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# STELLAR ASTROPHYSICS – A TRIBUTE TO HELMUT A. ABT

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## Helmut A. Abt

It is an honor to have the opportunity to write about Helmut A. Abt, a long time friend and colleague. Helmut is well known in the astronomical community for his contributions to astronomical research as well as for his dedication and service to the community.

Helmut was born in Germany in May 26, 1925. He and his family immigrated to the United States when he was 2 years old.

He obtained his Bachelors Degree in Mathematics from Northwestern University in 1946. After a long soul - searching decision he chose astronomy instead of mathematics for his graduate work. Helmut was admitted to several major astronomy departments. However, he took a chance by going to the newly established Astronomy Department at the California Institute of Technology. Thus, he became one of the first four graduate students at the Institute (three out of those four stayed in astronomy: Helmut A. Abt, Morton S. Roberts, and Allen R. Sandage.) It is no wonder Helmut has been so successful in binary stars research, as he had an early start. He worked for Olin Wilson on Zeta Aurigae, the eclipsing system involving a K supergiant and B dwarfs. It takes a week for the B star to disappear (or reappear) behind the supergiant chromosphere, and Wilson showed that the supergiant chromosphere would be totally ionized by the B stars unless the material occurred in sheets or clumps, rather than being smoothly distributed.

Helmut's thesis research was on W Virginis. He received the Caltech astronomy department's first Ph.D. in 1952. Helmut has often joked that he graduated at "the bottom of his class" - in a graduating class of one. After his graduation he spent a year at the Lick Observatory, where he showed that RV Tauri stars have discontinuous velocity curves due to a shock wave passing through their atmospheres, as in the case of W Virginis.

Then he went to the Yerkes Observatory, University of Chicago. During his six years there he was involved in a wide range of work: (1) teaching courses in the University of Chicago, (2) researching for Morgan and Meinel on HII regions, yielding the first large picture of the Gum Nebulae, (3) doing field work for the proposed national observatory that led to the establishment of the Kitt Peak National Observatory (KPNO), and (4) doing research at McDonald Observatory. The research showed that all supergiants have regular or semi - regular velocity variations with the expected pulsational periods. In the 1950s and 1960s he also did much exploring of the southwest, partly with William C. Miller, who found the first two supernovae petroglyphs that showed that the Native Americans observed the Crab Nebula explosion of 1054 A.D.

In 1959, Helmut joined the Kitt Peak National Observatory where he has remained to this day. At the Observatory, he has taken on many duties beyond his own research, such as (1) overseeing the construction of six spectrographs there and at Cerro Tololo (CTIO), (2) helping visitors get started in using KPNO equipment, and (3) supervising the acquisition of four libraries for Kitt Peak, Tucson, La Serena, and Cerro Tololo. At Kitt Peak, he utilized mostly KPNO and CTIO spectrographs to show that most Am (metallic - line) stars are members of binaries while the normal dwarfs of the same temperatures are never in binaries with periods less than 100 days. He carried out many projects on rotational velocities, spectral classification, and binary frequencies in open clusters. They showed that Ap stars take one to 100 million years to form, depending on their peculiarities.

In the 1960s and 1970s Helmut also showed that most solar - type stars have companions, and that the mass function of the secondaries is very different than that of field stars or early B dwarfs. He also worked with W. W. Morgan in producing two spectral atlases, mostly for stars earlier than the Sun. He published 23,000 individual radial velocities from the Mt. Wilson galactic structure programs; a bibliography of stellar radial velocities; and three General Indexes for the *Astrophysical Journal* (ApJ) and one for the *Astronomical Journal*.

Helmut's willingness to do large projects for the ApJ (those General Indexes) was one of the reasons why Helmut was selected to succeed Chandrasekhar in 1971 as Managing Editor of the ApJ. Chandra realized that the next need for the Journal was to reorganize it to handle large numbers of manuscripts. During the following 29 years the ApJ grew by a factor of 40 in number of papers per year, or a factor of 250 in length. This involved setting up a system of 15 Scientific Editors and a combined staff in Chicago, Tucson, and Cambridge of 40. Experiments in new technologies involved a microfiche edition, CD - ROMs for data, videos, on - line publication with instant recall of references (due to Peter Boyce), and publication without final pagination within three weeks of acceptance.

Helmut's research in the 1980s and 1990s involved how binary systems formed and evolved with age, the ages of Trapezium systems (less than 50 million years), and the discovery of transient inner disks around nearly all rapidly - rotating A - type stars.

In 1980, Helmut started a series of papers (42 to date) based on studies of publications, citations, and other statistics about astronomers. These studies led to some surprising conclusions, such as (1) small telescopes produce more papers and citations to them per dollar than large telescopes, (2) outstanding astronomers produce highly - cited papers

throughout their careers from roughly ages 30 to 80 with a peak in the middle years, (3) the productivity of American astronomers has not depended upon the availability of improved telescopes, computers, detectors, etc., but only on the numbers of astronomers, (4) currently more than 3/4 of our papers and citations to them come from ground - based optical telescopes that are smaller than 4 meters in aperture.

Helmut was President of the Astronomical Society of the Pacific during 1966 - 68 and recommended starting Mercury magazine. He was a Co - founder of the Van Biesbroeck Award for unselfish service to astronomy, arranged for its transfer to the American Astronomical Society, and received the award himself in 1997. He is a Fellow of the American Association for the Advancement Sciences, has been on the International Astronomical Union (IAU) Nominating Committee, Chair of the IAU Commission on Double & Multiple stars, on the Editorial Board of several journals, on many NASA committees, etc. Helmut has been appointed Guest Professor of Peking University of China. He is also a frequent consultant to the Chinese Astrophysical Journal. An asteroid was named after him recently - "9423 Abt".

Helmut is also very caring person. He adopted a troubled teenage boy who has, with Helmut's guidance, grown into a respectable young man.

Like many of us Helmut has many non - astronomical addictions, including (1) chamber music, as a member of a Tucson group that presents 15 concerts per year and has commissioned 21 new chamber pieces, (2) Chinese jade carvings, which he proudly shows to those who share his passion, and (3) collecting Chinese stamps.

I am extremely happy that the Scientific Organizing Committee had dedicated this Pacific Rim Conference in Stellar Astrophysics to Helmut A. Abt in recognition of his enormous contribution to the field of astronomy and his service to the astronomical community. As an added feature of good will the Local Organizing Committee decided that he should be treated like a King: he was wheeled around in a special chair throughout the duration of the conference! (I was told that he had broken his ankle in May the day before his birthday).

KAM - CHING LEUNG

## Preface

The Pacific Rim Conferences for the first decade from the mid 1980's to the mid 1990's were primarily concerned with binary stars research. The Conference expanded to all areas of Stellar Astrophysics for the last two meetings in Hong Kong; at Hong Kong University of Science and Technology in 1997 and at the Hong Kong University in 1999.

At the conclusion of the very successful Pacific Rim Conference on Stellar Astrophysics held in Hong Kong University, members of the Scientific Organizing Committee began planning for the next conference. We approached Professor Tan Lu of Nanjing University and Professor Tipei Li of the Institute of High Energy Physics about hosting a conference in China. The city of Xi'an in Shaanxi province and a city in Yunnan province, were considered to be the most likely locations. It became crucial to find the right person to serve as Chair (or Co-chairs) for the Local Organizing Committee. Initially, Professor Lu was the logical choice but he declined for personal reasons. Professor Li was invited to lead a new department of Astrophysics at Tsinghua University so he could not take on the additional load of chairing the LOC. Professor Gang Zhao of Beijing Astronomical Observatory was approached to take on the task but he also declined. This has been a busy time for Chinese astronomers.

The SOC decided to have the conference dedicated to honor Dr. Helmut A. Abt for his enormous contribution to stellar astrophysics and his service to the astronomy community.

The city of Xi'an emerged as the most attractive location for the Rim Conference. With that in mind it was agreed that someone from Xi'an should chair the LOC. Clearly it was logical to convince Professor Zhigang Li, Director of Shaanxi Observatory to shoulder the responsibility. Shortly after he took on the task he stepped down from the directorship. The new director of the Observatory Professor Zi Zhu encouraged Professor Li to continue to serve as the Chair of the Committee. For this we are grateful.

Finding a good conference hotel at a reasonable cost to the participants is always a real challenge. With Professor Zhao's excellent community connections we found the Xi'an Ju Jiang International Conference Hotel. It proved to be a retreat from Xi'an's heat and an outstanding venue.

Professors Tan Lu, Tipei Li, and Helmut A. Abt were most helpful in every stage of the planning.

The Xi'an meeting was most successful using all the usual criteria and participants were extremely impressed by the historical and cultural surroundings of the area. We would like to acknowledge the support of grants from; Chinese National Science Foundation through Professor Tipei Li and the Hong Kong University Research Council through Professor K. S. Cheng. Ms Anisia Tang was most helpful in managing the conference WEB as well as putting together the proceedings. The photographs were supplied primarily by KCL.

KAM-CHING LEUNG AND KWONG-SANG CHENG

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