

matters arising

Rapid fluctuations of large volume astronomical sources

SIR,—The argument that the characteristic fluctuation time of an astronomical source implies that the source be smaller than a characteristic dimension is often quoted without adequate discretion, particularly concerning QSOs¹ and pulsars. That argument is actually valid only for incoherent generation of radiation and since non-thermal radiation mechanisms are strongly suspected the validity of the argument must also be suspected.

As a simple counter-example I take the case of a rapidly fluctuating star situated in a large absorbing cloud. For an external observer the star appears to have unaltered dimensions and fluctuations, but lower brightness temperature, compared to if the cloud were absent. Now if the cloud were to have negative

absorption (maser amplification) the external observer would still see the same dimensions and fluctuations, but higher brightness temperature, again compared to if the cloud were absent. The observer would not see the cloud itself even though the power generation could occur throughout the full volume of the cloud.

Such a mechanism could clearly alleviate the power density dilemma of quasars even at cosmologic distances. QSOs would be able to fluctuate rapidly and also appear small even though the power generating volume were large.

It turns out that such an amplifying cloud could also alleviate the second principal dilemma for cosmological QSOs; their apparent connections with peculiar local galaxies. Rozyczka² has mentioned three possible explanations for those connections. They may be: (1) real; (2) by chance; or (3) caused by the amplification of radiation in the vicinity of the peculiar local galaxies. Large

amplifying clouds, this time surrounding galaxies, again might conciliate puzzling observations.

My purpose here is not to advocate amplifying clouds, for they raise problems as serious as those they solve. The source of energy and the required pumping and amplification mechanisms would pose enormous difficulties. (The energy source is actually a serious problem for almost any explanation.) The purpose is rather to provide a reminder that thorough and meticulous logic must be exercised during deductions if the conclusions are to be valid.

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¹ Burbidge, G. R., *Nature phys. Sci.*, **246**, 17 (1973).

² Rozyczka, M., *Acta Astr.*, **23**, 233 (1973).

Announcements

Appointments

B. S. Hartley of the **Medical Research Council Laboratory of Molecular Biology at Cambridge** has been appointed to the chair of biochemistry at **Imperial College**, London.

G. E. Eden has been appointed to take charge of the **Water Pollution Research Laboratory**, Stevenage.

W. G. Crewther has been appointed chief for the **CSIRO Division of Protein Chemistry**.

International Meetings

February 12, **High Performance Liquid Chromatography: A forum for the Exchange of Experience with Apparatus** (The Society for Analytical Chemistry, Analytical Division, Chemical Society, 9/10 Saville Row, London W1X 1AF)

February 13, **Fundamentals of Remote Sensing** (General Secretary of the Remote Sensing Society, Dr W. G. Collins, Reader in Remote Sensing, Remote Sensing Unit, University of Aston,

Gosta Green, Birmingham, B47ET)

February 13–15, **Biological effects of Electromagnetic Radiation** (Public Relations, The New York Academy of Sciences, 2 East 63rd Street, New York 10021)

February 19, **High Performance Liquid Chromatography** (The Society for Analytical Chemistry, Analytical Division, Chemical Society, 9/10 Saville Row, London W1X 1AF)

February 20, **Automatic Turbidimetry** (The Society for Analytical Chemistry, Analytical Division, Chemical Society, 9/10 Saville Row, London W1X 1AF)

February 20, **The Rational of Control of Sterile Areas** (The Society for Analytical Chemistry, Analytical Division, Chemical Society, 9/10 Saville Row, London W1X 1AF)

February 20–21, **The origin of Cosmic Radiation** (The Executive Secretary, The Royal Society, 6, Carlton House Terrace, London SW1Y 5AG)

February 27, **Secondary Steelmaking** (Meetings Secretary, Institution of Metallurgists, Northway House, Whetstone, London N20 9LW)

Reports and Publications

not included in the Monthly Books Supplement

Great Britain and Ireland

Greater London Council Scientific Branch. Annual Report of the Scientific Adviser 1972. Pp. 136. (London: Greater London Council, 1973.) £4. [71]

British and Continental Progress in Water Pollution Control. (Sixth Public Health Engineering Conference, held in the Department of Civil Engineering, Loughborough University of Technology, January 1973.) Edited by John Pickford. Pp. 86. (Loughborough: John Pickford, Department of Civil Engineering, University of Technology, 1974.) £3. [71]

The Astronomer as Natural Philosopher. By Professor A. H. Cook. (An Inaugural Lecture.) Pp. 36. (London: Cambridge University Press, 1973.) 45p net; \$1.75. [81]

ARC Index of Agriculture and Food Research. Pp. viii + 132. (London: Agricultural Research Council, 1973.) £1. [81]

Getting Down to Fundamentals—the Particle Spectrum. By Professor I. Butterworth. Inaugural Lecture, November 14, 1972. Pp. 67–82. 45p. The Synthesis of Dynamical Systems. By Professor D. Q. Mayne. Pp. 83–102. 45p. Time, Gravitation and the Universe: The Evolution of Relativistic Theories. By Professor G. J. Whitrow. (Inaugural Lecture, May 22, 1973.) Pp. 103–126. 45p. (London: Imperial College of Science and Technology, University of London, 1973.) [81]

Potatoes—Consumer Buying Behaviour and Attitudes during 1972–73. (A Report of a Survey conducted for the Potato Marketing Board by Research Bureau Limited.) Pp. 47. (London: Potato Marketing Board, 50 Hans Crescent, SW1.) [111]

Cranfield Institute of Technology. Annual Report 1973. Pp. 14. Cranfield Bedford: Cranfield Institute of Technology, 1974.) [111]

Agricultural Research Council Animal Breeding Research Organisation—Report, January 1974. Pp. 56. (Edinburgh: ARB, Animal Breeding Research Organisation, 1974.) 40 p.