

# ASTRONOMY DURING THE SCHOOL DAY

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The field of astronomy offers a wide range of opportunities for engaging students in physics. Optical astronomy, however, requires night-time conditions and reasonably low levels of light pollution. As a result, many courses resort to teaching *about* astronomy rather than teaching by *doing* astronomy. The author is currently investigating ways in which hands-on activities related to astronomy can be developed and included in physics and science lessons and STEM clubs during the school day.

## SOLAR ASTRONOMY

A good starting point is an investigation of the sun. Designing and building a sundial involves consideration of the meridian line, the time of year and accurate calibration. Projecting an image of the sun introduces the physics of light and optics as well as safety considerations. Measuring the changing position of sunspots from day to day can lead to a calculation of the period of rotation of the sun. As a bridge to non-optical astronomy, the concept of space weather – for example, how the sun interacts with the earth's atmosphere – can be readily understood by school students and actively pursued using readily available equipment. The author is currently collaborating with the Society for Amateur Radio Astronomers to make monitoring equipment such as SuperSID available to schools.

## RADIO ASTRONOMY

The power and relatively low cost of modern electronics can be harnessed to enable students to receive and work with radio signals from space. With guidance, students can design and build suitable directional or horn antennas using off-the-shelf materials. Coupled with software-defined radios, modular low-noise amplifiers and filters, these antennas allow the collection of real-time data for interpretation. The author has been working in this field to develop a system for detecting meteors using reflected radio pulses. The latest project aims to replicate the SARA Scope-in-a-Box system to detect and analyse hydrogen-line emissions from our own galaxy.

## ASTRONOMY ONLINE

Many professional astronomers collect data from remotely controlled optical and radio telescopes. The growth of technology in this field has resulted in a range of online telescopes becoming available for public access. The SLOOH project provides access to optical telescopes within an educational context which includes Quests, Star Parties and social media groups. The Onsala Space Observatory allows free public access to its three online radio telescopes. Data and observations from the Leon Mow Radio Observatory can be streamed from the dark-sky site outside Melbourne, owned and operated by the Astronomical Society of Victoria.

## SUMMARY

The focus of this session will be to identify and describe a range of examples of resources which can be used during the school day which are free or involve relatively modest cost. The author aims to foster exploration in the field and to encourage students and teachers to enjoy physics and perhaps to become citizen scientists and contribute to relevant research.

## REFERENCES

- Scope-in-a-Box, Society for Radio Astronomers, retrieved August 30, 2022 from <https://www.radio-astronomy.org/store/projects/scope-in-a-box>
- SuperSID, Society for Radio Astronomers, retrieved August 30, 2022 from <https://www.radio-astronomy.org/store/projects/supersid>
- SLOOH, retrieved August 30, 2022 from <https://www.slooh.com/>
- Leon Mow Radio Observatory, Astronomical Society of Victoria, retrieved August 30, 2022 from [https://asv.org.au/lmro\\_home](https://asv.org.au/lmro_home)

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