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# **Adriaan van Ballegooijen (1953–2021)**

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**Aad van Ballegooijen died on August 30, 2021.**

Adriaan (“Aad”) van Ballegooijen was born in the village of Wijk en Aalburg in the Netherlands on June 15, 1953. He was fascinated by astronomy and mathematics from a very early age and pursued those interests at the University of Utrecht as both an undergraduate and graduate student. There he worked with Kees Zwaan and Henk Spruit on his thesis and received a Ph.D. in 1982. He met Christine Lacki during a visit to the U.S. in 1979, and they were married in 1980. The couple's daughter Sarah was born in 1984 in Palo Alto, California, where Aad worked at Lockheed until 1986, when he joined the Center for Astrophysics. Aad retired in 2013, and he and Chris moved to a more sunny location, eventually settling near family in Dallas, Texas. After retiring, he remained active in research projects related to the solar wind.



*Photo credit: Chris Lacki.*

A significant part of Aad’s research was devoted to understanding the role of magnetic fields in the structure and stability of filaments and prominences. His work demonstrated the central role that flux rope structures have in the storage and release of energy in the solar corona. He collaborated with scientists from around the world to develop a novel modeling toolkit. At the heart of his approach was an intimate connection between observations and simulation. He was a theoretician who made himself an expert in state-of-the-art observations. He shared his software package widely within the international solar community and opened up a new approach to modeling complex active region and global scale filament magnetic fields. He worked with a number of graduate students and postdocs in the US, UK, China and South America and made a huge impact on the theory and modeling community. After he formally retired, Aad continued to collaborate, guide, and inspire solar physicists.

In the 1990's, Aad joined the U.S./Italian team building the UVCS ultraviolet spectrometer for the SOHO satellite. He led vital parts of the development effort, especially those related to software and testing, and he was known among the Italian engineers as the guy who says little but knows everything. As with all satellite projects, there were times of stress, but he approached every problem calmly, quietly and with scientific rigor. The success of the UVCS mission owes a great deal to Aad's ability to identify what needed to be done, his willingness to take on new tasks, and his ingenuity. After UVCS began to take data, he provided theoretical interpretation for observations of coronal mass ejections and streamers.

Another major contribution of Aad's research was studying the role of magnetic braiding and MHD wave dynamics in the heating and acceleration of the Sun's outer atmosphere and solar wind. In the coronal loops, Aad's simulations demonstrated that waves traveling in both directions along loops would interact to produce turbulence, which would convert the energy of the footpoint motions into heat. In the open field, Aad simulated the heating and acceleration of the solar wind flowing from the magnetically open corona. Aad's sophisticated approach to MHD modeling included the upward propagating waves that are reflected downward to get the interactions required for turbulent heating. He modeled these interactions in great detail and showed for the first time that density fluctuations could enhance the turbulent heating in the solar wind. Aad's research greatly improved upon existing models of magnetic braiding and MHD wave models and expanded the scientific understanding of the Sun's corona and outer heliosphere. In addition, Aad's masterful use of observations in initiating and constructing MHD models demonstrated a very high level of excellence in scientific research.

We have heard from numerous colleagues since Aad's passing. It is clear that Aad was a scientist that took great care in developing the careers of young scientists. He appreciated the struggles of postdocs moving to a new city and readily offered assistance and support. Personal connections were always important to Aad and through them he had a broad impact across the international solar physics community. Aad was never the loudest voice in a room, but he was listened to and his intuition about physical processes in the chromosphere, corona and solar wind was extraordinarily accurate.

There is much talk about building communities that allow a diverse population of scientists to thrive. Let us take a lesson from Aad's approach, person to person, caring, challenging and building through collaboration. Take the time to understand people's

needs in the moment and help build a foundation for their success. Through our actions each of us can honor the legacy of Dr. Aad van Ballegooijen.