01.02.06  Helium Abundances and Cepheid Pulsation.
E. G. SCHMIDT, U. Neb. - The presence of nonvariable
stars within the Cepheid instability strip might be
explained by low helium abundances (Cox, King, and
received some support from the gravities of these
189, 293). However, direct evidence on this point
is still lacking. To further study this question
spectra have been obtained of 8 stars in the clus-
ters M 19, which contains a nonvariable within
the instability strip, and M 25 which contains a
Cepheid. The helium abundances implied by this
data will be discussed.

01.02.06  Convection in Pulsating Stars. N. M.
BAKER, Columbia U., D. D. Gough, U. of Cambridge, and
R. F. STELLINGWERF, Columbia U. - Models of pulsating
stars having extensive surface convection zones have
been constructed, using linear nonadiabatic stability
analysis. Convection is described by a time-
dependent generalization of mixing-length theory
based on a local scale height. Nonadiabatic effects
due to the modulation of the convective energy flux,
as well as those due to work by the turbulent
Reynolds stresses, are included. Reynolds stresses
have also been incorporated in a consistent way in
the equilibrium models whose stability is being
tested. Numerical models are discussed in some
detail and their properties compared with those of
similar models in which the convection-pulsation
interaction has been neglected. This work was

01.04.06  Stellar Angular Diameters and Visual
Surface Brightness: A New Calibration with Color
Index and an Application to Variable Star
Distances. T.G. Barns III, B.S. Evans, & S.B.
Parsons, U. of Calif., Austin. - Numerous stellar an-
gular diameters found by lunar occultation per-
mit the relationship between visual surface
brightness and color index to be defined for
stars as late as M8. By combining these angular
diameters with others from the literature, the
relationship is found to be well defined for the
spectral type range 05-M8, without dependence on
luminosity class, provided the calibration uses
(V-I) rather than (B-V). Application of the
relationship to estimation of stellar angular
diameters, effective temperatures, and bolometric
corrections is discussed. A new and fully inde-
pendent method for determining the distance
scales of variable stars is demonstrated to
follow from this relationship: although at the
present time its execution strains the precision
both of the available photometric data and the
values of the coefficients in the empirical
surface brightness-color index relation.

01.05.06  The Origin and Evolution of RR Lyrae Stars
of High Metal Abundance. R. E. Taam, Robert F. Kraft, &
Nicholas Suntzeff, Lick Observatory, Brd. of Studies in
Astron. and Astrophysics, Univ. of Calif., Santa Cruz. -
Studies of the mean space motion and metal abundance
[Fe/H] of the metal-rich RR lyrae, i.e., those with
Preston (1959) index Δv ≤ 2, suggest that they descend
from red giants of the old disk population (Eggen 1973).
The probability that an old disk giant will later become
an RR Lyrae star is only 1/3000 of that of its halo popu-
lation counterpart. Metal-rich RR Lyrae of the field
show a strong preference for slow or non-detectable
period changes. We thus think it unlikely that the
relatively parnous production of metal-rich RR
Lyraes, per old disk giant progenitor, can be attri-
buted to unusually rapid evolution through the
instability strip.

Model ZAHB stars with solar composition (X = 0.70,
Y = 0.28, Z = 0.02) and helium core mass $M_\odot = 0.45 M_\odot$
were constructed for a mass-range 0.49 $M_\odot$ to 0.60 $M_\odot$,
and were evolved through the stage of core helium
burning. Initial evolution of all models proceeded
rapidly blueward along the ZAHB, the slowest part of all
tracks being located at the "blue hook", beyond which
the relative inactivity of the hydrogen shell source
leads to contraction of the core and expansion of the
envelope. Evolutionary time-scales near the "hooks"