negative.

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THE AUTHOR COMMENTS: Joseph Weber's brilliant experiments have recently been subject to close scrutiny. Half a dozen



physicists, a number of whom (as the present writer) have studied portions of the raw data, and all of whom have studied the reports mentioned above, independently calculated that the effective sensitivity of the apparatus is less than a tenth the reported value, and publicly stated so.

My own reasoning, following detailed discussions with Richard Garwin, Samuel Goudsmit, Richard Muller, Tony Tyson, Weber and others, has convinced me that these arguments have merit (one author stated much more drastic conclusions, but I found fault in his line of argument and avoided citing his papers; the other work was not mentioned because I tried to limit citations to work published or in press).

Although I refrained from offering my own conclusions at length in the March article, I found no reason to abridge the statements provided to me, at the same time going to some lengths to ensure that Weber's point of view was properly represented. Weber will find all this in elaborate detail in our correspondence over the last few months.

In the ten years since the publication

of his first observations, Weber has nowhere published a comprehensive and detailed description of the apparatus and signal-processing techniques that would render discussions such as the foregoing unnecessary. Because of Weber's brilliant original work, it will now be possible for others to independently elucidate these questions—experimentally.

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Solar sea power

Clarence Zener's article, "Solar Sea Power" (January, page 48) correctly states that his program would have the maximum effect of raising the temperature of the world's northern oceans by one degree Centigrade. What effect this would have on the Earth's polar caps and hence the meteorology of Earth does not seem to interest Zener any more than the massive alteration of the oceans' currents that would attend any large-scale installation of his generators.

If one assumes (as do most) that the generation of power is always to be accompanied by the generation of waste heat, one must try to find the most environmentally innocuous method of either utilizing or disposing of this waste heat. Hopefully, we have been disabused of the idea that the oceans of the world are an infinite sink for heat and material waste.

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THE AUTHOR COMMENTS: Carl Pitasi's concern over the environmental effects of solar sea power is certainly justified. As has been re-emphasized by W. Likely (*The Sciences*, Jan/Feb 1973, page 6) meteorological science has not as yet developed to a stage where long-range predictions can be made of any environmental changes we may make. In the meantime, we do not protect our environment by refusing to determine the technical and economic feasibility of alternatives to conventional fossil