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Jacques Beckers (1934–2021)

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Dr. Jacques Beckers, 87, passed away on February 26, 2021, in Scottsdale, Arizona, with his children and fiancée by his side.

Jacques M. Beckers was born in 1934 in [Arnhem](#), Netherlands. He conducted his PhD work at [Utrecht University](#) with [Marcel Minnaert](#) serving as advisor and received the PhD in 1964. Jacques's PhD thesis, "A study of the fine structures in the solar chromosphere," which he completed while living in Australia, set the tone for much of his work in solar physics. After completing his PhD, Beckers obtained a position at the Sacramento Peak Observatory (SPO), where he remained from 1964 through 1979 and continued his studies of the solar chromosphere and in the

Photo by Rob Rutten

development of instrumentation. Beckers's interests were quite broad, including many aspects of solar physics and a variety of topics in astronomical instrumentation. Jacques's solar studies ranged from chromospheric dynamics to oscillation in sunspots, Alfvén waves in the corona above sunspots, detection of magnetic and velocity fields in the photosphere and chromosphere through both imaging and spectroscopy, formation of coronal lines and response functions for estimating the depth of line formation among other interests. A small sampling of his instrumental interests included very large telescopes, adaptive optics for large telescopes, speckle interferometry, achromatic retarders for filter systems, segmented mirror telescopes and their use as interferometers, laser-guide stars for adaptive optics, seeing monitors using scintillations and UV spectrographs for space missions. Jacques's early work at SPO included studies of chromospheric dynamics, in particular, in spicules; his seminal reviews of spicules served as the basis for spicule research for the next fifty years.

While at SPO, Jacques designed the Universal Birefringent Filter (UBF) and was active in improving observations at the Dunn Solar Telescope (Vacuum Tower Telescope or VTT at the time). The UBF was tunable from 420 to 700 nm with a variable bandpass

of 4 to 13 pm and became a major user instrument at the VTT. Also, at the VTT, Jacques developed a comprehensive setup for spectroscopy called HIRKHAD for studies of the solar chromosphere. HIRKHAD combined observations in Ca II H & K, the Ca II IR triplet, H α , the Na I D lines, a Zeeman-sensitive Fe I line and a non-Zeeman-sensitive Fe I velocity line. Many researchers took advantage of the HIRKHAD program at the VTT to study the solar atmosphere. Jacques Beckers and Tim Brown developed a concept for a Fourier Tachometer for measuring small (a few m/s) velocities in the solar atmosphere; construction of a prototype was a joint Sacramento Peak Observatory / High Altitude Observatory (SPO/HAO) project. The concept later played a major role in studies of solar oscillations and is at the heart of the GONG instrument. Jacques worked with and provided guidance to many of SPO's summer research students. For example, he and George (Pinky) Nelson made the first measurement of the horizontal flow in granules. Jacques modified the light feed for the Littrow Spectrograph at the Evans facility to obtain spectra integrated over the entire solar disk and used the new setup to make a spectral atlas of the solar irradiance from 380 to 700 nm. His Littrow set became a workhorse in studies of the Sun as a star.

Photo by Horst Mauter

Following his interest in optics and large telescope technology, Jacques left SPO in 1979 to become director of the [Multiple Mirror Telescope](#) at [Mount Hopkins](#) in Arizona

from 1979 to 1984. Afterwards, Beckers served as head of the National New Technology Telescope (NNTT) project and the Advanced Development Program at NOAO. In 1988 he started as research leader of the Interferometry Group at the [Very Large Telescope](#) of the [European Southern Observatory](#) in Chile. Around that time Jacques introduced the concept of Multi-Conjugate Adaptive Optics (MCAO) using an array of laser guide stars — an idea that Jacques in his 1988 paper called “futuristic” [1]. MCAO is now being implemented at many telescopes, with nighttime applications at Gemini and, for the Sun, at Big Bear Solar Observatory (BBSO) and soon the Daniel K. Inouye Solar Telescope (DKIST). MCAO will be an integral part of the next generation of Extremely Large Telescopes.

Jacques returned to the National Solar Observatory as director from 1993–1998. As director, Jacques increased the emphasis on the adaptive optics program and was strongly interested in developing a large aperture solar telescope with coronal capabilities. Jacques’s interest in pursuing a large aperture reflecting solar telescope resulted in the Coronal and Low Emissivity Astronomical Reflector (CLEAR) project. Jacques took a year off in 1996 to pursue the CLEAR design and Doug Rabin became the acting director during his absence. After stepping down as NSO director, he worked a further three years as researcher at the observatory. He designed a seeing monitor that was used to evaluate potential sites for the Daniel K. Inouye Solar Telescope (DKIST), now located on Haleakala in Maui. DKIST took advantage of some of the concepts from CLEAR. In 2001, Beckers moved to the [University of Chicago](#) where he continued his interest in optometry. Over the course of his career, Jacques published many papers on techniques for improving imaging, phasing segmented telescopes, and many other aspects of optics.

Beckers was awarded the [Arctowski Medal](#) by the [National Academy of Sciences](#) of the United States in 1975. In 1988 he became a foreign member of the [Norwegian Academy of Science and Letters](#). Beckers was elected a corresponding member of the [Royal Netherlands Academy of Arts and Sciences](#) in 1989. In 2004, [Lund University](#) awarded Beckers an [honorary degree](#). On March 24, 2005 Jacques was knighted by the Queen of The Netherlands as a Knight in the [Order of the Netherlands Lion](#). Jacques held positions in 7 countries and published 436 articles, which were cited 8,742 times. References for his awards and accolades can be found at https://en.wikipedia.org/wiki/Jacques_Beckers.

Jacques will continue to live on through his design contributions on the European Extremely Large Telescope (130 feet diameter) in the Atacama Desert on Cerro

Amazonas, Chile, that will be finished in 2025, alongside his many other scientific achievements. Jacques is survived by his fiancée, Christine; 2 children, Christina Georgiou and Michael Beckers; 7 grandchildren; 2 great grandchildren; 2 brothers and many cousins, nieces and nephews.

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Citations

1. Beckers, J. M. (1988). Increasing the Size of the Isoplanatic Patch with Multiconjugate Adaptive Optics. In *Very Large Telescopes and their Instrumentation*, Vol. 2 (Vol. 30, p. 693). [↗](#)