Bernard Lovell

(1913–2012)

Physicist and radar pioneer who created the famous Jodrell Bank radio telescope.

With vision, inspiration and determination, Bernard Lovell created the Jodrell Bank Observatory in Cheshire, UK, and the great radio telescope there that bears his name. Through his leadership, generations of astronomers developed the tools of radio astronomy that have revolutionized astrophysics and cosmology.

Lovell was born in Oldland Common near Bristol, UK, and educated at the local Kingswood Grammar School. He was attracted to science through a lecture by physicist Arthur Tyndall. He joined Tyndall as a research student at the University of Bristol, where his meticulous work on the resistance of thin metallic films earned him a PhD in 1936. Taking up a lectureship at the University of Manchester, UK, Lovell became interested in research on cosmic rays, joining the group of Patrick Blackett, who was developing cloud-chamber techniques for the rays' detection.

Lovell followed Blackett into government science, becoming a key figure in the development of radar in the Second World War. Lovell's group designed an airborne radar system that operated at a wavelength of 10 centimetres, with high positional accuracy. Lovell also designed large, airborne scanning antennas that required big holes to be cut in aircraft fuselages. The radars, vital for navigation and able to detect surfaced German U-boats, were installed in the aircraft of Coastal Command and Bomber Command and had a dramatic effect in the battle of the Atlantic.

While working at one of the Chain Home radar stations that guarded the UK coast, Lovell saw the background of sporadic echoes against which the aircraft signals had to be distinguished, and wondered where they came from. He discussed with Blackett whether they might be reflections from ionized clouds in the atmosphere, perhaps formed by cosmic-ray showers, an idea he pursued after the war.

Returning to Manchester in 1945, Lovell used his wartime experiences to develop the Jodrell Bank Observatory. An army radar brought to Manchester was moved some 30 kilometres out of the city to a university botany site to escape electrical interference from trams. The source of the echoes Lovell had seen while at the Chain Home radar was soon revealed: meteor trails. (No echoes have ever been detected from cosmic rays.)

Lovell wanted a larger antenna. He and a small team built a parabolic reflector 66 metres in diameter, made of wires stretched between scaffold poles. Robert Hanbury Brown used this dish to discover radio waves from the Andromeda galaxy. It was the start of astronomy at Jodrell Bank. That dish was fixed and could only stare upwards. Lovell's ambition was to build a steerable reflector at least as big. He started on plans for the iconic 76-metre-diameter dish that we know as the Lovell Telescope.

PHOTOSHOT

Building such an innovative, huge instrument required extraordinary determination and powers of persuasion. The telescope's original cost more than doubled from £259,000 in 1952 to £640,000 in 1956 (today equivalent to £13 million, or US$21 million). This was mainly because the discovery by Dutch astronomers in 1951 of a spectral line at the relatively short wavelength of 21 centimetres from hydrogen in interstellar space demanded a more precise reflecting surface. The UK government and the university met most of the increase, leaving a debt of £50,000 for which Lovell became personally responsible. He was faced with an enquiry by the government's Public Accounts Committee, and with the possibility of imprisonment.

The launch of the Sputnik satellite by the Soviet Union in 1957 transformed this embarrassing situation. Typically, Lovell rose to the occasion. The new telescope obtained echoes from the Sputnik launch vehicle, a feat unmatched anywhere else in the Western world. Suddenly everyone realized the telescope's importance. Lord Nuffield paid off the debt, half personally and half from the Nuffield Foundation, and serious astronomy could begin.

The telescope fulfilled Lovell's vision of opening a new window on the Universe. It had illustrious roles in early space exploration, in the discovery of quasars and the first gravitational lens, and in the discovery and study of pulsars, or neutron stars, which have provided the most precise tests of Einstein's general theory of relativity. After 55 years and two major refurbishments, the telescope is still working at the frontiers of knowledge.

Jodrell Bank Observatory, the academic institution set up in the telescope's shadow, is established as an international centre for astrophysics and technology. It was chosen last year to host the headquarters of the Square Kilometre Array, which will be the world's largest radio telescope when it is built in South Africa and Australia in coming decades.

Warm and generous, Lovell took particular pleasure in the millions of people who came to the observatory's visitor centre, which he initiated 41 years ago. His instinct for good science and his empathy with staff and students led him to allocate telescope time without controversy. He retained a close interest in the observatory after he retired, but as the directors who succeeded him, we can attest that he never told us what to do with his telescope.

Lovell received many honours, and served as president of the Royal Astronomical Society (1969–71) and of the British Association for the Advancement of Science (1975–76). But he was most pleased when the telescope was given his name to mark its 30th anniversary.

Outside science, Lovell was an accomplished musician, playing the organ regularly in the church of his home village of Swettenham in Cheshire. He was a keen cricketer and horticulturalist, establishing arboretums adjacent to the telescope and to his home. He was much loved and respected by his colleagues. ■

Francis Graham Smith, Rodney Davies and Andrew Lyne *are emeritus professors of physics at the University of Manchester, UK, and former directors of the Jodrell Bank Observatory (in 1981–88, 1988–97 and 1997–2006, respectively).*
e-mail: fgs@jb.man.ac.uk