

Why study physics?

- Physics answers the big questions
- Energy generation and distribution
- Global warming
- Environmental monitoring/protection
- Health (Diagnostics and Therapeutics)
- Quantum/optical computing
- Nanoscience/nanotechnology
- Offers a challenging and rewarding career focused on creation and application of new knowledge









Why study physics?

Physicists provide leadership in:

- Basic research
- Commercial R&D
- Education and training
- Finance/market prediction and modelling
- Industry, business, public service
- Engineering, design, innovation





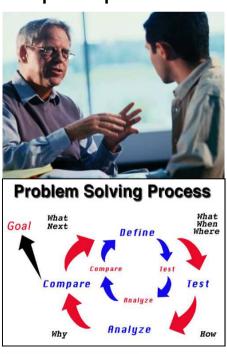
Why study physics?

- A physics degree provides a broad education
- Offers a challenging and rewarding career focused on creation and application of new knowledge
- A scientific qualification is an international passport

Applicable to a wide variety of jobs

- IT literate
- Problem solving
- Mathematical modelling
- Ability to think 'outside the box'





Why study physics at DCU?

- Student-centred: Physics Orientation as well as general University Orientation
- Social events in lab, meet and greet etc.
- Small classes and dedicated Year Tutors
- School is actively involved in Physics Education Research ensuring an excellent standard of teaching/tutoring
- Physics staff have won President's Teaching and Research Awards, National Teaching Awards....



Why study physics at DCU?

- Put yourself at the Cutting Edge
- DCU Physics has excellent track record in Research & Development
- Opportunities for students to get involved internships from Year 2
- Staff leading Research Centres (FPC@DCU, NCPST, NCSR ...) and involved in International Collaborations CERN, ITER, MAXLAB, SLAC, DESY...
- 4 Physics staff have been awarded President's Award for Research; recent papers in Nature / Nature Physics / Nature Photonics / Nature Astronomy / Physical Review Letters







Why study physics at DCU?

- Example of recent paper in Nature in high energy astrophysics:
 - Dr.Masha Chernyakova (DCU School of Physical Sciences) as part of the Hitomi collaboration - Solar abundance ratios of the iron-peak elements in the Perseus cluster, Nature November 13th 2017 (doi:10.1038/nature24301)

LETTER

dol:10.1038/nature24301

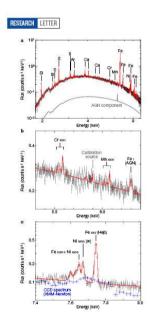
Solar abundance ratios of the iron-peak elements in the Perseus cluster

Hitomi Collaboration*

The metal abundance of the hot plasma that permeates galaxy clusters represents the accumulation of heavy elements produced by billions of supernovae¹. Therefore, X-ray spectroscopy of the intracluster medium provides an opportunity to investigate the nature of supernova explosions integrated over cosmic time. In particular, the abundance of the iron-peak elements (chromium, manganese, iron and nickel) is key to understanding how the progenitors of typical type la supernovae evolve and explode²⁻⁶. Recent X-ray studies of the intracluster medium found that the abundance ratios of these elements differ substantially from those seen in the Sun²⁻¹¹, suggesting differences between the nature of type la supernovae in the clusters and in the Milky Way. However, because

thought to be created predominantly by type Ia supernovae over a cosmological time period^{18,19}. Therefore, the abundance of these elements provides crucial information about the integrated nucleosynthesis in type Ia supernova and its physics.

Despite the importance of type Ia supernovae as distance indicators in cosmology 20,21 , many of their basic features remain elusive. One important open question is whether the mass of an exploding white dwarf is close to the Chandrasekhar limit ($M_{\rm Ch} \approx 1.4 M_{\odot}$, where M_{\odot} is the mass of the Sun), regardless of whether it originates from a single white dwarf accreting mass from a non-degenerate companion 22 or a violent merger of two white dwarfs 23 . Recent hydrodynamical simulations show that both delayed-detonation explosions of near- $M_{\rm Ch}$ white dwarfs 412



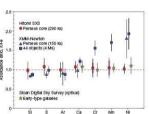


Figure 2 Hermantal abundances of the Presence cluster. Bedavis abundance with respect to Fe GaTe, "S. S. S. C. S. C. A. G. M. N) normalized to the corresponding select abundances" (dashed line). The red cricket present the SSC measurements with server burs of typical statistical uncertainty at a 1-c confidence level (thick magents) any stemantic uncertainty due to the model selection (this black, see Methosection Spectral analysis for details). The blue triangles and squares represent the XSM nestricts and september of the Persence cleate and the integrated data of 44 objects, respectively with the error bars including both statistical and systematic uncertainties at a 1-c confidence level. The yellow stars show optical measurements of dellar abundances and typical positions from the Solon Digital Sky Survey¹⁵ the error bars included the velocity-dispersion dependence and systematic errors of 50°C.

Fig. 2).** Our X-ray measurement resolves this discrepancy and strongly suggests that the average nature of type is supernova is independent of the star-formation history of their host galaxies. This robust result, which is unaffected by complicated realistive transfer processes that may lend uncertainty to optical studies, is obtained by reasonance emission line, which is easily resolved from the F4 H6 line and other weak emissions of Fe xzuv and Fe xzvi in the SSS spectrum. Because Cr and Mn abundance of individual objects were not constrained by the previous XMM-Newton observations.¹¹ we cannot exclude the possibility that sample variance leads, at least in part, to the discrepancy between our results and those of ref. 11. Nevertheless, we demonstrate in Muhochch that hish-rosolution nevertocome is essential

Undergraduate Programmes

Applied Physics (DC171)

Physics with Biomedical Sciences (DC173)

Physics with Astronomy (DC167)







Common Physics Topics

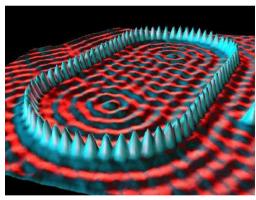


Year 1	Mechanics, Optics, Thermal Physics, Electricity and Magnetism, Chemistry, Computing, Labs and Projects
Year 2	Quantum Mechanics, Electronics, Mathematics, Electromagnetism, Relativity and nuclear Physics, Labs and Projects
Year 3	Wave Optics, Quantum Physics, Statistical Mechanics, Mathematics
Year 4	Choice of Optional Topics, Professional Development, Final Year Project

Applied Physics

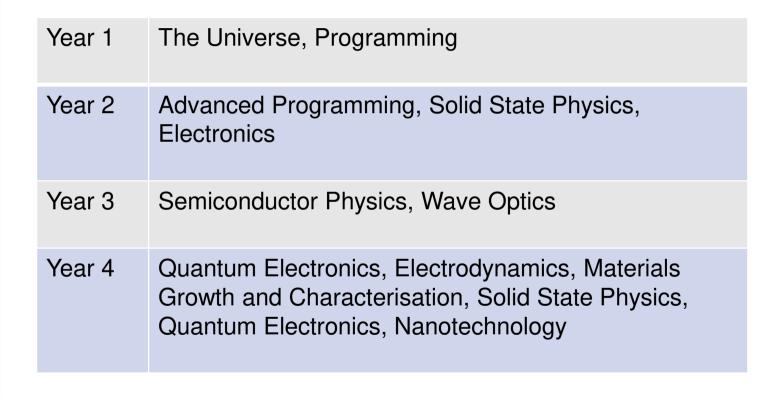
General physics degree aimed at industrial R&D and fundamental and applied research

- Semiconductor Physics
- Digital Signal Processing
- Optics and Photonics
- Computer Modelling
- Instrumentation / Measurement





Applied Physics Topics



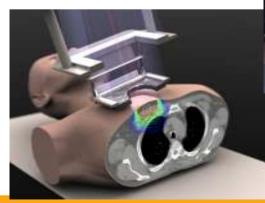


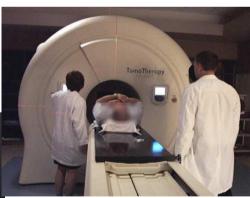
Physics with Biomedical Sciences

Physics is of vital importance to the Biomedical field

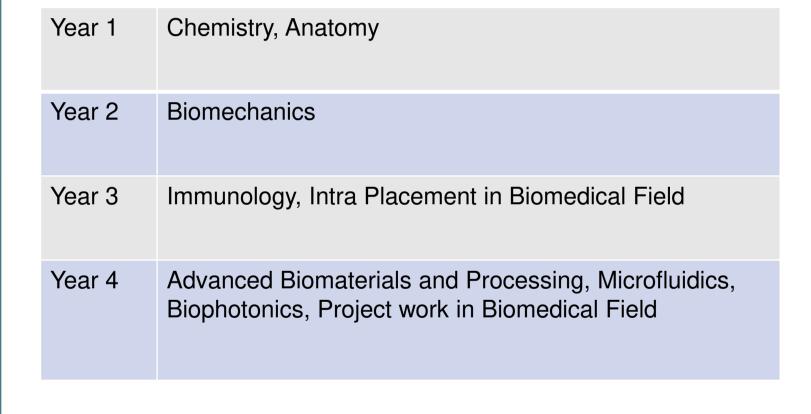
- MRI / PET / CAT Scanners
- Imaging Technology
- Radiation Therapy / Nuclear Medicine
- Diagnostic Devices
- Laser Treatment







Biomedical Specialist Topics





Physics with Astronomy

Physics is at the core of modern astronomy, both in terms of experimental apparatus, theory, and

analysis of data

- Data Acquisition
- Imaging Technology
- Computational Physics
- Cosmology and Relativity





Physics with Astronomy Specialist Topics



Ollscoil Chathair Bhaile Átha Cliath

Year 1	The Universe, Programming
Year 2	Advanced Programming, Relativity, Nuclear and Particle Physics, Space Science and Technology
Year 3	Astronomical Techniques, Stellar Physics, Field Trip to Foreign Observatory (Switzerland, Spain, Italy)
Year 4	Applied Spectroscopy, Image Processing, Topics in Astrophysics, Extragalactic Astrophysics and Cosmology, Astronomy project

Industry Engagement/INTRA Opportunities

Applied Physics

Six month Industry/Enterprise placement

Physics with Biomedical Sciences

Six month INTRA placement (in hospital / biomedical industry)

Physics with Astronomy

Field trip to foreign observatory
Six month industry/enterprise option

- Lab Placements in School or Research Centre
- Opportunities for research placements through scholarships and networking in EU and US



Entry Requirements

Physics with Biomedical Sciences

O3 or H6 in Mathematics

O3 or H5 in a Laboratory Science or Applied Mathematics

Points cut-off 2017 – 465

2016 - 415

2015 - 435

Physics with Astronomy

O3 or H6 in Mathematics

O3 or H5 in a Laboratory Science or Applied Mathematics

Points cut-off 2017 – 444

2016 - 415

2015 - 440

Applied Physics

O3 or H6 in Mathematics

O3 or H5 in a Laboratory Science or Applied Mathematics

Points cut-off 2017 – 423

2016 - 415

2015 - 410



Graduate Employment Sectors where our graduates are employed

- Computing
- Internet
- Finance
- Medical Physics
- Research Scientist
- Renewable

- Computer hardware
- Mobile Communications
- Science teaching
- Astronomy/Space Science
- Semiconductor industry
- Nanotechnology



Companies who have employed our recent graduates (3 years)

Intel

Applied Materials

Meteor

O₂/Three

Eircom/Eir

AIB Group

Hibernian Group

FORFÁS

Science Foundation Ireland

Hewlett Packard

Crème Software

FEM Software

DIT

St. James's Hospital

Mater Hospital

Google

First Derivatives

State Street Corporation

Royal College of Surgeons,

Ireland RCSI

RAPT Touch



More than 90% or our recent graduates are either employed or in further education!

Recent Physical Sciences Student Highlights

• Undergraduate students:

Rachel Hanley, Physics with Biomedical Sciences, highly commended in the Undergraduate in the Undergraduate Award Medical Sciences category, 2016

Columb Doherty, Applied Physics, highly commended and regional Undergraduate Award winner in the category of Maths and Physics, 2016

Adam Dempsey, Applied Physics, winner of Institute of Physics in Ireland Earnshaw Award for final year project, 2016

Rachel Moloney, Physics with Astronomy, top 3 place in Institute of Physics in Ireland Earnshaw Award for final year project, 2017

Postgraduate students:

Daniel Kirby won the best video competition at recent Miniaturized Systems for Chemistry and Life Sciences (µTAS) conference in Korea, 2015.

Cathal O'Broin (a recent PhD graduate supervised by Dr. Lampros Nikolopoulos) won the IoP Computational Physics Group Thesis Prize 2016.



B.Sc. in Science Education

DCU has responded to the need for a new generation of science teachers by preparing a new integrated curriculum including:



- Mathematics
- Education
- Information Technology







Further information in XG01 (Friday)/XG15 (Saturday)

Other routes into Physics

 You have the option of entering the Physics programmes after a common first year on Common Entry into Science – further information in XG22 (Friday)/XG19 (Saturday)

(DC201)

Points 2017 - 478

Points 2016 - 480

 You can study Physics as part of the BSc in Environmental Science and Technology – further information in XG21 (Friday)/XG20 (Saturday)

(DC166)

Points 2017 - 392

Points 2016 - 425



Life at DCU

- New student centre
- Student Advice Centre
- Uaneen Module
- Students Union / Office of Student Life www.dcusu.ie
- Elite Athlete Entry Scheme
- Clubs and Societies
- Learning Support Service
- Disability Service
- Student Accommodation
- Class Representation







Getting there

- 44 & 104 now stop on campus, with numerous other buses from Ballymun Road and Collins Avenue
- Private buses from Dundalk, Drogheda, Bettystown, Skerries, Lusk, Laytown and Rush
- Bus Eireann 101 and 109A
- Go Car on campus
- M50 links
- Walking and Cycling routes
- Drumcondra Train Station



Physics graduates 2015





Physics graduates 2016





Physics graduates 2017





Messages from Physics Alumni Brendan Owens (Physics with Astronomy 2009)

