9 JANUARY 1986
THURSDAY MORNING
Session 45: Invited Talks
8:30-9:30 (Grand Ballroom)

45.01
The Solar-Stellar Connection: I. - Solar Studies
S. Sofia (Yale U.)

Because of its nearness to us, uniquely sensitive observations of the Sun are possible which cannot be performed on other stars. As a consequence, the "standard solar model" has proven to be inconsistent with many of these observations, and more sophisticated solar models must be constructed. The question is, which specific physical processes must be added to the current standard models in order to make them compatible with the observations. In this talk, I shall address the solar properties that cannot be fitted with the current solar models, and introduce the mounting evidence suggesting that the next step requires the inclusion of rotation and magnetic fields. Finally, I shall review some current efforts to accomplish this model upgrading, and discuss the specific areas where improvements are expected.

45.02
The Solar-Stellar Connection: II. - Stellar Studies
F. Demarque (Yale U.)

The Sun has traditionally served as testing ground for theoretical ideas about the physics of stellar interiors, and conversely stellar studies have helped in refining our solar models. This review will focus on the new opportunities where this interaction is currently taking place in stellar evolution, in the theory of stellar convection and in the evolution of the rotating Sun. The problem of the structure and depth of stellar convection zones, of the effects of internal rotation on chemical mixing and on the determination of the ages of old star clusters will be discussed.

Session 46: Instrumentation
9:30-5:00 (Exhibit Hall)
Display Session

46.01
Stellar Motions in the Solar Neighborhood
A. R. Upgren (Van Vleck Obs.)

The astrometric program of the Van Vleck Observatory has obtained parallaxes and proper motions of several hundred nearby dwarfs. Most of the stars were taken from the lists of dwarf K and M stars found at the McCormick Observatory by Vysotsky which are representative of the solar neighborhood because they do not contain a bias toward high proper motion. The parallax stars were chosen from those among the Vysotsky stars with published radial velocities and photometry. Stars with these data are mostly limited to magnitudes brighter than \( V = 10 \), whereas the entire Vysotsky lists are complete to about one magnitude fainter. The distributions of the \( V \) magnitudes and proper motions of the Van Vleck stars are not representative of the entire group of dwarfs but they are representative of the Vysotsky stars with proper motions and photometry as well as the nearly identical group of stars brighter than \( 10 \). The brighter magnitude limit imposes a different distribution in proper motion from that of the entire list because it favors a closer distance limit and emphasizes the intrinsically brighter portion of the main sequence defined by the entire group. The distribution of the transverse velocities is not altered by the brighter magnitude limit. The space motions of the Van Vleck stars are representative of the kinematics of the solar neighborhood.

46.02
AN ASTROMETRIC PROGRAM TO DEFINE COORDINATE FRAMES
FOR GENERAL RELATIVITY EXPERIMENTS
A. Buffington (Center for Astrophysics and Space Science, University of California, San Diego)

General relativity frame-dragging experiments compare a coordinate frame as defined by a gyroscope or pendulum to a frame defined by the distant stars. The local frame suffers a precession because of the nearby presence of the rotating earth. Until recently it was believed that the gyroscope had to be in space to be free of spurious torques. However, the advent of laser gyroscopes opens the possibility of conducting the experiment on the ground. The gyroscope- or pendulum-defined direction must be compared with an inertial reference frame. Such a reference frame could be provided by an astrometric telescope viewing a sequence of faint, distant stars. The times of passage of these stars past the meridian plane define a coordinate frame rooted in our galaxy. The telescope can be kept in a fixed relationship to the gyro or pendulum, either by direct mechanical connection, or with optical metrology. Thus the experiment is rendered insensitive to various geophysical perturbations that might detract from indirect methods of determining the inertial frame at the gyro or pendulum. The experiment requires an astrometric accuracy of several milliarcseconds to be maintained for days to months. The atmospheric seeing spectrum might permit reaching this accuracy in about a night's observing, using a Ronchi telescope.


46.03
CCD Astrometry of Uranian Moons

In support of the Voyager Uranus encounter, astrometric observations of Uranian satellites have been made with the USNO 61-inch reflector and the Caltech Weathervane-Gunn CCD camera. Techniques of observation, reduction, and analysis are described. Observational errors are discussed.

46.04
Signal to Noise Characteristics of Data from Pulse-Counting Imaging Detectors
D.G. Ebbets (Ball Aerospace)

Pulse-counting detectors with both linear and two dimensional arrays of pixels have become increasingly common in both spectroscopic and imaging instruments. One of their attractive features is that the photometric quality of the data is usually determined by statistical noise in the