

UCLA Department of Physics & Astronomy

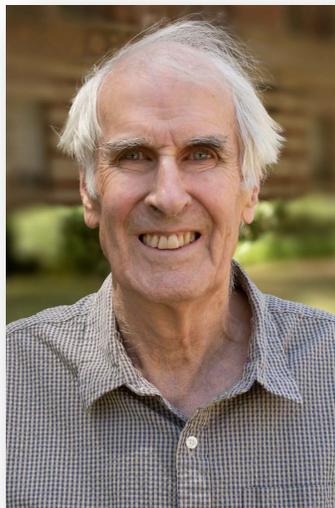
COLLOQUIUM

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PAB 1-434

The Beginnings of Helioseismology and Studies of Solar Dynamics

Roger K. Ulrich
UCLA



Helioseismology began with the 1962 report by Leighton, Noyes and Simon announcing the discovery of the 5-minute oscillations. The discovery happened before I was a professional astronomer. I was a graduate student at UC Berkeley working on convection in Louis Henyey's group studying stellar structure and evolution. As I was nearing completion of the thesis, John Bahcall visited and suggested we should compute a solar model. I computed a solar model, sent it to John and was greeted by return mail with a list of things that had to be fixed. Fellow students and I did the fixes and published the paper. Meanwhile I got an invitation from John to come to Cal Tech and work on computing solar models.

My interest in the solar 5-minute oscillations began with observations by fellow graduate student Ed Frazier which showed that the oscillatory motion was disrupted by convection cells rather than being generated. Based on that clue, I did a modal analysis of a model convective envelope which showed the oscillatory power should be restricted to frequencies that depend on the horizontal wavelength. This prediction eventually led to the development of Helioseismology which in turn led to Asteroseismology. I will review the high points of the prediction verification and subsequent development of the space-based instruments now serving as the basis for helioseismology.

After 1985 I accepted the responsibility for managing the program of observations at the 150-foot solar tower telescope on Mt. Wilson. Consequently, after that date I stopped doing helioseismology and began studying solar surface dynamics and magnetic fields. These studies continue and I have recently found a new variation of velocities near the rotation poles which have timing closely related to the solar cycle.