Frontiers of Physics 2009: Waterford IT

Physics teachers headed to Waterford IT on the last Saturday of September for the annual energy boost that is the Institute of Physics *Frontiers of Physics* day.

After a welcome from Dr Eilish McLoughlin of IOP, we had an outstanding presentation from David Hughes of Sheffield University on the history of telescopes. With a dry, northern wit, Prof. Hughes entertained us with tales of how telescopes as "light buckets" have doubled their light-collecting power every 50 years so far. He explained the amazing discoveries each improvement brought, starting with Galileo's first views of the Moon and Jupiter's satellites. One spectacular example he gave was the Hooker 100-inch telescope built at Mt Wilson in 1917. Hubble used this to look at the formerly "blurry" galactic nebulae and saw that in fact they were other "star cities" i.e. galaxies, like our own Milky Way. Prof Hughes described how this meant scientists had to make a "slight" numerical correction in their results: "You know how we thought the number of galaxies in the Universe was 1? Well, now we think it's closer to 100 billion".

He described the proposed next generation of telescopes such as the James Webb Space telescope (JWST) and concluded that although, as they say in Yorkshire, astronomy may not affect "the price of fish", there are great discoveries still waiting to be made. Seeing fainter and further objects could enable us to see back in time to the edge of the Universe.

ISTA members will be familiar with the great work being done by Sheila Donegan and Eoin Gill of CALMAST, based in WIT. Eoin, resplendent in 17th century wig, talked about "local hero", Robert Boyle from Lismore. He described how Boyle's education and travels in Europe may have influenced his developing interest in scientific ideas. Physicists present learned some interesting things about his work in chemistry, including his use of "syrup of violets" as the first acid-base indicator.
Eoin went on to show us some demonstrations he uses when giving his interactive show about Boyle to school students. This included some nifty variations on how to show Boyle's law. With a sealed syringe of air with different weights placed on it, he explained how to help students to "get their head around" Boyle's Law without getting bogged down in complicated experimental details often present in Leaving Cert physics versions.

Dr. Cormac O Rafeartaigh of WIT talked about "*From Walton to the LHC*". He took us through the development of the "Standard Model" of particle physics and explained how this model will remain incomplete until (unless?) the Higgs boson is discovered. He showed how the higher energy density available with the Large Hadron Collider allows us to reproduce conditions (in a small space!) close to those of the Big Bang. This "looking back in time" connects with the use of the best telescopes to see as far as we can in the Universe, which of course is also seeing back in time to the early Universe. His ANTIMATTER blog has more on this and other topics.
Cormac also forcefully pointed out how Walton made his discovery when working, under Rutherford, with the best scientists and equipment available internationally in the 1920s. He argued strongly that Ireland should now be involved in international projects like CERN and European Southern Observatory (ESO) to achieve this best level of co-operation for Irish scientists.

After a great lunch and some time to catch up with colleagues, there were two workshops. Jonathan Sanderson, of the *Planet SciCast* competition, showed how students can make a 2 ½ minute video illustrating a scientific idea. He got some "volunteer" teachers to do the demonstrating, camera and sound and within minutes we had a (basic!) video, showing how "do-able" this could be with the right preparation. Previous participant Declan Doherty of St Joseph's in Lucan also shared the positive experience of his students with us. Check the *SciCast* website for some sample films and more details www.planet-scicast.com

Robert Hill of the Northern Ireland Space Office and International Year of Astronmy2009 took us on an energetic tour of astronomy IT resources (all free!) including some spectacular 3D trips through the solar system and beyond. I have since downloaded and used one called "*Celestia"* and it is impressive. He also showed how the "Underneath the Stars" theme (ages 11-14) on the Northern Ireland curriculum links Spiritual Awareness, Science, Maths and English as an example of their thematic approach.

There was also a number of stands present, among them *Discover Sensors* and *SciFest* with Sheila Porter. I learned from her that almost 2000 students took part last year as *SciFest* goes from strength to strength.
Thanks to PharmaChemical Ireland, the presentations will be available to view over again. Keep an eye on http://iopireland.org for more news.

Thanks to all at WIT for the welcome and the venue and also the IOP Paul Nugent and Dave Keenehan. The day was well worth the trip from Dublin and I am looking forward to us getting together again next year: Maynooth!

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