

The Institute of Physics

**History of Physics Group**

*Chairman:* Professor A J Meadows CPhys FInstP

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NEWSLETTER

No. 2

November 1987.

PHILOSOPHIÆ  
NATURALIS  
PRINCIPIA  
MATHEMATICA.

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Autore *J. S. NEWTON*, *Trin. Coll. Cantab. Soc. Matheseos*  
*Professore Lucafiano, & Societatis Regalis Sodali.*

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IMPRIMATUR.  
S. PEPYS, *Reg. Soc. PRÆSES.*  
*Julii 5. 1686.*

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LONDINI,

*Jussu Societatis Regiæ ac Typis Josephi Streater. Prostat apud*  
*plures Bibliopolas. Anno MDCLXXXVII.*

The title page of the first edition of Newton's Principia.

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**Editor :** Mr. D. Hooper, 36, Flag Lane N., Chester CH2 1LE, U.K.

**Newsletter Contents :** Please see back page.

### Forthcoming Events.

3 December 1987. (Thursday.) 1730.

"Standards Converters." (Converters operating between standard TV systems.) Mr. J L E Baldwin. (IBA).  
Details : IEE. (See below.)

11 January 1988. (Thursday.) 1730.

"Early Days of Electric Lighting." Mr. C N Brown. (Science Mus.)  
Details : IEE. (See below.)

10th. February 1988. (Wednesday.)

"Physics and the Ethics of Warfare."

Panel discussion meeting.

University of Surrey.

**IOP History of Physics Group** with the South Central Branch .

Details : Dr. John Roche.

11 February 1988. (Thursday.) 1730 for 1800.

"The Misrepresentations of Physics - Concepts which are commonly taught incorrectly." Dr. J W Warren. (Brunel University.)

All Saints Building, Manchester Polytechnic.

Details : IOP Manchester & District Branch. (See below.)

25 March 1988. (Friday.) 1930.

Wine and Cheese Party and "The History of Newton's Apple Tree."

Dr. R G Keesing. (University of York.)

Staff House, All Saints Building, Manchester Polytechnic.

**Tickets necessary.**

Details : IOP Manchester & District Branch. (See below.)

15th.-16th. July 1988. (Friday & Saturday.)

"George Green (1793-1841) and his work."

Nottingham.

**IOP History of Physics Group.**

Details : Dr. J Roche.

26th. October 1988. (All day Wednesday.)

"Chapters in the History of Low Temperature Physics."

**Also A.G.M. of the Group.**

Royal Institution London.

**IOP History of Physics Group.**

Details : Mrs. R Williamson, UMIST.

(A.G.M. Details : Dr. J Roche.)

16-19 November 1988.

Joint Meeting of 4S (the Society for Social Studies of Science) and EASST (the European Association for the Study of Science and Technology).

Hotel Krasnapolsky, Amsterdam, Netherlands.

Details : Dr. L A Leydesdorff, Science Dynamics, Nieuwe Achtergracht, 166,

1018 WV Amsterdam, Netherlands.

Continued.

**Forthcoming Events.**

**Continued.**

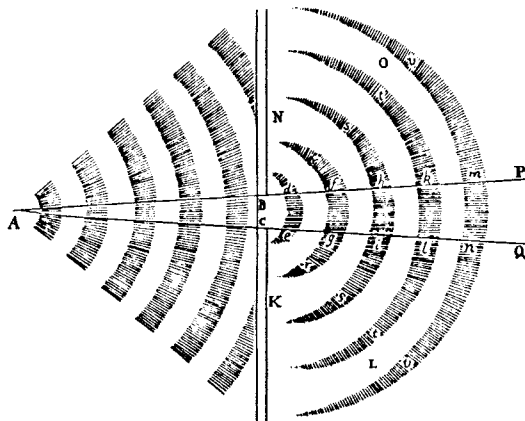
Addresses for Details.

IEE : Debbie Twentyman, Groups Officer, The Institution of Electrical Engineers, Savoy Place, London WC2R 0BL.

IOP Manchester & District Branch.

Meetings Secretary : Mr. D Baldwinson, British Aerospace, Woodford. (Tel : 061 439 5050 ext. 3625.)

RICHST : Royal Institution Centre for the History of Science and Technology, 21, Albemarle Street, London W1X 4BS.



**Notes for Contributors.**

The Newsletter is edited by David Hooper, 36, Flag Lane North, Upton Heath, Chester CH2 1LE. His telephone number is Chester (0244) 380844. It is hoped to publish the next issue of the Newsletter in May 1988 but this will depend on the amount of copy received. If you have contributions which are not particularly date sensitive, please send them at once. For the time being, it has been decided **not** to include book reviews, research papers and advertisements except in exceptional cases. However organisers of relevant meetings are invited to send details to the Editor for possible publication.

### **Editorial.**

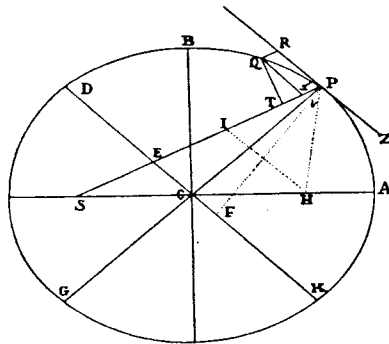
Thanks are due to the people who have kindly welcomed the first issue of the Newsletter. Their encouragement was much appreciated.

I would also like to thank all contributors, including the organisers of meetings who showered me with paper. I am only too sorry that owing to editorial delays, it has not been possible to give details of some meetings which have already happened, and others which I have considered of only marginal interest to our readers. I expect that I shall have omitted some important meetings out of ignorance, but our listing is not claimed to be comprehensive. We are all indebted to Clive Jones, the IOP Meetings Officer for his expertise in producing the first Newsletter and this one.

I am sorry that there has not been room for everything but please do keep sending anecdotes. It would be better if full references could be given unless the anecdotes are from personal knowledge.

Would anyone like to assist in editing the Newsletter? A volunteer, for example to proof read or to compile the list of events, would be very welcome!

David Hooper.



### **History of Science and Technology in the School Curriculum.**

A Conference held at the University of Oxford Department of External Studies, 12-13 September 1987, organised by Dr. M. Shortland.

There have been many conferences recently and much discussion concerning the role of the history of science in the classroom. The stated purpose of this conference was to translate this interest into definite commitments. This was reflected in the many sponsoring bodies involved including the Oxford Schools Science and Technology Centre, the British Society for the History of Science and the History and Education Groups of the IOP.

## **History of Science and Technology in the School Curriculum.**

**Continued.**

The programme was well-balanced with lectures by various specialists on the present status of the History of Science and Technology in School Curricula and Syllabuses, the resources for study and research in the History of Science and parallel workshops on the role of the History of Science in teaching physics, chemistry, biology and medicine.

The interaction between the educationalists, historians and science teachers present was very fertile and resulted in a clear consensus on several issues. There is an immediate need for short historical articles for school teachers which have direct relevance to the present content of the school science syllabus. These articles must be prepared through collaboration between teachers and historians of science. It also became clear that the history of science as a subject taught in schools could not make significant progress if it was not introduced into the examinations syllabus. Even if it is not taught as a set subject, it was emphasised that the history of science could illuminate, clarify and humanise the teaching of science. In the final plenary discussion, a heavy responsibility was placed on the Education Section of the British Society for the History of Science to implement these suggestions.

Most participants found the conference stimulating and helpful. Dr. Shortland was congratulated for the timeliness and quality of organisation of the event.

One immediate effect of the meeting is that the IOP History of Physics Group is now considering the publication of historical pamphlets.

John Roche.

### **Stop Press.**

#### **Preliminary Report on the Second Annual General Meeting.**

The A.G.M. was held at 47, Belgrave Square, London on the 18th. November 1987. In the unavoidable absence of Professor A J Meadows, Mr. Stuart Leadstone was in the chair. It was noted that the Constitution of the Group was awaiting final approval so it was agreed the steering committee consisting of Professor Meadows, Dr. Roche, Mr. Brian Davies, Mr. Hooper, Professor Kurti, Mr. Leadstone, Mr. Spurgin and Mrs. Williamson, should all remain in office. Vacancies on the Committee exist but no volunteer came forward at the meeting.

The Secretary's report and a financial report were received and past and future events, listed elsewhere in this Newsletter, were discussed. At the end of the meeting, Professor Meadows and Dr. Roche were thanked for all their work and enthusiasm on behalf of the Group.

## **The International Conference to Celebrate the 40th. Anniversary of the Pi Meson.**

Report by Rajkumari Williamson, UMIST.

The year 1947 had been rich in discoveries of great significance for elementary particle physics. Conversi, Pancini and Piccioni, through a series of experiments in Rome, had demonstrated that the mesotron\* really interacted only weakly with matter; it could thus not be the particle predicted by Yukawa in 1935. The true Yukawa-particle, now known as the Pi-meson, was discovered in the same year (1947) by the Bristol group under Cecil Powell using the nuclear emulsion technique. At Manchester, also in 1947, Rochester and Butler working in Blackett's department reported new particles which later became known as "Strange particles".

Participants at the conference had the rare opportunity of hearing some of the makers of these discoveries along with others who laid the theoretical and empirical foundations of the field. They described the innovations, conditions and personalities of forty years ago. The conference also provided an opportunity for old colleagues and friends to come together and reminisce about old times.

In the opening talk, Professor Conversi gave an historical sketch of the empirical investigations of mass, lifetime and decay modes of the mesotron; these formed the background to the work of his group, which finally established the leptonic nature of the mesotron. Professor Kemmer, being one of those who had coined the word "meson", described how the theory of nuclear forces from Heisenberg to Yukawa and his own formalism had been "waiting for the pi-meson". Professor Fowler recounted the discovery of the pi-meson by the Bristol Group. Mr. Waller of Ilford Ltd. gave an account of the patented chemical process used to manufacture nuclear emulsions. Dr. Lock explained how measurements on new electron-sensitive emulsions could be used to determine the properties of particles. Dr. Davies surveyed the modern use of emulsions, particularly on measurements on "charmed" particles. Professors Rochester and Butler described the parallel work of the Manchester group who used the cloud chamber for cosmic ray studies and discovered the V-particles now known as the "strange" particles. The conference included a round table discussion and an after-dinner talk by Professor Amaldi on "The Beginnings of Particle Physics from Cosmic Rays to CERN."

\* The mesotron was discovered by Anderson and Neddermeyer in 1937. It was believed to be the Yukawa-particle, the carrier of the strong nuclear force.

## The Fundamental Fundamental Particles.

By Professor H. Lipson CBE FRS.

There are many so-called fundamental particles, but three are most important - the proton, the neutron and the electron. Is it generally known that all three were Mancunian (of Manchester) in origin? The last two were discovered in Cambridge by J.J. Thomson and James Chadwick, who were Mancunians. The other, the proton, was discovered in Manchester by Rutherford.

Most people seem to think that all scientists are careful logical people, who plan their work until they arrive at the result they are seeking. Perhaps J.J.'s discovery fits into this picture but Rutherford's certainly does not. And Chadwick's career as a physicist was quite accidental.

In 1961 a conference was held in Manchester to celebrate the discovery of the nuclear atom. Sir Edward Marsden, who carried out the work, explained how it happened. At the time he was an undergraduate. Rutherford was not over-enthusiastic about examinations and thought that students could best be judged by how they could cope with new ideas. So he had a list of what he called "useless experiments" - experiments which would not produce anything new but would introduce students to research technologies without getting in the way of the "real" research. Marsden was told to see if alpha-particles could be reflected off metals. Rutherford then knew that they couldn't. But Marsden found that some particles could be, although these formed a very small proportion. He had to check and re-check his work before he had the courage to tell Rutherford, who was, as we all know, a very dominating figure. Marsden's result made Rutherford think. After a few weeks, at a party I believe, he said to a fellow physicist "I think I know why these particles are reflected: the atom is not the solid thing that we have always thought; it must be hollow with a nucleus, and some alpha-particles will penetrate to a very small distance of this nucleus." After a time, he had the courage to announce his idea to the world.

There is a sideline to this. Many years ago, I was an examiner for the Cambridge Local Examinations Syndicate and set a question of the form "What would you expect if ....?" Another examiner, an older experienced schoolmaster, took me to task: "No scientist ever expects anything from his experiments; he is completely objective." Now I know that no scientist does an experiment unless he expects something. If he gets what he expects he is happy; if he doesn't he is still happier because he is on to something new - like Rutherford!

Chadwick's introduction to physics was also accidental, although in a different way. He was one of the bright boys from the Manchester Municipal Secondary School which was just opposite the Manchester Municipal College of Technology, now UMIST. He was particularly keen to become a mathematician and applied to Manchester University.

## **The Fundamental Fundamental Particles.**

**Continued.**

Chadwick was interviewed in a very large room, and by chance found himself in the wrong queue, being interviewed by a physicist. Chadwick was too shy to object and, in any case, he liked the interviewer; so he went to the physics department.

At first he was disappointed with the content of the course; he much preferred the mathematics lectures given by Horace Lamb. But in his second year he was lectured to by Rutherford. He later said "Rutherford was not up to much as a lecturer, but by Jove, you knew what physics was about."

I served under Chadwick for one term when he was appointed to Liverpool. Even then he was rather reserved, and I could well appreciate the story about him. But he altered my life. When Bragg invited me to Manchester, I told Chadwick and he said, rather gruffly, "He might have asked me." This was the first time that anyone in authority had indicated to me that I had some importance.

H. Lipson.

## **Past and Present.**

By Professor A.J. Meadows.

One of the pleasures of delving into history lies in finding items you did not expect, as well as those you did. Recently, I was looking into a question relating to 19th. century interest in the properties of water. I found something relevant in a small book Water: Its Composition, Collection and Distribution, published a century ago.

I also found that a debate was raging in the 1880s on the desirability of introducing domestic water meters. Unknown, I suspect to most of us, much of the current debate on this topic was thoroughly discussed a hundred years ago. The clinching argument then is one heard less of now, so it may be worth reproducing here :

"It has frequently been proposed ... to control and check waste by applying a meter to every house, charging by measure for the water used for domestic purposes. There are numerous objections to this method of supply, but perhaps the chief objection is that its adoption would certainly tend to restrict unduly the legitimate and necessary use of water. It need scarcely be said that social improvement depends to a great extent upon, or must, at least be concurrent with, a more liberal use of water, and the promotion of habits of cleanliness. Any arrangement which enhances the price, or in any way checks or discourages the free application of water to useful purposes, is an obstacle to social progress."



### Recent Publications by Members of the Group.

#### **The Making of Physicists.**

Edited by Rajkumari Williamson, UMIST.

Adam Hilger. 0 85724 524 9

viii + 200 pages. Illustrated hard cover.

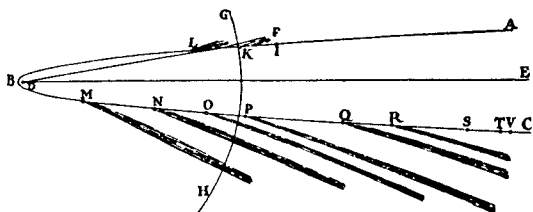
£15. (IOP members £12.)

This book, inspired by the meeting organised by the Group in Manchester in October 1985, has just been published. Eighteen senior physicists recount their student days in a collection of narratives which paint a vivid picture of a life of study in the 1920s and 1930s. Well illustrated and good value for money!

#### **Gay-Lussac's Gas-Expansivity Experiments and the Traditional Mis-teaching of "Charles's Law".**

C.B. Spurgin, 34, Dean Close, Leasingham, Sleaford, Lincolnshire  
NG34 8NW. Annals of Science, 44 (1987) 489-505.

This paper is a fine example of the relevance of the history of physics. The author argues that an error made by Biot in 1816, was perpetuated subsequently by many authors. This led to a standard school experiment in which, at constant pressure, the relationship between gas volume and temperature as measured by a mercury thermometer is "shown" to be linear. This is only to be expected as gas thermometers have long been used as the ultimate standard for the calibration of mercury thermometers!



#### **Moseley Centennial Celebration on 23 November 1987.**

The IOP Manchester & District Branch and the Physics Department of the University of Manchester organised a very successful meeting to celebrate the Henry Moseley (1887-1915) Centennial.

There was a small exhibition and two interesting talks were given in the Moseley Lecture Theatre, Manchester: "Moseley: The Manchester School and the Atom." by Mrs. R. Williamson and "Modern X-Ray Optics." by Professor M. Hart FRS. It is to be hoped that Raj Williamson's excellently presented paper can be given again to a meeting of the Group. Professor Hart indicated that had Moseley used modern apparatus, he would have had trouble in discovering the law which bears his name. This seems to me to be another example of the paradox that for scientific progress, too precise measurements can be a disadvantage. David Hooper.

### Letter to the Editor.

(Correspondents are requested to keep their letters as concise as possible; sadly more than half of Mr. Stander's welcome contribution has had to be omitted!)

Dear Editor,

I am sure that you would accept that in reality mathematics and physics are inseparable particularly when the works of men like Archimedes, Newton, Lagrange, Gauss and a host of others are considered. I have in the past identified a number of areas where there are a lack of resources available for lecturers and teachers wishing to introduce an historical dimension into their mathematics or physics teaching. To fill these gaps I have prepared a "Bibliography" of resources about the History of Mathematics. This is being published by the School of Education; if you would like more details Professor Burghes at Exeter or I will be pleased to provide them.

Another area is the lack of an indexed collection of Mathematical and Scientific Anecdotes. One of my ideas is to use a bookmark system to augment my own collection of anecdotes. I propose to ask interested people to give these book marks to their students and colleagues. I hope that the reverse side of the bookmark will be completed with the reference and handed back by anyone who finds an anecdote.

Yours sincerely,

Derek Stander.

#### Reply by the Editor :

The collection of anecdotes, should I think be supported as they can make the dulllest lesson or lecture much better. Most teachers have their own favourites, and most teachers will be looking for more. Mr. Stander of 23, Beacon Down Avenue, Plymouth PL2 2RU will no doubt be pleased to receive help with his undertaking. I will also be very glad to include some in this Newsletter.

This type of project does, of course, raise considerable problems as many anecdotes have no valid foundation in primary sources. Should doubtful anecdotes have historical health warnings attached? Should we have an A to E scale where A means almost certainly (nearly) correct and E almost certainly untrue? What is clear is that we need to know the contemporary source(s) of the anecdote. There is a real risk that the history of science as a respectable academic enterprise can be undermined by the very real need of teachers to have interesting stories to tell. So long as everyone is clear as to the differences between myths and historical/scientific "facts" all will be well. Otherwise, we may invite the scorn of professional historians.

## **News of other Societies and Institutes.**

### The British Association for the Advancement of Science.

Fortress House, 23 Savile Row, London W1X 1AB.  
Membership is open to all. Annual Meetings are planned for Oxford in 1988 and Sheffield in 1989.

### The European Society for the Study of Science and Technology.

"EASST was founded in 1981 to stimulate communication, exchange and collaboration in the field of studies of science and technology in Europe. One reason to establish an interdisciplinary scholarly society is the merging of history, philosophy, sociology and psychology of science in recent years. Another reason is the importance of connecting these perspectives with economics and political and policy studies of science and technology." Thus reads part of the introduction to the EASST Newsletter which is edited by Arie Rip, Science Dynamics, University of Amsterdam, Nieuwe Achtergracht, 166, 1018 WV Amsterdam, Netherlands. The Annual subscription for British members is £6; this may be sent to Professor John Ziman, Dept. of Social and Economic Studies, Imperial College, 53, Prince's Gate, London SW7 2PG.

### The Science, Technology and Society Association (STSA)

This Association deals with the Social relations of Science. A new issue of their Newsletter is due out shortly. Details from Mr. Stephen Veazey, Faculty of Applied Sciences, Luton College of Higher Education, Park Square, Luton LU1 3JU, U.K.

### History of Science Seminar at Liverpool.

A group of historians and scientists at the University of Liverpool has come together to form a history of Science seminar to meet on some Thursdays at 16.30. Further details from : Professor T E Elliott, Dept. Of Geological Sciences, Dr. D Edwards, Dept. of Physics or Dr. B M Hamilton, Liverpool Institute of Higher Education.  
(Information extracted from the BSHS Newsletter.)

### **Disclaimer.**

The IOP Historical Group Newsletter expresses the views of the Editor or of named contributors, and not necessarily those of the Group nor of the Institute of Physics as a whole. While every effort is made to ensure accuracy, information must be checked before use is made of it which would involve financial or other loss. The Editor would like to be told of any errors as soon as they are noted please.

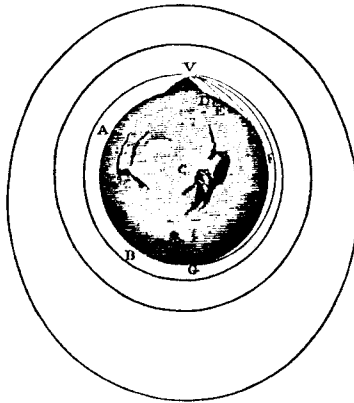
THE INSTITUTE OF PHYSICS HISTORY OF PHYSICS GROUP NEWSLETTER.

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Illustrations.

The illustrations in this Newsletter are all taken from Sir Isaac Newton's Principia.