

Josef Petzval (1807-1891) and the early development of astrophotography

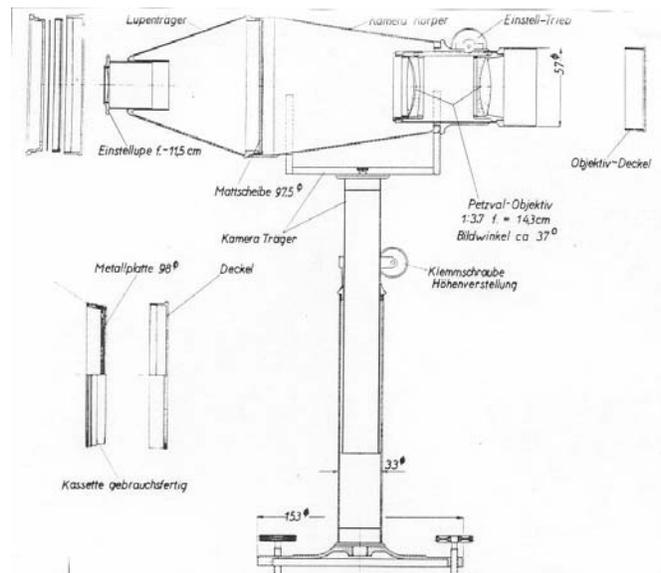
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In 1839, the invention of photography was made public. Immediately astronomical applications were attempted. First “daguerreotypes” of Moon, Sun, and bright fixed stars were made.

The first fifty years of photography are characterized by the search for suitable methods of obtaining the most stable and lifelike image. The first successful attempt to develop and fix a photographic image – on a silver-coated copper plate (daguerreotypy) – was in 1839. In 1840, Josef Petzval (1807–1891), professor of mathematics at Vienna University, developed a portrait objective, a dublet system. Compared to Daguerre’s lens, this “Petzval objective” was 22 times faster, had a larger field of view and had less aberrations. The optician Peter Wilhelm Friedrich Voigtländer (1812–1878) used it in 1841 for the first metallic camera.

Also in 1839, another process was announced which allowed prints to be made from paper negatives (calotype). From 1851 a new method gained acceptance in which a glass plate was coated with a light-sensitive layer immediately before exposure (collodion wet plate process). This reduced the required exposure time to a few seconds. The new medium quickly became established in many areas of application, including especially portrait photography. But until the invention of the gelatine dry plate process (1871), photography remained a complicated business which could only be carried out by specialists. In the 1880s this “dry plate” allowed much shorter exposure times, hence photography became widely known.



Petzval portrait objective

The portrait objectives were especially useful for astrophotography in the 19th century. The ratio between objective diameter and focal length was 1:5. The advantages of portrait objectives are their speed and their large field of view. Especially for photographing the Milky Way Max Wolf (1863–1932) and Edward Emerson Barnard (1857–1923) successfully used portrait objectives; now even celestial objects could be photographed which were not visible to the naked eye. A further advantage – in contrast to the direct measurement at the telescope – was the convenient analysis of the photographic plates in the laboratory and their availability for later comparisons.

Since about 1900, special photographic objectives have been developed for astronomical purposes. Astrographs are long focal length refractors. The ratio between objective diameter and focal length is about 1:10. Astrographs have only a small field of view, but good angular resolution e.g. for the observation of binaries. In 1887, the first meeting on astrophotography took place in Paris. The Henry Brothers proposed an international collaboration for a photographic survey of the whole sky. For this purpose they designed a standard astrograph: objective diameter 34 cm, focal length 3.4 m.

Fast glass reflectors with short focal length (the ratio between objective diameter and focal length is 1:3) can resolve individual stars in some galaxies. Their field of view, however, is much smaller than that of portrait lenses. Since 1900, reflectors have gradually established themselves. Only since 1930 it has been possible to image large fields of the sky without distortion with a Schmidt Telescope.