



Observing the Night Sky at the Institute of Astronomy

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On clear nights in Cambridge, the dome observatory at the back of the Institute of Astronomy opens onto a magical view that feels extraordinary. The department's 16-inch telescope waits in darkness, pointing towards a sky that is both familiar and endlessly new. As a Physics PhD student at the Kavli Institute for Cosmology and the Institute of Astronomy, I have the privilege of using this telescope for observing sessions. These nights often become memorable not only because of the beautiful objects we observe, but also because they are shared with dear friends.

Upon entering the dome, the first feature that often surprises visitors is the deep red illumination used throughout the observing space and on the software display. This is not simply an aesthetic choice. Red light has the longest wavelength and the lowest energy within the visible range, so it disturbs the eye's dark adaptation less than other colours. In practical terms, this allows the pupils to remain as dilated as possible, helping the observer to see fainter stars and subtler detail in the night sky. The red display on the software serves the same purpose, making it possible to operate the telescope without sacrificing night vision.

The dome itself is an essential part of the observing experience. Its sliding shutter opens to reveal the night sky, while the dome can rotate through a full 360 degrees so that the opening can be aligned with the region of night sky to be observed. From inside the dome, the contrast between the warm wooden interior and the dark opening above gives a strong sense of stepping into a working observatory.

The telescope is mounted on a Paramount ME II robotic mount, which gives it remarkable precision. Although the sky appears still to the naked eye, the Earth's rotation means that celestial objects are drifting steadily from east to west across the sky. To keep the Moon or any other target centred, the mount moves continuously and smoothly, counteracting that apparent motion. This precise tracking is essential for both extended viewing and detailed astrophotography.

This tracking process is controlled through TheSky Professional software, which serves both as a detailed digital planetarium and as the telescope's command system. On screen, stars, planets, constellations, nebulae, and galaxies are mapped in real time. A selected target can be chosen directly from the chart, after which the telescope slews to it automatically and begins tracking. It is a striking blend of traditional observation and modern technology, where centuries old curiosity about the night sky is supported by modern precise digital control.

When observing, we alternate between three Tele Vue eyepieces with focal lengths of 10 mm, 24 mm, and 41 mm. Each produces a different magnification and field of view, allowing the telescope to be adapted to very different kinds of targets. The 10 mm eyepiece gives a magnification of about 272 times and is especially well suited to smaller and more distant objects, where higher magnification is needed to reveal fine detail more clearly. By contrast, the 41 mm eyepiece gives about 66 times magnification and offers a much wider field, making it ideal for large objects such as the full Moon and extended clusters. This flexibility allows us to move easily from wide views of nearby Solar System objects to more concentrated views of distant celestial targets.

A perfect example of what the telescope can reveal is the detailed photograph of the full Moon that I captured during an observing session on 7 September 2025. The image shows an astonishing amount of detail across the lunar surface. Tycho crater appears near the lower part of the disc, surrounded by the bright rays cast out by the impact that formed it. Copernicus and Kepler can also be identified clearly, each leaving its own distinctive mark on the landscape. The darker plains, created by ancient volcanic flows, include Mare Tranquillitatis, Mare Crisium, and Oceanus Procellarum.

Together, the dome, telescope, mount, software, and eyepieces form a complete observing system that allows both visual observation and astrophotography to be carried out with precision. Whether used for imaging the Moon or exploring a range of celestial targets across the night sky, the observatory offers an excellent setting for experiencing astronomy in practice.