newsletter

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Inside...

TRINITY SCHOOL OF

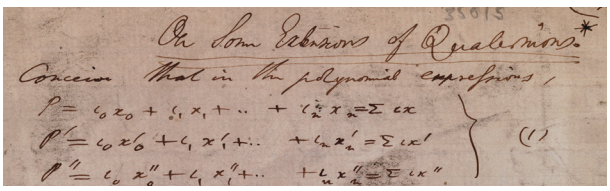
Mathematics

Welcome to the School of Mathematics' first newsletter where you will find highlights from the past year and updates on new developments in the School.

Professor Sinéad Ryan

Head of School

It has been an exciting year for the School which included the launch of the Hamilton Scholars at the 12th JL Synge Public Lecture, the popular masterclass in particle physics for secondary school students and a review of the School by internationally respected mathematicians and theoretical physicists. We were also delighted to welcome new members of staff as well as increasing numbers of international students to our degree programmes.



The School has an excellent international reputation for research in theoretical physics and mathematics and our staff are regularly invited to present their work in keynote talks. We lead the way with the most highly-cited papers in theoretical physics in Ireland and an annual William Rowan Hamilton Geometry and Topology Conference that attracts over 100 mathematicians from around the world to Trinity every year.

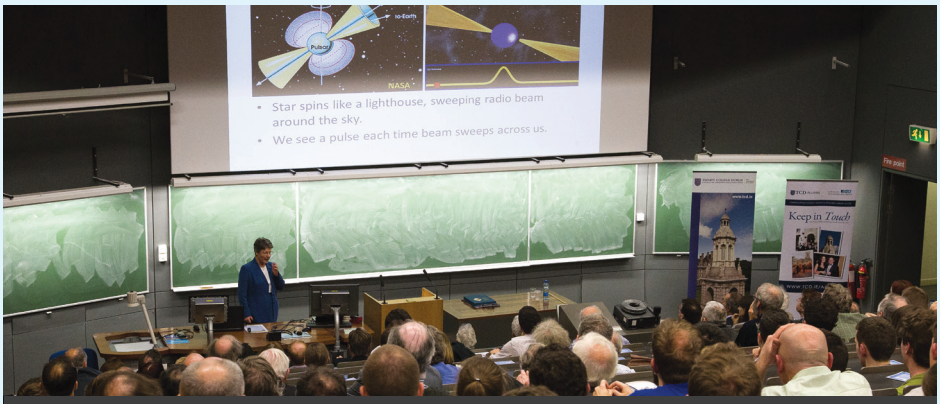
Our undergraduate degrees in Mathematics, Mathematics in two-subject moderatorship and Theoretical Physics continue to attract the very best students from Ireland and internationally. Our commitment to teaching and learning is as strong as ever and while many lectures are delivered with blackboard and chalk our students have access to backup resources online and for the larger classes new technologies including clickers in class for real-time feedback.

Meanwhile, our taught Masters degree in High Performance Computing is attracting students from diverse backgrounds. These students use the large-scale computing resources at Trinity's Centre for High Performance Computing to complete their projects on topics as wide-ranging as finance, genetics, physics, mathematics and telecommunications.

I hope that you enjoy catching up with events in the School from the past year. We always welcome news from our alumni and friends so do please keep in touch.
You can find the latest news and events on our website www.maths.tcd.ie

Trinity College Dublin
Coláiste na Tríonóide, Baile Átha Cliath
The University of Dublin

12th JL Synge Public Lecture by Dame Jocelyn Bell Burnell



Dame Jocelyn Bell Burnell spoke to an audience of 300 about 'Pulsars and Tests of Einstein's General Relativity'

Dame Jocelyn Bell Burnell and Professor Emeritus Petros Florides

Dame Jocelyn Bell Burnell spoke to an audience of 300 about 'Pulsars and Tests of Einstein's General Relativity' at the 12th JL Synge Public Lecture on the 30th October 2014, which was hosted by the School of Mathematics.

Dame Jocelyn Bell Burnell was involved in the discovery of pulsars, which are highly magnetised, rotating stars that emit beams of radiation which are only observed when they point at the Earth; this characteristic means they are useful for mapping the galaxy as well as measuring other astronomical phenomena with incredible precision. Their regularity of pulsation makes them more precise time-keepers than atomic clocks. Unsurprisingly, the discovery of pulsars opened a new branch of astrophysics.

Dame Jocelyn Bell Burnell has received many prestigious prizes and awards, including an Honorary D.Sc. from Trinity College Dublin in 2008; she was also elected Pro-Chancellor of Trinity in 2013.

Professor Sinéad Ryan said: "We were delighted to welcome Dame Jocelyn to Trinity and to hear her engaging review of how Einstein's general theory of relativity is being tested through astronomical observations of pulsars orbiting other bodies. The modern era of precision astrophysics has opened up so many interesting questions for theoretical physicists to try to answer."

World-leading Mathematicians welcomed to 10th William Rowan Hamilton Geometry and Topology Workshop hosted by Hamilton Mathematics Institute, Trinity College Dublin

The School of Mathematics welcomed leading mathematicians from across the globe to its 10th annual William Rowan Hamilton Geometry and Topology Workshop. The workshop took place on the 26th-30th August 2014 and consisted of a two-day mini course which was then followed by a three-day lecture series.

Jeffrey Brock, Professor and Chair of Mathematics at Brown University

The primary goal of the workshop is to provide a forum in which the international geometry and topology community can meet with its European counterparts, to discuss topics of an interdisciplinary nature. A major anticipated outcome of these annual workshops is the determination of future research directions, and the generation of a list of open problems in the topics of focus.

Dr Vladimir Dotsenko, Assistant Professor of Mathematics at Trinity, was on the organizing committee and he said "….for 10 years this has been one of the biggest international events in pure mathematics hosted by an Irish university, and Trinity College is very excited to be the continuing host of this event."

The workshop was hosted by the Hamilton Mathematics Institute at Trinity with sponsorship from the US National Science Foundation, Boston College, and Science Foundation Ireland. Among the distinguished speakers this year was Professor Jeff Brock, Department of Mathematics, Brown University in the USA. Professor Brock said he was "….increasingly impressed by how well involved young mathematicians are in the early mini-courses, and how nicely their enthusiasm bolsters the research lectures by more senior researchers during the main body of the workshop."

Launch of The Hamilton Scholars

On the occasion of the 12th JL Synge Public Lecture, the School of Mathematics launched the Hamilton Scholars programme for Ph.D. studentships and announced the award of the inaugural Hamilton Scholarship to Argia Rubeo, following an international competition.

The Hamilton Scholars will train professional mathematicians to pursue the study of scientific and technological problems by mathematical methods and to undertake research in various branches of the subject. Trinity plays a leading role internationally in a number of research areas including Algebra and Number Theory, Analysis, Partial Differential Equations, Quantum Field Theory, Lattice Quantum Chromodynamics and String Theory.

The scholarships are named in honour of Sir William Rowan Hamilton, one of the world's most revered scientists and mathematicians, who studied and taught at Trinity in the 1800s. Hamilton made seminal contributions to the mathematical foundations of dynamics and the Hamiltonian formulation of classical mechanics laid the foundations for quantum mechanics.

Scholarships will be awarded to Ph.D. students of outstanding talent, from Ireland and internationally, who will be selected to study a new and unsolved problem in mathematics or theoretical physics. To address the gender imbalance in these disciplines, female candidates will be sought and specifically encouraged to apply.

To help deliver our plans to sustain and strengthen research and teaching excellence in Trinity College, we are offering the opportunity for supporters to play a pivotal role in this exciting initiative.

We are seeking an investment by supporters of €25,000 a year over four years for a total amount of €100,000 and would be delighted to advise on opportunities to contribute to the initiative, either individually or as part of a group. Donations are eligible for full tax relief in Ireland, the UK and USA.

If you are interested in finding out more about the Hamilton Scholars programme or if you would like information on how to get involved as a supporter, please contact:

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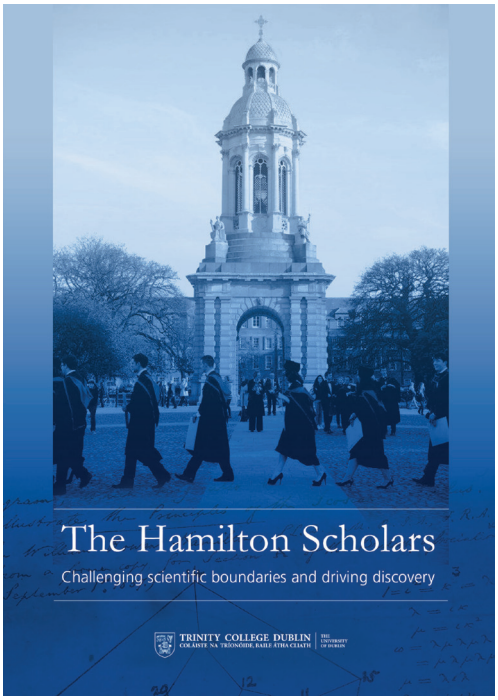
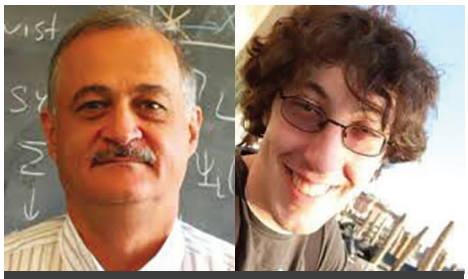
Professor Stefan Sint (Supervisor), Argia Rubeo (Hamilton Scholar), Professor Clive Williams (Faculty Dean) and Professor Sinead Ryan (Head of School of Mathematics)



Research & Awards

Professor Ruth Britto

Professor Ruth Britto has recently been awarded a European Research Council (ERC) grant valued at almost €2 million. Professor Britto will study Loop Amplitudes in Quantum Field Theory (CutLoops). The traditional formulation of relativistic quantum theory is ill-equipped to handle the range of difficult computations needed to describe particle collisions at the Large Hadron Collider (LHC) at CERN within a suitable time frame. The goal of Professor Britto's research is to construct a new and complete approach to computing amplitudes such as those describing the Standard Model and its extensions from a detailed understanding of their singularities, based on prior successes of so-called on-shell methods combined with the latest developments in the mathematics of Feynman integrals. Scattering processes relevant to the LHC and to formal investigations of quantum field theory will be computed within the new framework.



Professor Samson Shatashvili and Dr David Conlon

Trinity College Dublin participation in the 2014 International Congress of Mathematicians

The International Congress of Mathematicians (ICM) which began in 1897 takes place once every four years. The 2014 ICM took place in Seoul, South Korea and Professor Samson Shatashvili, University Chair of Natural Philosophy (1847) and Director of the Hamilton Mathematics Institute at TCD was invited to give a plenary lecture on mathematical physics as part of the scientific programme. The title of Professor Shatashvili's lecture was "Gauge theory angle at quantum integrability" and it can be viewed online www.youtube.com/watch?v=nWKhsplU0Hw

Professor Anton Gerasimov, a long-term research visitor at the Hamilton Mathematics Institute and Dr David Conlon (B.A. (Mod.) in Mathematics (2003)) were also invited speakers at the 2014 ICM. David's talk was in the Combinatorics section and was entitled "Combinatorial theorems relative to a random set". David has held a Royal Society Research Fellowship since 2010, first at Cambridge where he did his Ph.D. under the supervision of Fields medallist Timothy Gowers, and more recently in Oxford.

Professor Samson Shatashvili awarded Ivane Javikhishvili Medal by Georgian Government

Professor Samson Shatashvili was awarded the Ivane Javikhishvili medal by the Georgian government with the nomination of Tbilisi State University in September 2014. Professor Shatashvili was given the award for his contribution to the internationalisation of the Tbilisi State University (TSU), including the promotion of TSU's scientific potential abroad, facilitation of scientific and research activities between universities, the development of the university's scientific and educational processes, as well as the development of scientific and practical skills among young people.

Mathematics Fellow and Scholars

Warmest congratulations from the School to Dr Dmitri Zaitsev, who was elected to Fellowship in 2014. Congratulations also to the Senior Freshman Mathematics students elected to Scholarship - Adam Keilthy, Conor McMeel and Niall Thornton.

Dr Dmitri Zaitsev is an Associate Professor in the School of Mathematics. He grew up in Kiev, Ukraine and studied Mathematics at Lomonosov Moscow State University. He completed his Diploma in 1993 and his Ph.D., within 1 year, in 1994 at Ruhr-University, Bochum, Germany. Dr Zaitsev's research comprises contributions to Geometry and Analysis of Several Complex Variables as well as connected areas of Mathematics, such as Lie Groups, Differential Geometry, Real and Complex Algebraic Geometry, Partial Differential Equations and Dynamical Systems. He has over 20 international collaborators from over 10 countries and has authored over 50 peer-reviewed research articles.

Dr Dmitri Zaitsev

Trinity Walton Club

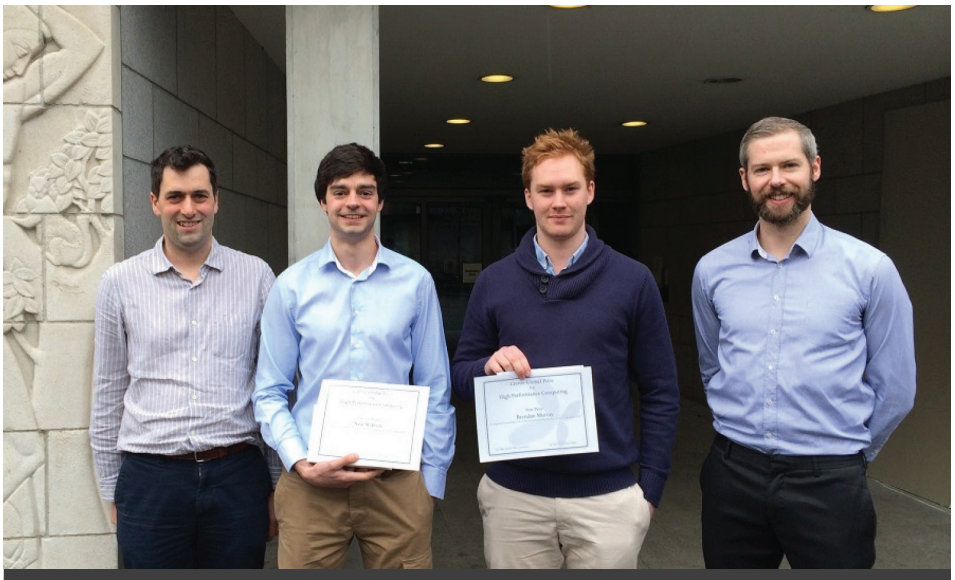
The Trinity Walton Club is Trinity's first science, technology, engineering and mathematics (STEM) club dedicated to supporting post primary students in their pursuit of STEM. This club, formed through a collaboration between Trinity Schools of Physics, Mathematics and Education, offers young students a unique experience to come on campus and work with STEM experts. The Trinity Walton Club, named after Nobel scientist (Physics, 1951) and Trinity student and professor, Ernest Walton, came to exist through faculty seed funding, philanthropy, Trinity's Alumni Association and Trust and the concerted effort of college staff from the Schools of Physics, Mathematics and Education.

The Trinity Walton Club is a new and exciting venture for Trinity and each year the club will grow in student and educator numbers. If you would like to become involved, collaborate or for more information please contact: Dr Arlene O'Neill, Academic Co-ordinator, Walton Club, School of Physics, Trinity College Dublin. Tel: +353 1 896 3153 Email: oneillar@tcd.ie or visit our website www.tcd.ie/waltonclub

walton club

Crème Global Prize for High Performance Computing

Students from Trinity College Dublin have been awarded with Crème Global Prize for High Performance Computing. The award is in recognition of outstanding dissertation work in the M.Sc. in High Performance Computing. Brendan Murray received the first prize for his work on applying Space-Filling Hilbert curves to parallelize computations in the field of Computational Fluid Dynamics. The second prize was awarded to Neal McBride for his application of Queuing Theory to the analysis of Phase Transitions in very large Complex Networks. Crème Global specialises in predictive intake modelling software, services and data.



Recipients of the inaugural Crème Global Prize for High Performance Computing. (From left) Professor Mike Peardon (Course Coordinator, M.Sc. HPC), Neal McBride (second prize winner), Brendan Murray (first prize winner), E.J. Daly (CTO, Crème Global).

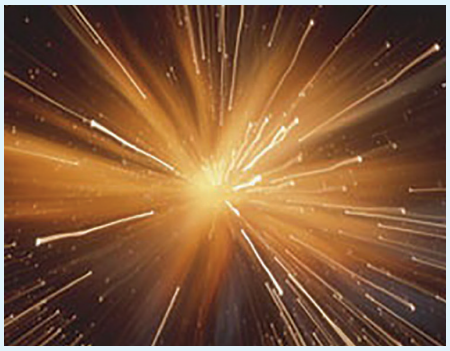
Trinity Hosts Public Lecture on the Early Universe and Big Bang

Last summer, the School of Mathematics hosted a public lecture on the Early Universe and Big Bang. The lecture kick-started the Irish Quantum Foundations Conference, also held at Trinity, which featured talks that ranged in focus from the Higgs Boson to string theory and the origins of dark matter.

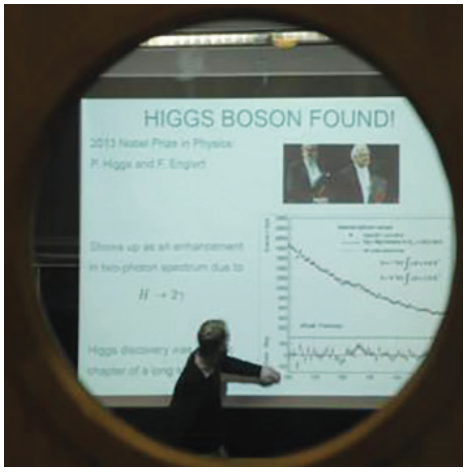
Dr Créidhe O'Sullivan of NUI Maynooth gave the public lecture, in which she touched on the most important recent cosmological insights. Those with an interest in cosmology and the origin of everything around us heard how it was that our Universe expanded by 100 trillion, trillion times in the mere blink of an eye.

Dr O'Sullivan said that "this is an exciting time for cosmology. Our understanding of the Universe has been transformed in the last 15 years and we now believe that while it contains only 5% ordinary matter, almost two-thirds of the Universe is made of a mysterious "dark energy".

Dr Tristan McLoughlin, Assistant Professor of Mathematics at Trinity, one of the organisers of the event said that "Dr O'Sullivan's talk gave insights into the most cutting edge developments."



Secondary School Students Take Part in International Particle Physics Masterclass



Local secondary school students enjoyed an International Masterclass, as Trinity College Dublin's School of Mathematics gave them the opportunity to be particle physicists for a day. The students analysed real data from the Large Hadron Collider (LHC), which is housed at CERN, as they took part in a global initiative running in 42 countries.

Particle physics is one of the most important emerging fields in science. The discovery of the Higgs boson at the LHC in summer 2012 led to a huge media echo and large public interest. The idea at the heart of the *International Masterclasses* is to let students work as much as possible like real scientists.

Four experiments - ATLAS, CMS, ALICE, and LHCb - made data available for educational use within the program. Students examined the products of collisions between elementary particles that travel through the 27 kilometre accelerator at close to the speed of light. Students were able to rediscover the structure of the proton, and reconstruct "strange particles" but the highlight was the hunt for Higgs bosons. ATLAS and CMS have made available real Higgs candidate events for students to track this rare, elusive, and very short-lived particle.

The worldwide participation of students reflects the international collaboration in particle physics, with students experiencing this aspect in a video conference that concluded their research day. In a video linkup with student groups in other countries and CERN participants presented their findings - much as particle physicists do in their collaborations.

Hitachi Assistant Professor of Mathematics at Trinity, Dr John Pulava, organised the event. He said: "I was happy to see students attend this year's Trinity College Dublin Particle Physics Masterclass, not only from the greater Dublin area but from all around the country. Those who attended had a keen interest in particle physics and were notably engaged in the lectures, exercises, and video conference with similar schools across Europe."

Alumnus Interview

Dr Helen Joyce (1991)
International Section Editor,
The Economist

What are you doing with yourself these days?

I edit The Economist's International section, which is devoted to cross-border issues and trends - from threats to free speech to the race for the Arctic; from tropical deforestation to the rise of telemedicine.

Why did you choose your current career?

I have a Ph.D. in mathematics (from UCL) and was editing specialist publications on maths and stats (Plus, plus.maths.org, from the University of Cambridge; and Significance, the magazine of the Royal Statistical Society) when, on impulse, I applied for a job writing for The Economist, in 2005. I didn't expect to get it, but hoped to meet some of the editors, and perhaps do some freelance work. They liked my background in stats and academia, and hired me to cover education, which I did until 2010, when I moved to Sao Paulo to write about Brazil. I returned last year to take over editing the International section.

What excites you most about your work?

Meeting interesting people, and learning new things. I've had opportunities I would never have dreamed of, like interviewing the president of Brazil and meeting indigenous people who are trying to balance the demands of modernity with saving their ancient environment, in the tropical Amazon. Though I'm more desk-bound these days, every week I grapple with challenging ideas - and learn from colleagues who are experts. It's like a fascinating seminar, every day. In just the past two weeks I've been thinking about how violence committed during sport should be treated by the law; and how even laudable attempts to regulate free speech in the name of lessening intercommunal hatred and violence end up being abused by governments seeking to silence their opponents.

How do you like to spend your free time?

Like many parents of young kids who have challenging jobs, I don't have much. But I live in Cambridge, which means that world-class events are brought to my doorstep. The Philip Glass ensemble was in town recently, which was great. I've become an avid knitter, too - useful for the commute (when I don't have articles to edit on my laptop, at least). I've also started learning Spanish via podcasts - I'm not good at languages, and learning Portuguese for Brazil was so harrowing that I decided to get as much return on that enormous investment of time and effort as I could!

What are your fondest memories of studying Mathematics at Trinity College?

I loved it all. The lovely, cloistered environment right in the heart of town. The strong esprit de corps in a smallish class of people all keen on a subject that many others (mistakenly!) hate. After school mathematics, which I did enjoy but is less about ideas and more about methods, I loved the rigour and willingness to investigate ideas, even without any obvious applications.

Which Trinity lecturer had the greatest impact on you?

Not a lecturer, but my tutor, Eric Finch of the Physics department. He never taught me, but came to my rescue when I had a wobble two days into the Schol exams. That was before mobile phones, and when I rang his office in despair at a mistake I'd just realised I'd made on a paper, someone there gave me his home number. His wife told me he'd gone to the airport to catch a flight. Then I got a call back from him - she'd rung the airport and paged him. He stayed talking from a payphone for quite some time, and calmed me down from my overwrought state. He told me to take the rest of the day off, not to worry and to go on and do the rest of the exams - I had been thinking of giving up. He pointed out that I'd nothing to lose by keeping going. What good advice, and how kind of him. (I got Schol, too.)

What did you like most about being a Trinity student?

Maybe it's advancing old age, but I remember those days with a rosy glow! So rather hard to pick out one aspect.

Have you any advice for students or fellow alumni?

For maths students, at least, my advice would be not to underestimate the relevance of your studies to quite surprising fields. I know that my interviewers at The Economist thought it would be handy to have a maths/stats bod on staff. They had plenty of economists and quite a few people with degrees in English, history and the like, and reckoned I'd have a different, and useful, perspective. Given how much of the reporting we do is on statistical evidence for public policies, or international comparisons, I think they were right.

What are your plans for the future?

I hope I'll stay in my current post for a while. The Economist moves people fairly regularly and once my kids are at a more suitable point educationally (they are now 8 and 13) I'd be keen to think of another foreign posting. Brazil hadn't even been on my radar, but it was life-changing. Where next?

Remember. The power of a legacy to Trinity

There's an old saying that the true meaning of life is to plant trees under whose shade one does not expect to sit. When you leave a legacy to Trinity however big or small, you're planting a tree which will grow to provide shelter to many. You're empowering ground-breaking research which will benefit people in Ireland and all over the world. You're supporting students from all backgrounds to access a Trinity education. You're helping preserve our unique campus and heritage for new generations.

When you remember Trinity in your will, you join a tradition of giving that stretches back over 400 years – and reaches far into the future. For more information about leaving a Legacy to Trinity, please contact Eileen Punch.

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Stay in touch

Get connected with Front Gate Online. Update your details, search and contact fellow alumni, register for events, join the career network and other groups, all in one place! Register today!
www.tcd.ie/alumni/frontgateonline

Alumni Events

Let us help you organise a class get-together at one of our alumni events:

- Alumni Reunion Weekend 21-23 August 2015
- Christmas Commons, December 2015
- Homecoming, 2015

www.tcd.ie/alumni/services/reunions

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