



EDUCATIONAL RESOURCES FOR PHYSICS

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Leaving Certificate Physics

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GENERAL PHYSICS BOOKS

Advanced Level Physics - Nelkon & Parker

This academic style book is useful as a reference.

Heinemann Educational Publishers (1998) ISBN 0-435923-03-X c. €37

Advanced Physics, Fifth Edition – Tom Duncan

Well written and a useful reference book for Leaving Certificate teachers, especially in the area of electricity. It has examples of use of spreadsheets and data loggers.

John Murray (2001) ISBN 0-719576-69-5 c. €32

Data Logging in Practice - Roger Frost

This book offers practical ideas for using sensors and handling data. It includes advice and discussion activities for organising resources in school.

ASE (1999) ISBN 0-952025-74-4 c. €25

Electromagnetic Induction – ISTA

Comprehensive cover of all areas of electromagnetic induction, written by physics teachers.

Some copies are available from the ISTA Bookshop.

Explaining Physics - Stephen Pople

This O-level Physics book uses simple language and has over 1000 diagrams.

Oxford University Press (1987) ISBN 0199142-72-6 c. €16

GCSE Physics (2nd Ed.) – Tom Duncan

Covers much of the LEAVING CERTIFICATE Physics course without deep mathematical treatment. This is a useful library book for students.

John Murray (1987) ISBN 0-719543-80-0 c. €25

NOD DON EOLACH Gasaitéar Eolaíochta - An Dr. Matt Hussey

Tugann an leabhar seo cúntas ar réimsí éagsúla den eolaíocht i gcomhthéasc an t-saoil timpeall orainn. Tá sé dírithe ar an ngáthléitheoir ach is áis é don mhúinteoir eolaíochta go háirithe leis an mbéim nua atá ar thábhacht na heolaíochta sa saol laethúil.

An Gúm, B.A.C. (1999) Uimh. Chatalóige GR 1594. ISBN 1-857911-03-2

Oxford Dictionary of Physics

A dictionary is always a useful reference tool to have in the lab for students or teachers. This one has 3,500 entries on physics, many with diagrams and extended explanations.

Oxford University Press (2000) ISBN 0-192801-03-1 c. €13

Physics for You - Keith Johnson

This book is written for the GCSE physics course and the co-ordinated science syllabuses. Many of the diagrams, examples, crosswords, etc. in the book are suitable for the Irish syllabus.

Nelson Thornes (1991) ISBN 0-748727-61-2 c. €18

Signs, Symbols and Systematics - ASE

This booklet covers all branches of science and contains units, symbols, safety signs, conventions and notes.

ASE (1995) ISBN 0-863572-32-4 c. €3

Software for Teaching Science - Roger Frost

This book reviews computer software suitable for classroom use in physics, chemistry and biology. It also reviews data logging software and has an index of useful addresses.

ASE (1998) ISBN 0-952025-75-2 c. €5

The Cartoon Guide to Physics - Larry Gonick & Art Huffman

This book uses humorous cartoons to illustrate basic concepts in physics. This could be used to liven up the presentation of the subject in Leaving or Junior Certificate courses.

Harper Collins (1992) ISBN 0-062731-00-9 c. €13

The World of Physics - John Avison

This book is an O-level Physics book, which covers most of the Leaving Certificate course. It shows how physics is useful and relevant to society. It uses simple language and is very readable for students of ages 14-18.

Nelson (1987) ISBN 0-174382-38-3 c. €25, currently out of print.

STS BOOKS

Curie in 90 Minutes – John and Mary Gribbin

This is a short, but very readable, account of the life and scientific work of Marie Curie. Very highly recommended.

Constable ISBN 0-094770-20-4 c. €6

Also highly recommended in the John and Mary Gribbin series are:

Einstein in 90 Minutes, Faraday in 90 Minutes, Newton in 90 Minutes, Galileo in 90 Minutes, Halley in 90 Minutes.

Electricity and Thermal Physics – Mark Ellse and Chris Honeywill

This is one of four books in the Nelson Advanced Science series. Other books in the series are ‘Mechanics and Radioactivity’, ‘Waves and Our Universe’ and ‘Fields, Forces and Synthesis’. The book has two main sections, Electricity and Thermal Physics, but it also has Option topics at the end, which include Astrophysics, Solid Materials, Nuclear and Particle Physics and Medical Physics. Each chapter in the main section consists of two pages. There is a no-nonsense feel to the book, which goes from simple to fairly difficult quite quickly.

Nelson (2000) ISBN 0-174482-98-1 c. €2

Holt Physics – Raymond Serway and Jerry Faughn

This hardback is a very colourful book, designed for American High School Physics. It uses SI units almost entirely throughout and it has lots of sections with ‘Did You Know’, which are usually relevant to our STS area. Safety in the laboratory is emphasised throughout. Practical work uses, almost entirely, data logging equipment and graphic calculators. There are clear diagrams and many well-worked examples.

Holt, Rinehart and Wilson (1999) ISBN 0-030505-97-6 c. €9

Horrible Science – Nick Arnold, Phil Gates and Tony De Saules

This is a series of books including titles such as ‘Fatal Forces’, ‘Sounds Dreadful’, ‘Chemical Chaos’, ‘Ugly Bugs’, ‘Disgusting Digestion’ and ‘Evolve Or Die’. Phonetic pronunciations of some of the more difficult words are given, some of which you may not agree with! Worthwhile for younger students.

Scholastic (1999) ‘Fatal Forces’ ISBN 0-5901971-18 c. €7

How Things Work - Louis A. Bloomfield

The aim of this book is to allow the students to begin to see science in their everyday lives. As well as providing a large number of examples of physics in everyday life it also has review questions and exercises based on the various topics covered.

John Wiley & Sons (1997) ISBN 0-471594-73-3 c. €38, currently out of print

Mad About Physics - Christopher P. Jargodzki & Franklin Potter

This is very similar to the Flying Circus book and should be a great resource for TYO as well as in physics. With over 350 questions and answers on everything from racing cars to jumping fleas to vanishing elephants.

John Wiley & Sons, Inc. (2000) ISBN 0-471569-61-5 c. €19

My Name is Becquerel - Ernst Schwenk

This book recounts the stories of the scientists whose names were given to international units.

Hoechst, 1994 c. €13

On Giants' Shoulders – Melvyn Bragg

This has excellent accounts of the lives, works and thoughts of some well-known scientists. The author looks behind the science to give an insight into the person.

Sceptre Publishing ISBN 0-340712-60-0 c. €13

Physics in the 20th Century - Curt Suplee

This is a coffee-table book about the advances in physics in the 20th century, covering such topics as particle physics, the transistor, nuclear fusion and fission as well as chaos and cosmology.

Harry N. Abrams, Inc (1999) ISBN 0-810943-64-6 c. €45

Physics, Jazz and Pop - The Open University

This is part of a series of eight titles built around a common core of physics and aimed at promoting independent learning for the post-16 student. It would be a useful background resource for teachers in dealing with the area of sound.

Heinemann Educational Secondary Division (1996) ISBN 0-435688-38-3 c. €13

Physics of Sport - The Open University

Also part of the same series to which the previous two books belong. It is a useful resource as it deals with the physics involved in sport; it provides useful and interesting examples to deal with many aspects of physics.

Heinemann Educational Secondary Division (1997) ISBN 0-435688-45-6 c. €13

Physics on a Plate- The Open University

Also part of the same series to which Physics, Jazz and Pop belongs. It would be a useful background resource for teachers in dealing with the applications of physics.

Heinemann Educational Secondary Division (1997) ISBN 0-435688-44-8 c. €13

Physics Through Applications - Jim Jardine

This book demonstrates the relevance of basic scientific concepts in a real-world context. It first shows the applications of physics principles and then introduces the concepts to make sense of the physical phenomena. It is not a textbook but would be very suitable for transition year students.

Oxford University Press (1989) ISBN 0-199142-80-7 c. €19

Physics Through Investigation – Gren Ireson

This is a very useful book. It addresses an area of science that is not very well catered for in the Irish system, that of 'investigation'. This is a very worthwhile resource book.

Hodder & Stoughton (1998) ISBN 0-340720-40-9 c. €17

Serendipity - Royston M. Roberts

Accounts of how many happy accidents in the laboratory and elsewhere have led to important discoveries e.g. penicillin, Archimedes, polyethylene etc. Interesting reading for teachers and pupils.

Wiley (1989) ISBN 0-471602-03-5 c. €22

The Flying Circus of Physics with Answers - Jearl Walker

This book is based on the physics of our everyday world. It poses questions related to common events and provides solutions.

John Wiley & Sons (1992) ISBN 0-471029-84-X c. €45

The Resourceful Physics Teacher - Keith Gibbs

This teaching resource contains over 600 demonstration experiments and ideas for students in physics. The experiments all use standard laboratory equipment.

IOP Publishing Ltd (1999) ISBN 0-750305-81-9 c. €43

The Scientific Apparatus of Nicholas Callan and other Historic Instruments – Charles Mollan and John Upton

This book is a documented collection of the scientific apparatus of the Museum at NUI Maynooth. It would be a well worthwhile addition to any school science library.

St Patrick's College Maynooth and Samton Ltd (1994) ISBN 1-898706-02-6 c. €19

The Time and Space of Uncle Albert - Russell Stannard

Easy to understand stories on space and time as told by Uncle Albert to his niece.

Faber and Faber (1990) ISBN 0-571142-82-6 c. €13

Thinking Physics Practical Lessons in Critical Thinking – Lewis Carroll Epstein

This book takes everyday situations, poses a question/problem about them and offers a number of possible answers.

Insight Press, San Francisco (1979) ISBN 0-935218-06-8 c. €20

Understanding the Natural World - William J Reville

This is a collection of science articles from the weekly 'Science Today' column in the Irish Times. The articles are aimed at the general reading public and assume little or no knowledge of science. Each article provides a brief overview of the particular topic and explains how the topic impinges on our daily lives.

Irish Times Books (1999) ISBN 0-907011-28-4 c. €19

University of Bath: Science 16 – 19

This is a family of books consisting of a core Physics textbook - accompanied by 6 other books. These cover Telecommunications, Medical Physics, Energy, Astrophysics, Nuclear and Particle Physics, and Electronics. They are excellently laid out and well presented. Highly recommended for all school libraries.

Nelson (1992) ISBN 0-174385-10-2 c. €41(textbook), c. €9(accompanying books)

PARTICLE PHYSICS BOOKS

Get A Grip On New Physics - John Gribbin

For a beginner to become familiar with terms like relativity, quantum theory, quarks, muons, strings and a lot more, this is the place to start.

Weidenfeld and Nicholson (1999) ISBN 0-297827 03-0 c. €13

Nuclear and Particle Physics - David Sang

A useful reference book.

Nelson 1996 ISBN 0-174482-38-8 c. €25

Nuclear Physics and Fundamental Particles –

Roger Muncaster

Recommended for Higher level students. It is a good source of questions and worked examples for the classroom.

Stanley Thornes 1995 ISBN 0-748718-05-2 c. €25

Particles and the Universe -Professor I P Kalmus

Lecture for Schools and Colleges 1998/1999

Reprinted from Physics Education, IOP Publishing 1999

Available from the Institute of Physics website at <http://physicsweb.org/>

Particle Physics: A New Course for Schools and Colleges

This work pack consists of a teacher's guide, teacher's notes and student sheets and has been designed to support A-level particle physics modules offered by several boards.

The Education Department of the Institute of Physics c. €38

Particle Physics Summary Sheets

Three glossy, colourful double-sided A4 sheets provide a concise summary of the most important points about quarks and leptons, forces, particle accelerators, particle detectors, particle physics and the Big Bang (also available on the Web at http://www.hep.ph.rhbnc.ac.uk/hep/hep_handouts.html).

Q is for QUANTUM - John Gribbin

This book, also called 'Particle Physics from A to Z', gives an overview of a hundred years of scientific investigation of the microworld. All the technical terms are fully explained in the alphabetical section.

Phoenix Giant 1999 ISBN 0-753806-85-1 c. €20

Quarks, Leptons and the Big Bang - Jonathan Allday

This clearly written book is a good introduction to particle physics and related areas of cosmology. It is suitable for bright Higher level students, teachers and general science readers.

Institute of Physics Publishing 1997 ISBN 0-750304-62-6 c. €25

The Cosmic Onion: Quarks and the Nature of the Universe-

Frank Close

This clearly written book provides a good introduction to the concepts of particle physics. It is a good reference for Leaving Certificate Higher level students.

Heinemann Educational 1984 ISBN 0-435691-71-6 c. €28

The Particle Hunters -Yuval Ne'eman & Yoram Kirsh

A beautifully written, non-technical account of the search for the fundamental building blocks of matter. An excellent read for teachers.

Cambridge University Press 1996 ISBN 0-521476-86-0 c. €25

Royal Holloway College, University of London, 1996 Free

The Search for Fundamental Particles: OU Science Foundation Course Unit 32

This unit forms an integral part of 'Particle Physics: A new Course for Schools and Colleges', but can also be sold separately.

The Education Department of the Institute of Physics c. €13

The Structure of Matter

A double-sided, full colour A2 broad-sheet on the structure of matter, covering the story of the discovery of electrons, protons, neutrons and quarks, and looking at current research into the family of elementary particles.

PPARC, 1999 Free

The World of Particles - Brian Southworth & Georges Boixader

This colourful, imaginative and accessible cartoon-strip booklet successfully describes elementary particles and the work of CERN.

PPARC, 2001 Free

World Wide Web - Invented at CERN

A leaflet describing the World Wide Web, and explaining how and why it was invented at CERN.

CERN Press Office Free

JOURNALS

An tEolaí Nuachtlitir Eolaíochta na nIar-Bhunscoileanna

Seo nuachtlitir eolaíochta atá ar fáil saor in aisce i ngach iar-bhunscoil. Aistriúcháin ar altanna ar an eolaíocht ó fhoinsí difriúla ar fúd an domhain. Úsáideach i scoileanna lánGhaelach nó mar pháirt d'obair trasna an curaclam leis an bhfisic agus an Ghaeilge.

This is a science newsletter, available free to all second level schools. It contains translated science articles from different sources around the world. Useful with Irish language lessons in cross-curricular work.

An Gúm, B.A.C. ISSN 0-7916-66-3

New Scientist – Periodical (Weekly)

This weekly magazine (also available on the Web at <http://www.newscientist.com/>) provides readers with news, reviews and regularly features good articles on particle physics.

Reed Business Information Ltd. ISSN 0262 4079 c. €

Physics Education

Physics Education is a truly international journal. Articles are chosen to support secondary school teachers and those involved with courses up to introductory undergraduate level, giving everyone who is teaching physics in schools and colleges the support and information they need on the latest developments in physics and teaching methods.

Institute of Physics Publishing, ISSN: 0031 9120

Physics World

This monthly publication (also available on the Web at <http://physicsweb.org/>), keeps readers up to date with the latest developments in physics; occasionally contains very good articles on particle physics.

Institute of Physics Publishing, ISSN: 0953 8585

Science – ISTA

Published three times per year, this journal has many interesting articles and contains up-to-date information on syllabus and curriculum developments in Irish science. Good book reviews by teachers appear in each edition. Highly recommended.

Science

This weekly magazine (also available on the Web at <http://www.sciencemag.org/>) occasionally features particle physics items in its science news section. It is more suitable for teachers than pupils.

American Association for the Advancement of Science, ISSN: 0036 8075

Scientific American – Periodical (Monthly)

This monthly magazine (also available on the Web at <http://www.sciam.com/>) contains well-written in-depth articles suitable for bright, Higher level students. Occasionally covers particle physics. The Working Knowledge section explains the science of everyday machines. The Amateur Scientist section is a good source for ideas for project work.

Scientific American Inc. ISSN 0036 8733 c. €7

School Science Review

This is one of six journals published by the Association for Science Education in England, and is sent to all ordinary members of the Association as one of the benefits of membership. There are four issues per year. It is a journal for science teachers teaching students in the 11 to 19 age groups. It contains articles, notes and reviews of books, videos and web sites.

The Irish Scientist Yearbook

This yearbook was founded in 1994 to provide a view of science in Ireland. It contains articles from the Department of Education and Science, Science Centres and Universities as well as Reports from Scientific and Technical Societies.

Frontiers – UK particle physics, astronomy and space science

Frontiers is published three times a year by the Particle Physics and Astronomy Research Council. Each issue contains many interesting articles on issues relating to particle physics, astronomy and space science, e.g. in the spring 2000 issue there was an article entitled ‘The Quark Uncovered’; would be particularly relevant to the teaching of the Particle Physics Option.

PPARC ISSN 1460 5600

CD ROMS

A Brief History of Time - Stephen W. Hawking

Created by Jim Mervis and Robit Hairman

Excellent animated clips on fundamental particles and forces. The work of famous scientists such as Newton and Einstein is discussed. It contains plenty of material to enhance the teaching of STS and particle physics.

Focus Multimedia, c.£10 (sterling), details of how to order on www.focusmm.co.uk

Crocodile Physics

Crocodile Physics is a computer software package used for simulating electronic, mechanical and physical systems. The user can see simulated experiments, circuits, optical and mechanics systems, which behave like the real thing. Crocodile Physics comes complete with 'absorb HIGH SCHOOL PHYSICS', which combines with the simulation from Crocodile Physics to cover a physics course for 14-16 year olds. There are also over 100 interactive on-screen lessons, separate from those included in the 'absorb High School Physics' section. The most powerful features, which mark Crocodile Physics out from other teaching software, is the Integrated Multimedia Editor. This allows you to alter the supplied activities to suit your own needs, or you can write your own lessons from scratch.

Crocodile Clips Ltd, www.crocodile-clips.com, c. €254 [5 user licence]

Encarta Encyclopedia 2000

While this is a general encyclopedia it has a lot of material which is of interest to physics teachers and students. Strongly recommended are the animations; particularly those on the Doppler effect, nuclear power and the electric motor.

Microsoft. c. €26

Encyclopedia of Science 2.0

This CD includes physics, chemistry, mathematics and life sciences. The video footage of the resonating Tacoma bridge alone would make this CD worth having. The short animations provide clear introductions to many areas of physics.

DK Multimedia. c. €26

Events in DELPHI (or Particle Detectives: The DELPHI Case)

A PowerPoint presentation, that serves as a fun introduction to the world of the particle detective. After a short tutorial, it's down to you to make sense of what happens next (also available on the Web at

<http://webnt.physics.ox.ac.uk/documents/particledemos/DelphiIntro/index.html>).

Dr Christine Sutton Free

Lancaster Particle Physics

This PC-based interactive software package, consisting of a floppy disk and 50-page explanatory booklet, has been designed specifically for A-level students. The package aims to give students a feel for the basic physics and experimental techniques involved in experimental particle physics. For a comprehensive description of the package see <http://www.lancs.ac.uk/users/spc/wotsnew/lpp/lpp.htm>

Dr Frank Foster c. €6

OnScreen Particle Physics

This interactive software package takes you inside a 3D particle-detection chamber. Users can simulate particle decay events and investigate the effects of varying the initial energy of the particle, the size of the chamber and the strength of the chamber's magnetic field. Versions are available for Macintosh or Windows 95/NT, and are accompanied by both User and Instructor Guides. The software is available either on a floppy disk or from the OnScreen Science Web site at <http://www.onscreen-sci.com/>. A more detailed description of the package can also be found at this site.

OnScreen Science, Inc. c. €45

Oscillations and Waves Interactive multimedia for Advanced Physics

Among the fifteen titles within this CD are: transverse waves, longitudinal waves, beats and diffraction. The clear animated diagrams can be used to introduce or revise a topic. In each section the wavelength, for example, can be varied to show different effects and the display can be frozen to illustrate some points in detail.

Fable multimedia.(Central Technology Supplies, Dublin. c. €20, single user)

Physics 'a Teacher's Handbook'

The Department of Education and Science's Intervention Project in Physics and Chemistry produced this CD. It contains interesting background information on each section of the syllabus. Selected sections may be printed for class notes or overhead transparencies.

Videos

IOP Library

The following videos are available from the Education Sub-Group of the Institute of Physics in Ireland and are available to schools with Basic Affiliation to the IOP, which is now free. These videos come from various sources including the Open University, the IOP, Philips Guild, Channel 4 EQUINOX, British Gas, Manchester University TV, Australian IOP, Granada Television, Cardiff University, Goldsmith's College, UKAEA, Coronet/Viewtech, Sheffield University, Dept of Physics UCD and Dept of Physics UCG. Further details regarding these videos can be found at the Institute of Physics in Ireland website at <http://www.tcd.ie/IOP/schools.html>

Basic Electromagnetism

This programme is packed with information but coverage is superficial in places.

Open University 25 minutes, age 16-18

Electric Skies: The intriguing power and beauty of Lightning

This stunning film looks at the latest research and meets those whose lives have been touched by lightning, both intentionally and unintentionally.

Channel 4 EQUINOX series 50 minutes, age 12+

Gravity

This film is more concerned with the nature of 'weightlessness' than with the nature of gravitational forces.

Goldsmith's College 25 minutes, age 11-16

Images

This video gives a clear exposition by Professor Charles Taylor of the way in which lens systems form images from the 'holograms' produced by objects.

Cardiff University 40 minutes, age 16-18

Isotopes in Action

This video deals with some facts about isotopes in action and the many applications of radioisotopes, including medical and industrial.

UKAEA 20 minutes, age 11-18

Magnetism

Tape 1: The Lorentz Force and Hall Effect

Old style of presentation but very clear explanations.

Tape 2: The Origin of Magnetic Fields

Looks at current and magnetic induction relationships.

Philips/Guild 20 minutes each, age 16+

Mechanics- A Visit To The Circus

This programme revises the basic ideas of Newtonian mechanics.

Open University 25 minutes, age 16-18

Physics and the Sound of Music

A continuous lecture presentation, which is actually a compilation from three consecutive lectures given by Professor Charles Taylor.

Institute of Physics 50 minutes, age 11-18

Science and The Sound of Music

This entertaining video is a one- hour lecture given by Charles Taylor.

Australian IOP 45 minutes, age 11-18

Semiconductor Physics

Tape 1: Conduction in Pure Crystals

An introduction to insulators, conductors, semi-conductors, flow of free electrons.

Tape 2: Conduction in p and n crystals

The film shows how doping could produce p-type or n-type crystals and looks closely at how electricity is conducted in terms of majority carriers.

Tape 3: The p-n junction

Looks at the two opposing forces which limit the size of the barrier region.

Tape 4: The Crystal Diode

Tape 5: The Transistor

A transistor's ability to amplify power is explained in terms of electron/hole movement at the emitter-base and collector-base p-n junctions.

Philips Guild 20 minutes each, age 16-18

The Geneva Event

Documentary footage of the Cern experiment to detect the W and Z particles.

Open University 60 minutes, age 16+

The Magic Metal Uranium

Introduces the concepts of atoms, electrons, nuclei etc., using animation.

UKAEA 15 minutes, age 11-16

The Nature of Sound

Examples of vibrating sound sources; need for a propagating medium; models showing wave propagation; definition of amplitude, wavelength and frequency; introduction to the Doppler Effect; applications in geology and oceanography.

Coronet/Viewtech 13 minutes, age 11-16

The Photon Connection

Light - from beacon fires to optical fibres - is the theme of the lecture and plays a dominant role in its presentation.

IEE Faraday Lecture for schools from STC 35 minutes, age 14+

The Tacoma Narrows Bridge Collapse

Tacoma Narrows is near Seattle in Washington State, north-west USA and is exposed to westerly winds from the Pacific Ocean.

An Amateur Cameraman 5 minutes, age 14+

The Wave - Particle Paradox

This interwoven set of sequences from several Open University science programmes takes the viewer, at a sensible pace, to a thorough understanding of the subject.

Open University 40 minutes, age 16-18

Towards one force of Nature

Professor Russell Stannard takes the viewer through the Cern experiment of 1978 to 1982 which lead to the detection of the W and Z particles. These were predicted when the electromagnetic and the weak force were united as the Electroweak force.

Open University 60 minutes, age 16+

Transference of Heat

Conduction, convection and radiation are treated separately at Ordinary Level standard.

British Gas 30 minutes, age 11-16

Semiconductors in Action

This video, produced in the Department of Physics, University College Dublin by Dr. Tony Scott, illustrates the basic principles of semiconductors and their varied uses.

Department of Physics, UCD

X-Rays: Atomic energy levels and the origins of X-rays

This shows how an explanation of the characteristic X-ray spectra from different target materials led scientists to a better model of the atom, the Bohr Model, which then could also explain visible spectra.

Open University 25 minutes, age 14+

GENERAL PHYSICS VIDEOS

Encyclopaedia Britannica-Science and Technology Video Library

This 'Library' consists of a set of 32 videos covering BIOLOGY – 16 videos, GEOLOGY – 8 videos, ASTRONOMY – 2 videos, PHYSICS – 4 videos, NEW TECHNOLOGIES – 2Videos. The physics topics covered include Matter- the atom and the nucleus, Energy, Heat, Magnetism, Light, Waves, Sound and Electricity. They offer a very good introduction to the above topics with clear demonstrations and explanations for both junior certificate and Leaving Certificate. The set is a useful addition to any school science programme.

Geomagnetism

The earth can be seen as a natural laboratory in which to study physical fields and their effects.

Open University 25minutes, age 14+

Materials in Perspective

The viewer is first taken to see Robert Stevenson's 'Rocket' and asked to think about the different materials used in its construction.

Sheffield University 33 minutes, age 16-18

Oscilloscopes

This video produced in the Department of Physics, University College Galway illustrates the operation of a modern oscilloscope, its controls, the measurement of voltage and the frequency of time varying voltages.

Department of Physics, UCG 15 minutes

Physics and Fine Art

Physics and Fine Art shows how scientific analysis increases our knowledge of old master paintings.

Institute of Physics 1992 30 minutes

Physics in Action Produced by Granada TV

Tape 1: Electrostatics I & 2; The Generation of Electricity 1 & 2; Radioactivity.

Tape 2: The Thermal expansion of Metals; The Electromagnetic Spectrum; The Laws of Motion 1&2; Electricity in the home.

Granada Television 20 minutes each programme, age 13-16

Radon-The Home Video

This video gives straightforward answers to the questions: What is radon? How does it collect in the home? How is it measured? How can high levels be reduced?

NRPB, Chilton, Didcot, Oxon, OX11 ORQ 20 minutes, c. €6

Understanding Radioactivity

Radioactive concepts are introduced and explained through video, graphics and experiment.

BNFL, PO Box 100, Warrington WA4 6FB, age 14-16 years, 15minutes, c. €

Understanding the Universe

Programme 1: And There Was Light: Light is central to the very existence of the Universe. Its properties were shown by Clerk Maxwell to be the logical consequence of the basic laws governing Electricity and Magnetism. Under certain conditions light plus more light can produce darkness.

Programme 2: The Four Forces of the Universe: This programme looks at the manner in which Gravitational, Electric and Nuclear Forces combine to run the Universe.

Programme 3: The World of the Very Small: This programme introduces the world of Atoms, Atomic Nuclei and beyond.

Programme 4: The Story of the Universe: This programme looks at our Solar System, Stars and Galaxies.

Programme 5: The Question of Time: This programme retraces time right back to the creation of the Universe.

UCD Department of Experimental Physics 2 hours 20 minutes, age 14 +

Particle Physics Videos

Back to Creation

A 12-minute film explaining the evolution of matter, from the Big Bang to the present day. The use of accelerators at CERN to recreate the same process is shown.

Can be borrowed free from the Education Department of the Institute of Physics by members or affiliated institutions.

Bright Sparks of the Universe

The 1998 Faraday lecture, filmed at the Barbican Centre, in which Frank Close and Bryson Gore take you through a century of electrons.

Can be borrowed free from the Education Department of the Institute of Physics by members or affiliated institutions.

Euro Big Bang

This film focuses on CERN's contribution to the creation of a European identity. Using music and newsreel footage, key events in European post-war history are reviewed in parallel with the growth of CERN and the development of strong collaborative science centres in Europe.

Can be borrowed free from the Education Department of the Institute of Physics by members or affiliated institutions.

Stars Underground

This 12-minute film outlines the research currently being carried out at CERN, concentrating on the functioning of the Large Electron Positron Collider.

Can be borrowed free from the Education Department of the Institute of Physics by members or affiliated institutions.

The Cosmic Onion

The 1993 Royal Institution Christmas Lectures on the structure of matter and particle physics given by Frank Close to an audience of school children. Includes live demonstrations. Videos of the five hour-long lectures, which were broadcast on BBC television in January 1994, are available at c. €90, for the complete set.

INCA (London) Limited, 1993, age 14+

Physics Promotional Videos

Archimedes' Daughters

This video includes interviews with a number of young women who have chosen a career in Engineering. The Equality Committee of the Department of Education and Science commissioned this video.

Physics All Around Us

This award winning video is intended to promote an awareness of the excitement and importance of physics in all our lives. It aims to encourage pupils to think more positively about physics and its role in our society, and to encourage them to think of taking up careers in physics- related jobs.

IOP/ICI 24 minutes, age 14-18

Physics Means Business

'Physics Means Business' shows how all of us benefit from physics and the roles physicists play in our lives in premature baby units, environmental monitoring, optometry, aerospace research, and cancer detection.

The Institute of Physics 30 minutes, age 15+

Think Again

This video is designed to encourage pupils, particularly girls to consider studying physics and chemistry for the Leaving Certificate. As such, the emphasis is on the promotion of the subjects rather than the provision of definitive information. This video was produced with the support of INTEL and LOCTITE.

IOP and IAPC 20 minutes, age 13-16

Women and Physics

The University of Manchester Physics Department sets out to show girls that physics can be an exciting, interesting and worth while subject to study by inviting them to spend 3 days on a special residential course. This video was filmed during the 1983 course.

Manchester University TV 21 minutes, age 14-18

WEB SITES

These Web site links are given on the last page of the 'Physics-a teacher's handbook' CD ROM.

<http://www.ase.org.uk/>

The UK based Association for Science Education. Wide range of relevant resources. Good links.

<http://www.cern.ch/>

The European Organization for Nuclear Research, with 20 Member States, CERN explores what matter is made of, and what forces hold it together. This site is an excellent resource for Particle Physics. In late 1990, Tim Berners-Lee, a CERN computer scientist invented **the World Wide Web**, which was originally developed for high-energy physics collaborations.

http://www.irlgov.edu

Department of Education and Science

<http://www.iol.ie/~instchem>

Institute of Chemistry of Ireland. It has relevant information and links.

<http://www.iee.org.uk/Schools>

Institute of Electrical Engineers. It has some classroom resources and career information.

<http://www.iop.org/>

The Institute of Physics website is a rich resource for teachers and students. The latest news, careers information, journals and comprehensive links for all areas of physics.

<http://www.sdsc.edu/~woodka/resources.html>

Internet for Girls: World Wide Resources List. This list contains resources in mathematics and science, parent resources, teacher resources, and sites created especially for women and girls.

<http://www.irsa.ie/>

Irish Research Scientists Association is the primary research network in Ireland. Its membership is drawn from the whole island of Ireland and from 17 countries overseas. This site has good links, and information on famous Irish scientists.

<http://www.ista.ie/>

The Irish Science Teachers Association site has details of membership, events, branches, news and links.

<http://www.ncte.ie/>

This is National Centre for Technology in Education site. It contains information and resources for the use of computers in education.

<http://www.newscientist.com/>

This site offers articles from New Scientist magazine, as well as some Web only material. Searchable, it is useful for the latest developments, applications and issues.

<http://www.pparc.ac.uk/>

Particle Physics and Astronomy Research Council.

<http://www.psrc-online.org/>

The Physical Sciences Resource Centre is a project of The American Physics Teachers' Association.

<http://www.rpii.ie/>

The Radiological Protection Institute of Ireland is the organisation with responsibilities in matters pertaining to ionising radiation, in particular hazards to health associated with ionising radiation and with radioactive contamination in the environment. This is a good source of information on Radon.

<http://www.rsc.org/>

Based in the UK, the Royal Society of Chemistry is a publisher and provider of chemical information, supports the teaching of chemistry, organises chemical meetings and is active in communicating science to the public.

<http://www.ul.ie/~childsp/Sicici/index.html>

Schools Information Centre for the Irish Chemical Industry produces materials and provides services, which are useful to the second level chemistry teacher.

<http://www.scoilnet.ie/>

Scoilnet is the Irish education portal site. It has many resources for teachers, parents and students, with good links.

<http://www.chemists-net.demon.co.uk/>

The Chemists' Net.

GENERAL WEB SITES

<http://www.askjeeves.com/>

This is a useful and easy to use search engine, which allows a user to type in a 'question like' request. It will bring up a list of links that may answer the question. It also gives a few alternative search options for each question such as 'tell me how it works', if chosen this will bring up more sites related to the topic and perhaps more in line with the intent of the original question. Overall this search engine should allow students to search for useful sites easily.

<http://www.bbc.co.uk/education/home>

The links pages are the most useful area from the point of view of physics. These are broken into numerous areas including science for different age groups. The other advantage is that the site is regularly updated. This is a definite starting point for a search of the web for physics sites.

<http://www.crosswordkit.com/>

Crossword Construction Kit is the Desktop Publisher for creating theme based crossword puzzles. A trial evaluation version can be downloaded

www.geocities.com/worsleyschool/science/sciphysics.html

This is a site with many interactive programs - Java applets. It also contains some programs, which you can download.

<http://www.hpcc.astro.washington.edu/scied/physics.html>

This is a good source for Physics resources and links.

<http://www.iei.ie/steps/links.html>

Good links to general Physics sites.

<http://www.jlab.org/kids>

A wonderful science site specifically for schools. Check out 'question of the week' - a 'simple' question posed by a student, with an easy-to-understand answer provided by an expert.

<http://www.leavingcert.net/>

Physics link written for current LEAVING CERTIFICATE syllabus. Good links to other sites. Applets are very good. Site is user friendly.

<http://www.nasa.gov/>

Good site for Space and Earth Science information. It is very wide ranging and a person could spend all day on it.

<http://news.bbc.co.uk/hi/english/sci/tech/default.stm>

This BBC site giving current science news is very useful for giving up to the minute information on science news. It is in a very readable format and is suitable for students. It should help to increase pupils interest in the applications and developments in science.

<http://www.nsta.org/recommends>

The American National Science Teachers Association contains reviews of books, teacher publications and software available for science teachers.

<http://www.physics.nuigalway.ie/>

This site contains categorised physics links of interest to teachers and pupils.

<http://www.physics.org/>

This is a simple one-stop shop for information on physics. It uses a powerful natural language search engine to interpret your question and provide you with accurate and relevant web based resources that are guaranteed by the IOP. Very good site for STS as there are various links to physics in the home, school, work etc.

<http://www.physlink.com/>

Good up-to-date Physics with a very good search facility

<http://www.ri.ac.uk/>

Royal Institution - Apart from a list of the times and topics for the Christmas Lectures TV lectures at the Royal Institution there is not a lot of interest on this site. Even the links page is somewhat limited and one would be better to use a site such as the BBC or ASK JEEVES. There is a list of the previous Christmas lectures that are now available for sale on video, which may be useful.

<http://www.skool.ie/>

A user friendly site developed by AIB, The Irish Times and Intel. It has Physics sections for both students and teachers.

STS WEBSITES

<http://www.hawking.org.uk/>

Stephen Hawking's website: This is a good site with information about the man, his illness and his lectures (some of which can be downloaded in pdf format). There is also a useful animated style glossary with some pictures/diagrams used to explain terms which appear in the lecture notes, some of these are useful for the particle physics area of the new physics course.

<http://www.howstuffworks.com/>

This site is in the top 100 sites in the US. The diagrams used are good but lack animation, however lots of the linked sites have good animations and applets. Virtually everything is here, from the fridge to the mobile phone to GPS etc.

<http://library.thinkquest.org/19537>

This site also known as 'The Sundry', has interesting background and applications in sound. Particularly recommended is the information on noise cancellation and the applets.

PARTICLE PHYSICS WEBSITES

<http://alephwww.cern.ch/Public.html>

Detailed information on one of the four experiments at CERN using the Large Electron Positron (LEP) collider.

<http://durpdg.dur.ac.uk/lbl/cpep/history/main.html>

All the main discoveries from ancient times to the present day presented in a clear style with a touch of humour

<http://hepweb.rl.ac.uk/ppUK>

The latest news and information on particle physics for schools, journalists and professional physicists. A good educational resource with many useful links, and is a useful starting point.

http://hepweb.rl.ac.uk/ppUKpics/pr_pow.html

Discoveries, people, experiments and interesting images from the world of particle physics. The archive of this weekly 'picture & explanation' feature provides an ideal introduction to many areas of Particle Physics.

<http://hepwww.rl.ac.uk/pub/bigbang/intro.html>

This is a Web version of PPARC's 'Big Bang Science' booklet. Contains a clear explanation of the theories behind particle physics research, and descriptions of both current and future experiments at CERN.

<http://hepwww.rl.ac.uk/pub/phil/ppintro/ppintro.html>

A comprehensive and straightforward introduction to particle physics.

<http://particleadventure.org/>

Excellent particle physics resource with a slide show on the fundamental particles

<http://webnt.physics.ox.ac.uk/documents/WebGuide/default.html>

This is Christine Sutton's list of useful web sites - a really good set of links.

<http://www.lapp.in2p3.fr/neutrinos/aneut.html>

This site contains all the important information you need, and it's a good read too! Look here if you want to know what neutrinos are or how they were discovered, and for details of neutrino experiments.

<http://www.schoolscience.co.uk/>

World of Particles gives a clear and simple approach to basic particle physics aimed at pupils aged about 16 years old.

<http://www.astro.queensu.ca/~dursi/dm-tutorial/dm0.html>

A chatty and informative site featuring many Java interactive simulations.

<http://www.bigchalk.com/>

Particle physics websites

<http://www.cebaf.gov/services/pced/atomtour/atomtour.html>

Simple and fun tour of the components of the atom down to quark level.

<http://www.cern.ch/Physics/ParticleDetector/BriefBook>

Everything you ever wanted to know about detecting particles.

http://www.desy.de/pr-info/desy-forschung_e.html

The site describes the research currently being undertaken at DESY in Hamburg, Germany, and gives details of how to visit.

http://www.desy.de/pr-info/desy-fokus_e.html

A useful summary of past, current and future activities at DESY (the home of the world's only electron-proton collider, HERA).

<http://www.fnal.gov/>

This is the home page of the Fermi National Accelerator Laboratory, the laboratory where the top quark was discovered in 1995.

http://www.fnal.gov/pub/hep_descript.html

A clear explanation of the concepts and theories behind particle physics.

http://www.hep.ph.rhbnc.ac.uk/hep/talk/small_parts.html

The slides from a particle physics presentation entitled 'The Smallest Particles...The Biggest Machine' which can be printed out to produce transparencies

<http://www.iop.org/Physics/Electron/Exhibition>

A whole site dedicated to the humble electron (which has just celebrated its 100th birthday) presented in a clear and chatty style. This is the place to learn about the discovery of the electron, its properties and its numerous applications.

<http://www2.slac.stanford.edu/vvc/home.html>

This site is attractive and easy to read. Contains clear descriptions of the accelerators, detectors and experiments based at the Stanford Linear Accelerator Centre (SLAC).

JOURNALS WEBSITES

<http://www.nationalgeographic.com/>

National Geographic- Just like the magazine this is an excellent site, but also just like the magazine it is not the first place you would go for useful physics information.

<http://www.newscientist.com/>

As with the magazine this site is an excellent resource for the teaching of science. The site has good links and is well worth a visit.

<http://www.last-word.com/>

This is a sister site of the New Scientist site. It contains all the past and present questions covered in the last Word section of the magazine. This section covers all sorts of questions and answers on everyday science topics and is great for encouraging curiosity in science and how it explains the world about us.

<http://www.sciam.com/>

SCIENTIFIC AMERICAN - As with the magazine, this site is full of interesting presentations on modern science including, of course, physics. Links to other useful areas are to be found on the site as well as an 'ask the expert' section which allows you to submit questions for answer by experts in the field. Overall this site is a must for all science teachers as is the magazine.

USEFUL ADDRESSES

Planning and Building Unit

Department of Education and Science
Portlaoise Road
Tullamore
Co. Offaly
Tel: 0506 21 363
Fax: 0506 51 119

Institute of Physics

76 Portland Place
London
W1N 3DH
Contact: Catherine Wilson, Education
Department
Tel: 0044 171 4 704 800
Fax: 0044 171 4 704 848
Email: catherine.wilson@iop.org

Institute of Physics Publishing Limited

Dirac House
Temple Back
Bristol
BS1 6BE
Tel: 0044 117 9 297 481
Fax: 0044 117 9 294 318
<http://www.iop.org/>

Radiological Protection Institute of Ireland

3 Clonskeagh Square
Clonskeagh Road
Dublin 14
Tel: 1800 300 600
Fax: 01 2 697 437
Email: radon@rpii.ie
<http://www.rpii.ie>

Health and Safety Authority

10 Hogan Place
Dublin 2
Tel: 01 6147 000
Fax: 01 6147 020
Email: web-info@hsa.ie

ISTA

Blackrock Education Centre
Kill Avenue
Dun Laoghaire
Co. Dublin
Email: brocktc@iol.ie
www.ista.ie

Institute of Physics in Ireland

C/O School of Science & Technology
DLIADT
Kill Avenue
Dun Laoghaire
Co. Dublin.
E-mail alison.hackett@iop.org
<http://www2.tcd.ie/IOP/>

The Association for Science Education

College Lane
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Hertfordshire
AL10 9AA
Tel: 0044 1707 283 001
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<http://www.ase.org.uk/>

National Radiological Protection Board

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Fax: 0044 1719 635 800
Email: info@energy.org.uk

BT Education, PO Box 10
Wetherby
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Tel: 0600 622 302
Fax: 01937 845 381
Email: bt@twoten.press.net
<http://www.bt.com/education2000>

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1211 Geneva 23
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Contact: Neil Calder, AS Division
Tel: 00 41 227 674 101
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<http://www.cern.ch/Press/>

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Polaris House
North Star Avenue
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Wiltshire
SN2 1SZ
Tel: 01 793 442 110
Fax: 01 793 442 002
Email: pr.pus@pparc.ac.uk
<http://www.pparc.ac.uk/>

Scientific Equipment Suppliers

ALeaving Certificatehem Chemicals Ltd
Industrial Estate
Little Island
Co. Cork
Tel: 021 4354 188
Fax: 021 4354 374
Email: sales@alkem.ie
<http://www.alkem.ie>

Central Technology Supplies Ltd
Unit 5 Westpoint Business Park
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Tel: 01 822 3355
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PO Box 100
Warrington WA4 6FB
Tel: 0808 1001 444
<http://www.bnfl.com>

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46 Wallace Street
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136A Slaney Close
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Tel: 01 8 822 222
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Email: everyone@agb.ie

Chip Electronic Services Ltd
Unit 8 Hollyhill Ind Estate,
Hollyhill,
Cork
Tel: 021 4854 328/ 4393 741
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K B Scientific

Togher Industrial Estate

Togher

Cork

Tel: 021 4965 441

Fax: 021 4313 876

Peats Electronics

197, Parnell St.

Dublin 1

Tel: 01 8727 799

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Tel: 01 450 4077

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Email: shawsci@indigo.ie

<http://www.shawscientific.com>

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