



BAA Out of London Weekend, 2009 September 4–6, Leeds

Report by Ray Emery

The meeting began with a memorable session held in the grand surroundings of the Civic Hall in Leeds, headquarters of Leeds City Council. A reception was hosted by the Lord Mayor of Leeds, Madam Mayor Cllr. Judith Elliott and her husband and Consort.

The original speaker for this opening session (Prof Sir Anthony Hewish) was unfortunately unable to attend due to illness. However, our Event Organiser Hazel Collett had been able, at very short notice, to engage the services of Margaret Morris (Glasgow), who thoroughly entertained the audience with a most enlightening presentation which combined her lifelong interests of astronomy and philately.

Margaret is an avid collector of astronomy-related postage stamps from around the world, together with a considerable variety of other kinds of astronomical memorabilia. In addition to her well-illustrated talk, she had brought along a fine display of items from her collection (including John Herschel's RAS Gold Medal), which were intensively scrutinised by those present. A fascinating and charmingly 'different' experience which was very well received.

The theme of the main meeting the following day was 'Star Dynamics and Dynamic Stars'.

Opening the Saturday session in the School of Music's lecture theatre at the University was Dr René Oudmaijer of the School of Physics and Astronomy at Leeds. His talk on 'Stellar Birth: A Turbulent Tale' explored the highly dynamic characteristics of stellar formation and stellar youth. The causes of the original collapse of proto-stellar clouds was examined (including the likely impor-

tance of nearby supernova blasts in shocking the material of the cloud and promoting its initial collapse), and the key role of turbulence within the contracting cloud was explained. The astrophysicists at Leeds work closely with their colleagues in the School of Mathematics and the Centre for Computational Fluid Dynamics in order to produce cutting-edge models and simulations of astrophysical dynamics, many of which found their way into the day's presentations. Dr Oudmaijer's focus was on cloud turbulence, proto-stellar discs, and the production of bipolar outflow jets from newly-formed stars. These jets are themselves constrained and guided within twisted, elongated magnetic fields. The rapid pace of development in the modelling of such features, and its dependence on checking against the remarkable results flowing in from modern satellites and ground-based instrumentation, was made clear in this and all subsequent talks.

Dr Jim Wild (University of Lancaster) spoke about our own Sun in his talk 'Living with a Star', detailing how its persistent and yet variable activity interacts with our planet and indeed with our daily lives. He gave a very graphic account of the outpouring of the solar wind and its associated magnetic fields and radiation phenomena. We were reminded of the Sun's variability, most obviously seen in its (rather uneven) sunspot cycles. A series of vivid and dramatic movies of solar surface and coronal activity helped to illustrate the power of our local star. Dr Wild illustrated the Sun's ability not simply to produce beautiful aurora displays here on Earth, but also to disrupt communications, to overload critical satellites, and even to destroy power grids on the ground. It appears that the *Apollo* lunar astronauts sometimes barely escaped exposure to highly dangerous levels of radiation during the massive

but unpredictable solar flares and coronal mass ejections which often characterise our supposedly stable and well-behaved Sun.

After the lunch break, the BAA's own Dr Nick Hewitt managed to combine the theme of the meeting with his Deep Sky interests, with 'Super Stars of the Deep Sky'. The audience was engaged by the astrophysics and in-

deed the visual glamour of Wolf–Rayet stars and their associated nebulae. After an introduction covering the history of our growing understanding of these young and profligate stars (especially by the techniques of spectroscopy), Nick swiftly moved on to show wonderful illustrations of W–R-associated nebulae. The Crescent and Thor's Helmet nebulae were discussed both from an amateur's viewpoint and from the results of professional studies. A wonderful Keck Observatory animation of the Pinwheel Nebula WR104 in Sagittarius wowed the audience with its spectacular 'sprinkler hose' appearance. This binary pair of a W–R star and a massive O-type star, both shedding prodigious amounts of mass from hugely active stellar winds, made a superb illustration of the dynamic nature of Wolf–Rayet stars in general.

Jeff Moreland then gave a brief outline of how BAA members might gain access to the range of large robotic telescopes now in operation worldwide, and provided web addresses which he invited those present to access in order to discover more about the tremendous observing resources which are now available to the dedicated amateur astronomer.

Next, the author of this Report (RE) gave a highly condensed and light-hearted account of the (at least) 150 year history of the Leeds Astronomical Society from 1859, which is, so far as is known, the oldest local astronomical society in England. The Society actually had its first stirrings in the mid-1820s with a group of gentlemen – members of the Leeds Philosophical and Literary Society – who called themselves 'The Leeds Astronomical Society'. They alas disappeared rapidly from the scene, but the Leeds AS which we have today was successfully constituted in 1859, in the wake of a meeting of the British Association for the Advancement of Science held in Leeds in 1858 September. This meeting, held in the scarcely-completed Leeds Town Hall, was attended by Sir John Herschel, and it was with the assistance of Sir John and other astronomical luminaries (including George Biddell Airy, Astronomer Royal) that the Leeds AS took shape.

Despite its best intentions, the Leeds AS was clearly very much a middle class affair. However, the notables and worthies of Leeds were rather less than willing to part with their cash, so the nascent Astronomical Society was constantly starved of funds. Indeed, it had to formally re-constitute itself in 1863 in order to attempt to appeal to a much wider social group of potential members; this included the equipping of a small observatory-cum-meeting hall placed quite



Photo of the Leeds meeting audience by Melvyn Taylor.



Dr Robin Catchpole (Melvyn Taylor)

close to the commercial heart of the city. Alas, in the late 1860s the Society was forced to 'go underground' for lack of funds with which to continue formal operations. However, in 1892 it re-emerged in full vigour in the wake of the formation of the BAA, and continues active to the present day.

Ray's talk was illustrated with reference to some of the many characters and personalities who have influenced the course of the Society over the past 150 years. The precocious 14-year old William Trant who wrote to Sir John Herschel to ask for his assistance, and engaged his help in the procurement of a 3-inch Ross refractor which the Society still has in its possession; the railway engineer Washington Teasdale who was a key player both in 1859 and 1892; the prodigiously talented observer and artist Scriven Bolton; observer and author Ellison Hawks; the cycling prodigy and eccentric Anglo-Saxon enthusiast Greevz Fysshier – these were just some of the characters who made their mark on the Leeds AS.

Dr Tim O'Brien (Jodrell Bank/University of Manchester) – of 'Jodcast' fame – then addressed the topic of 'New Insights into Nova Explosions'. He explained the differences between novae and supernovae, and referred to the historical confusions which have arisen between the two. During the twentieth century the radical differences between the two groups of phenomena gradually became clear, with the development of modern astrophysical theory. Having explored the gradations of white dwarf explosions from recurrent novae (most novae are recurrent, Dr O'Brien suggested), he went on to examine the results of observations made in the radio spectrum using the MERLIN array operated by Jodrell Bank/University of Manchester, as well as other radio interferometer arrays around the globe.

These are producing synthesised images of exquisitely fine resolution, such that the expanding debris clouds from nova outbursts (e.g. RS Ophiuchi) can now be tracked and recorded as they begin to interact with their surrounding interstellar medium. Results

from radio observations can also be compared with high-resolution optical images such as those obtained by the Hubble Space Telescope. The various types of observation are now leading to highly sophisticated modelling of structures within the outburst, in particular the lobate nature of the bi-polar outflows of the expanding material. Some white dwarf systems which erupt as novae may be of very high mass, and may well be 'missing link' candidates for Type Ia SN progenitors – the RS Ophiuchi system being a case in point.

The daytime Saturday session was concluded by Dr Julian Pittard (University of Leeds). He spoke about one of the most famous – and enigmatic – star systems in the Galaxy: Eta Carinae. This vigorous and rapidly-evolving system is now being imaged (e.g. by the HST) in superb and dramatic detail, and at a wide range of wavelengths. Observations in the middle infrared are proving particularly valuable in penetrating to the heart of this extremely dusty region of the Milky Way; indeed at these wavelengths Eta Carinae is outshone in our skies only by our own Sun. It is also the hottest and strongest thermal X-Ray stellar source currently known.

Dr Pittard covered the history of observations of Eta Carinae from John Herschel in the 1830s onwards, laying emphasis on the recurrent major outbursts and expansions which typify this unstable system. He went on to discuss in detail the current binary star models of the system. The audience was treated to the very latest computer simulations of the energetic outflows of the two stars, as their highly eccentric co-orbit periodically brings them into close proximity. This produces a compression shock and then a rapid expansion of the stars' stellar winds. The speaker spent some time outlining how historical observations of this system's outbursts do indeed fit the current binary star model. The work of the University's Mathematics Department specialists in modelling turbulent hydrodynamic flows has been crucial in building confidence that the proposed models actually fit the observations (which now cover the full electromagnetic spectrum via both satellite and ground-based observations). The ultimate test of any model lies in its ability to predict in detail the behaviour of a system; thus far, the complex nature of Eta Carinae's outburst history suggests that there is still – rather pleasingly, for the researchers – some way to go until the goal of full and detailed prediction has been achieved.

Those who attended the Saturday evening meal were treated to a highly engaging after-dinner presentation by Dr Robin Catchpole (Institute of Astronomy, Cambridge). His topic was 'Are We Alone?', and addressed

the possibilities of our discovering alien civilisations which are both intelligent *and* attempting to communicate with the rest of the Galaxy. He reviewed the now-venerable Drake Equation and its predictions, pointing out that even if a civilisation had reached, say, a 'Classical Greece' stage (in itself no mean achievement) we would still never know of its existence. Overall, Dr Catchpole was not particularly sanguine about the prospects of our hearing from 'ET' – but only time would tell. As scientists, we must continue to be guided by the evidence, and not by mere speculation – however attractive this might be.

An excellent turnout for the Sunday morning session at the School of Physics and Astronomy was hosted by the Astrophysics group there. A thoroughly engaging programme had been laid on by the staff and research students. Three well-illustrated mini-talks commenced the session. Dr Melvin Hoare continued the theme of 'Observations



Dr Melvyn Hoare showed the group round the Scriven Bolton Observatory. (Ray Emery).

of the Birth of Massive Stars'; Dr Sven van Loo extended this by explaining the work of the Leeds University team in developing computer simulations of star formation processes. Professor Alan Watson then concluded with a talk on 'High-Energy Astrophysical Processes', with particular reference to his many years of ground-breaking work on cosmic rays, and as a key researcher with the Pierre Auger high-energy cosmic ray observatory in Argentina. As a proud Scot, he invited the audience to think of the size of the detector array there as covering the distance between Glasgow and Edinburgh.

Groups were then taken up onto the roof of the building by Dr Hoare to visit the Scriven Bolton Observatory, which houses a Meade 16-inch SCT. Meanwhile, several PhD students were on hand during the coffee break to discuss their own work on topics related to the Astrophysics Group's overall research programme.

This extremely enjoyable session rounded off a highly successful and well-received visit by the BAA to Leeds and to its University.

Ray Emery