

The National Schools' Observatory: Access to the Universe for All

Sally E. Cooper¹ 

¹Astrophysics Research Institute, Liverpool John Moores University,
IC2 Liverpool Science Park, 146 Brownlow Hill, Liverpool, L3 5RF, UK
email: nso@ljmu.ac.uk

Abstract. The National Schools' Observatory is an educational platform that offers free access to all schools in the UK and Ireland to the world's largest robotic telescope, the Liverpool Telescope. The website offers activities, resources for teaching and importantly Go Observing, the telescope interface. The website receives 1.5 million visitors a year and has registered users in 80 countries. The next generation of robotic telescopes offer a unique opportunity to build in education, that is open and accessible to all.

Keywords. Astrophysics – Instrumentation and Methods for Astrophysics, Astrophysics – High Energy Astrophysical Phenomena, Physics – Physics Education

1. The National Schools' Observatory

The National Schools' Observatory (NSO)† ([Newsam, A. \(2007\)](#)) offers free access to all schools in the UK and Ireland to the world's largest robotic telescope, the Liverpool Telescope (LT). The NSO is a well established astronomy platform that has over 1.5 million visits per year. It offers access to learning, activities, teacher resources and importantly Go Observing, the telescope interface. To date the NSO has received over 200,000 observing requests; providing schools the same access to the skies as professional astronomers. The NSO updated its website in 2017 and it offers general users access to all data and learning materials.

2. The Liverpool Telescope

The NSO provides opportunity for observing on the 2.0 metre Liverpool Telescope ([Steele *et al.* \(2000\)](#), [Steele, I. \(2004\)](#)). The LT is located at the Roque de los Muchachos Observatory on La Palma, 2396 metres above sea level, home to an array of telescopes. The LT is a professional telescope with a broad range of instrumentation and observing capabilities. It was built by Telescope Technologies Ltd and is run by the Astrophysics Research Institute at Liverpool John Moores University, in the UK. Approximately 10 percent of observing time on the LT is provided to the NSO. The telescope is fully robotic and autonomous so that there is no need for human intervention for normal operation. This makes it ideal for schools and users as they do not need to concern themselves with the technical side of observing. Even for professional astronomers, the telescope handles constraints on scheduling such as the weather, scientific priority and whether an object is observable. Its robotic nature and autonomous scheduling is fundamental to the simplicity of Go Observing.

† www.schoolsobservatory.org

3. Go Observing

Modern telescopes are complicated. Go Observing is the interface between the telescope and the NSO website where users can simply click to observe (4 clicks to observe a section of the Moon). It is designed to be dynamic and flexible and offers different observing programmes for teachers and their students. However, it is not possible to observe everything in the Universe! A limited number of objects can be selected but these include: stars, planets, galaxies, nebulae and much more. There are advanced options for those that want more control such as the choice of filter and exposure time. For those that want a 'live' experience of observing, see Lewis, F. (in these proceedings).

4. Activities and Access

Go Observing is the tool for observing but it is only one step in the astronomical process. LTImage is the software that is provided by the NSO to enable an enthusiastic new astronomer to explore the Cosmos. At a fundamental level it is an image processing tool but it can be used to do 'real' science; explore dynamic spectrum using scaling and false colour, measure the size and brightness of an object and create 3 colour images. Alongside these tools, the NSO platform offers a range of classroom and home based activities that lead the user to make observations and engage with the data in different ways rather than just point and see. The activities are suitable for ages 7 to 18 and for any keen adult. Access is completely free for teachers in the UK and Ireland to register. Other teachers and students and keen astronomers can register for free as a general user which provides the user with full access to the website learning materials and data archive of all observations taken to date.

5. The New Robotic Telescope

The NSOs early involvement in the design phase of the Liverpool Telescope was fundamental to its success. Liverpool John Moores University is leading the design of the New Robotic Telescope (NRT) (Copperwheat *et al.* (2015), a 4.0 metre robotic telescope in a similar location on La Palma. The NRT provides new challenges, both in its physical engineering and also in data transfer. For the NSO, this provides a chance to widen its educational activities, instead of being limited to traditional astronomy education methods, and engage students in wider STEM areas of engineering and computing. Our experiences with data in the world are more important than ever, with teaching being intermittently delivered remotely and online over the 2020/2021 school years in the UK and in many countries around the world. Data driven astronomy education is important to provide access to the universe for all, not just for future astronomers. The next generation of robotic telescopes planned for the future offer a unique opportunity to build in education from the outset that is open and accessible to all.

References

- Copperwheat, C. M. *et al.*, 2015, *Experimental Astronomy*, 39, 1, 119–165
Newsam, A., 2007. The National Schools' Observatory. *A&G*, 48(4), 4–22
Steele, I. A., Newsam, A. M., Mottram, C., and McEnerney, P., 2000. Enabling schools and public access to the Liverpool Robotic telescope. *Adv. Global Communications Technologies for Astronomy*, 4011, 133–145.
Steele, I. A., 2004, The Liverpool telescope. *Astronomische Nachrichten*, 325(6–8), 519–521.