BERNHARD SCHMIDT


Bernhard Schmidt (1879–1935) was the great optical instrument-maker who invented the Schmidt camera (as we call it today), which was to be so important in astronomy from the 1930s. He conceived, and brought into being, a whole new idea for wide-angle astronomical photography, which was completely unexpected by the optical theorists of his time, although once they learned of it, they grasped it at once and applied it not only to Schmidt’s original purpose, but also to building fast spectrographs for stellar, nebular, and galaxy spectroscopy.

Though most astronomers assume Bernhard Schmidt was German, in fact he was born in Naissar, an island in the Gulf of Finland, off Talinn, the capital of Estonia, then part of Russia. Schmidt was descended from a Finnish immigrant of the previous century, and according to Bernhard’s younger brother, “no drop of German blood had entered the family for more than two hundred years”.

Bernhard was an inquisitive boy, constantly experimenting (or playing) with lenses and chemicals. At the age of fifteen, “testing” a mixture of gunpowder, he accidentally set it off and tore two fingers off his right hand. His mother took him to Tallinn on a ferry and there a doctor amputated the entire hand and several inches of his forearm, apparently to lessen the chance of infection. In spite of this enormous handicap, Schmidt was to become the most skilful optician in Germany.

A fund provided by a shipping company enabled Bernhard to move to Tallinn, with an entry-level job as a night watchman. He soon moved up to their office, then to more technical jobs in telegraphy, photography, and electricity. He became an amateur astronomer, acquired a small visual telescope, and in 1899 he first appeared in print with brief notes and letters to Astronomische Rundschau, a German-language amateur astronomy magazine published in Austria.

Aided by another grant, Schmidt entered the Technical Institute at Mittweida, Germany, not far from Leipzig. There he learned practical mathematics, drafting, design, and working with precision tools. Equally importantly, through his astronomy contacts he obtained short-term jobs working on telescopes in small observatories in Austria and Germany. Schmidt soon became highly skilled in figuring optical surfaces in lenses and mirrors. After two-and-a-half years at the Institute, broken up by these two work experiences, he was ready to strike out on his own.

From Mittweida, he wrote to observatory directors promising to make reflecting-telescope parabolic mirrors at least as good as the best refractors (then favoured by most astronomers) of the same size, and he followed through and did so. He quickly was recognized as an outstanding astronomical optician. H. C. Vogel and Karl Schwarzschild published glowing testimonials to the optics Schmidt had made for their observatories.
However, the First World War stalled his career. Schmidt, a Russian citizen by virtue of his birth in Estonia, was classified as an enemy alien. He was interned, in spite of his ten years’ residence and work in Germany, and was locked up in an internment camp near Mittweida. Although neighbours and even the mayor of the little city argued for his release, he was confined to the camp until March 1915, and afterwards remained under police surveillance. This treatment embittered Schmidt; he remained a lone wolf, critical of authority and government, for the rest of his life. Schmidt’s optical business never recovered in wartime Germany. Financial conditions deteriorated even further after its defeat, with no money for scientific research. Schmidt, a man with a very small business and no financial backing, finally closed his shop in 1923. He thought he might start anew in Estonia, by then an independent republic, but he found conditions there even worse.

Salvation came from Richard Schorr, director of Hamburg Observatory, actually situated in Bergedorf, a small village outside the smoke and light pollution of the great city. Hamburg’s 1-metre reflector was the largest in Europe, and Schorr, who considered Schmidt the greatest optician in the world, wanted him there. Schorr also wanted to preserve him for German astronomy. Schmidt desperately needed an income and a place to work, so it was not hard for Schorr to make an arrangement under which the optician had his shop in the main building, and at times was employed by the observatory. At other times he made optics or instruments for other observatories there as an independent contractor. On his own, Schmidt, a technical gadgeteer all his life, worked on inventions, including a sailboat that could sail into the wind at any angle. He was a moody, lonely bachelor who would work intensely for days on a project he liked, then go off on a beer-drinking binge in Bergedorf. Schorr, an old-school director, tried to hold him on the straight and narrow. He dispensed fatherly advice, and even insisted on marching Schmidt straight to a bank after paying him, and watching him make a deposit. But the optician, by one stratagem or another, always succeeded in recovering some of it to finance his next drinking episode.

In the early twentieth century, astronomical photography had came to the fore, replacing the human eye for recording star positions and magnitudes. Schmidt knew of the problem caused by coma, the inherent aberration of a reflecting telescope, which degrades the images of stars relatively far from the centre of the field. It was especially serious for the Hamburg reflector, a large, ‘fast’ instrument. Walter Baade, who became the principal observer with it, frequently emphasized to Schmidt and Schorr the need for some way of eliminating coma, and the director often repeated this to the optician. In 1929 Schorr sent Baade and Schmidt to observe a solar eclipse in the Philippine Islands, and they were together for five months, with the long voyage out and back. The ebullient Baade repeated his exhortations over and over again, and Schmidt, who liked him, usually listened. Sometime on the return voyage, as Baade later stated, or soon thereafter in Hamburg, as seems more likely from the notes and drawings Barbara Dufner has found, Schmidt came up with his great idea, to put a thin, aspherical, corrector lens at the centre of curvature of a spherical mirror, which would eliminate coma.
Schorr told him to go ahead and make a test sample of his “coma-free system”, known today, largely through Baade’s efforts, as the Schmidt camera. By 1930 Schmidt had completed the “original Schmidt”, a 36-cm, f/1.75 photographic telescope of this design. It was an almost unbelievably fast system at that time, with small, round images over an equally unbelievable field of 15° or more. Schorr briefly described this breakthrough in the Hamburg-Bergedorf annual report for 1930, published in Germany in 1931, but it made no discernible impact in the United States. However, Baade moved to Mount Wilson later that year and revealed the “secret” of the Schmidt system to the astronomers there. Schmidt himself completed only one more, also for Hamburg. But in Pasadena they were being built and used for spectrograph cameras and in a search for supernovae.

Schmidt did not live much longer; as he grew older his health declined and his drinking increased. These are not uncommon tendencies among great opticians, creative geniuses who must be absolute perfectionists in shaping glass to incredible tolerances. Ultimately Schmidt was confined to a mental hospital for alcoholism. He escaped, but contracted pneumonia and died a few days later, in 1935.

This excellent biography describes everything that is known about Schmidt’s other optical accomplishments, in complete, understandable detail. The book is a Hamburg University dissertation, but is written in short, uncomplicated sentences. Schmidt left no collection of letters, but Dr Dufner found and used letters to, from, and about him in many German observatories, especially Hamburg. She also used published reminiscences of astronomers who knew him, and previous books, one by Schmidt’s nephew, another by an Estonian patriot. In the book she gives full references to all her sources. Her two advisers, an historian and an astronomer, served her well. Anyone who wishes to know anything about Schmidt and his work will certainly want to consult this book.

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INDIAN ASTRONOMICAL INSTRUMENTS


S. R. Sarma, formerly Professor of Sanskrit at the Aligarh Muslim University, has for over a decade been surveying Indian astronomical instruments preserved both in India and throughout the world. Several major repositories of Arabic and Persian manuscripts in India also have collections of historic instruments, and the present publication describes the eleven globes, astrolabes, and quadrants found in the Rampur Raza Library. (Rampur is a city about 100 miles east of Delhi.)

Sarma’s work is more than a simple catalogue; it includes a substantial historical