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Raymond Wilson, 1928–2018

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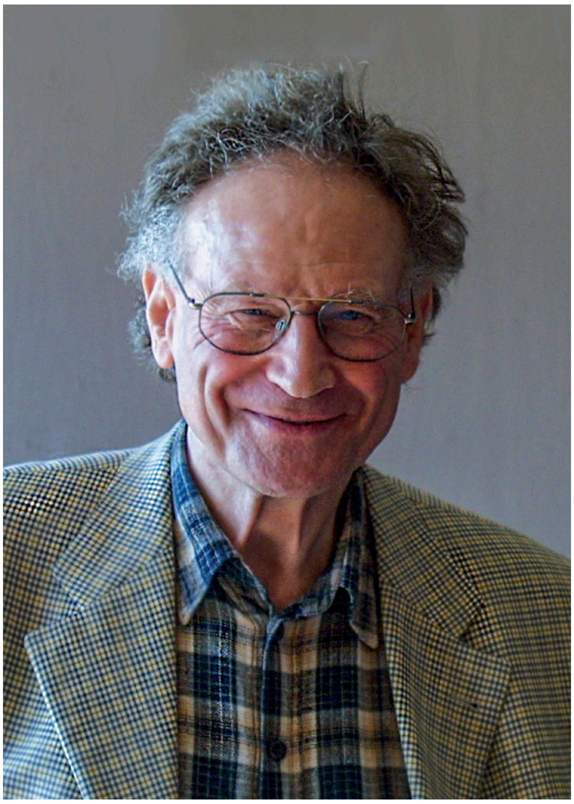

Ray Wilson, who worked at ESO for 21 years, died on 16 March 2018. He made an indelible impression on ESO, as well as on the design of modern large telescopes worldwide.

Ray was born in Sutton Coldfield in the UK, the youngest of four children. At school he excelled in Latin and history, but made much less impact in mathematics. Nevertheless, he had an early interest in astronomical optics and even built himself a telescope as a teenager. It was his mother who, influenced by a family friend, later persuaded him to study physics rather than the humanities. She thought — probably rightly — that it would offer better employment possibilities. Ray took his first degree in physics at Birmingham University and then went on to Imperial College in London as a postgraduate. It was here that he discovered his love of optics and optical design and his PhD thesis, presented in 1953, was entitled "The Production of Aspheric Surfaces".

After leaving Imperial, Ray joined the traditional British optical firm Ross and Company doing, as he said, what he liked doing best — designing optics. Unfortunately, this was not to last long. In the post-war decades the European optics industry was in flux. Many traditional commercial optics firms in England and France were going bankrupt in the face of German, and later, Japanese competition. Ross went bankrupt and Ray moved to the National Physical Laboratory (NPL) in Teddington in South West London in 1955. Earlier, the NPL had been very strong in optical design and aberration theory, but a new manager decided to concentrate on practical optics research which did not appeal to Ray. So, after three years at the NPL, he decided to look for employment in the thriving German optical industry. Through a former German colleague at Ross, Ray was offered a position in a small optics firm in Trier, called Karl Foitzik. This firm also went bankrupt within 10 months of Ray's joining and his next job was with Carl Zeiss. In 1959, there was no position free in optical design at Zeiss, and he was offered a position in the photographic laboratory, which was responsible for testing and quality control. This was partly theoretical, which suited him, and partly practical, which did not, but he was happy to be working for such a prestigious firm.

In September 1960, Ray received an offer to return to Imperial College London as an assistant lecturer to conduct theoretical research on the application of computers to optical design. He stayed there until the summer of 1963, and then returned once again to Carl Zeiss in Oberkochen, who had offered him his "dream position" in the optical design department for astronomical and analytical instruments.

In the early 60s there was a small epidemic of poliomyelitis in the region of Baden-Württemberg where Ray lived, and he contracted this disease shortly after returning to Zeiss. He was away from work for 10 months convalescing and, although he recovered, he was left with a slight disability.

After five years at Carl Zeiss, Ray was made head of department and his career seemed settled and secure for life, but clouds were forming on the horizon. In 1970, German industry was hit by a massive financial crisis. Carl Zeiss was also seriously affected by this recession and many of the staff in Ray's department were made redundant, through no fault of their own. While at Zeiss, Ray had already had contact with ESO through preliminary design contracts for the ESO 3.6-metre telescope. The unpleasant situation at Zeiss motivated him to look elsewhere and, in 1972, he was offered a position as head of the optics group in ESO's Telescope Project Division at CERN in Geneva.

Even several years before Ray moved to ESO, ideas about the active control of telescope optics, now commonly known as Active Optics, had been brewing in his mind. His collaboration with Gerhard Schwesinger, who had developed an analytical model of the aberrations introduced by support errors of primary mirrors, furthered these ideas. However, two problems remained: how to measure the support errors and how to correct them.

The ESO 3.6-metre telescope was equipped with a so-called Hartmann screen. This was a metal plate, the same diameter as the primary mirror, with an array of high precision holes bored in it. This was placed just in front of the primary mirror and a series of extra-focal photographic images were taken at different telescope positions. After scanning and analysing these images, the optical aberrations could be estimated. Not only was this a cumbersome and risky procedure, but the possibilities of correction with the 3.6-metre telescope were limited by the very heavy and stiff primary mirror. Nevertheless, Ray's position at ESO allowed him to develop the idea of Active Optics for future telescopes, and eventually to provide solutions to these problems. Even in the late 70s, ESO, along with other major observatories, was already thinking about the next generation of giant telescopes.

From 1979–1980, Ray spent a year at La Silla working with the optical group to gain experience in the operation and maintenance of large telescopes. This convinced him even more that future telescopes should have thin flexible primary mirrors with an active control system that would be able to correct optical misalignment and compensate for gravitational and thermal mirror distortions. About this time, Ray visited a former student colleague from Imperial College, Roland Shack, who was now professor at the Optical Sciences Center in Tucson, Arizona. Shack had invented a compact and efficient optical test device that was based on the classical Hartmann test, but could be mounted directly in the telescope focal plane. Ray immediately saw the importance of this device for future telescopes and set about having one built at ESO. The device became known as the Shack–Hartmann wavefront sensor. When this was later coupled to a CCD detector for image readout, ESO had a practical device to measure telescope aberrations in real time. However, to actively correct aberrations would require a telescope with a much thinner primary mirror than classical large telescopes like the ESO 3.6-metre. But to propose the construction of a very large telescope based on untested technology would have been a giant leap of faith that would hardly be accepted by the ESO Council.

Fortunately, Switzerland and Italy provided the solution. In 1982, both countries became ESO Member States and with their entry fees ESO decided to build another telescope to ease the load on the already oversubscribed 3.6-metre telescope. At the same time, this provided the Organisation with the opportunity to gain experience with innovative telescope technologies. Ray Wilson, by now head of the ESO Telescope Group, saw the opportunity to design a modern 3.5-metre alt-azimuth telescope that eliminated some of the recognised problems with the 3.6-metre.

Ray persuaded the then Director General, Lodewijk Woltjer, to build the new telescope with an actively controlled thin primary mirror. Woltjer agreed under the condition that the New Technology Telescope (NTT), as it would be known, must have a performance no worse than the 3.6-metre telescope even if the active control did not work as planned. Another innovation of the NTT was the free airflow enclosure design. This concept had been pioneered at the Multiple Mirror Telescope on Mt. Hopkins in Arizona and differed markedly from that of classical telescope domes, which had small apertures to “protect” the telescope from the outside environment. Having a relatively thin primary mirror and effective air flow through the enclosure allowed the telescope — and in particular the primary mirror — to be in thermal equilibrium with the ambient environment, instead of being isolated from it. Ray recognised the importance of this development and it became an important feature of the NTT concept.

The First Light of the NTT in March 1989 took place under excellent seeing conditions, allowing the NTT to demonstrate its performance to the full. This it certainly did, producing probably the best images ever obtained from a ground-based telescope at that time, and three times better than had ever been obtained with ESO's 3.6-metre telescope. And all of this was at a third of the cost of the 3.6-metre telescope! Almost overnight, ESO's reputation as an innovative and leading organisation for astronomical research was established. The overwhelming success of the NTT, founded to a very large extent on the insight and perseverance of Ray Wilson, changed the way future large telescopes would be designed and fully validated the decision of the ESO Council to go ahead with the construction of the Very Large Telescope (VLT).

Ray was a reluctant manager. He never strived for power or influence and, although justly proud of his achievements, was always self-deprecating. But with his abundant enthusiasm he very effectively led and inspired the dedicated group of physicists, engineers and technicians who developed Active Optics technology at ESO, implementing it on the NTT and later — in a more extreme form — on the VLT. He was happy to give credit to his colleagues and was always willing to listen and explain. He could talk as naturally to the Director General as he could to the ESO janitor and was thus greatly respected within the Organisation on a personal level as well as for his technical expertise.

During his final three years at ESO, and after he retired in 1993, Ray worked on a two-volume monograph “Reflecting Telescope Optics”. These two volumes, published in 1996 and 1999 respectively, remain classical works on the development and design of optical telescopes that represent a lasting epitaph to Ray's lifetime achievements.

In the latter part of his career, Ray was awarded numerous prizes and honours for his contributions to the advancement of telescope technology. These include the Medal of Geneva University in 1993, the Karl Schwarzschild Medal of the German Astronomical Society in 2003, the Chevalier of the French Légion d'Honneur in 2004, the Prix Lallemand of the French Academy of Sciences in 2008, the Kavli Prize of the Norwegian Academy of Science and Letters (together with Roger Angel and Jerry Nelson), as well as the Tycho Brahe Prize of the European Astronomical Society in 2010.

He leaves his wife, Anne, and two sons from his first marriage, Geoffrey and Peter.