Abstracts of Papers Presented

(Numerals preceding abstract titles indicate session and sequence of presentation.)

10 JANUARY 1983
MONDAY MORNING
Session 1: Stellar Chromospheres
0900–1200 (Imperial Ballroom)

Invited Talk

01.01 Chromospheres and Coronae of Cool Stars.
A. K. DUPREE and R. ROGNER. Center for Astrophysics,
Ultraviolet (UV) and X-ray ("Einstein") observations,
combined with ground-based optical spectra and photometry and
radio (VLA) observations reveal the conditions and
character of stellar activity, and of the structures
of the outer atmospheres of cool stars. Analogs with
results from solar physics are useful, but the great
diversity of stars permits a wide range of physical
conditions - gravity, effective temperatures, magnetic
field, binary membership, age, and rotation - to be
explored as fundamental determinants of stellar activity.
A review of the observational definition of chromosphere
and corona of cool stars based on these recent results
will preface discussion of current theoretical ideas
concerning stellar activity and the fundamental
connection to magnetic fields in cool star atmospheres.

01.02 Applicability of Solar Coronal Models to
Stars. R. HAMMER, JILA, Univ. of Colo. & NBS. -
Theoretical models of coronal loops of a size larger than
the coronal pressure scale height as well as models of
magnetically open coronal regions depend on the stellar
mass and radius. Virtually all existing detailed corona-
models, however, refer only to the Sun. Neverthe-
less, many of these solar models can be applied to other
stars by means of a variable transformation, provided
that all of the boundary conditions are invariant to a
change of the units of the involved quantities. This
applies, for example, to the loop models of Serio et al.
(1981, Ap. J. 243, 288) and to the models for open coro-
variable transformation exists only if both the thermal conductivity \( \kappa \) and the coefficient \( \Lambda \) of the optically
thin radiative losses can be approximated by power laws
which are coupled together, \( \kappa \propto T^{-1} \). (This coupling is
not required when no flows are involved, such as in
standard static loop models.) For collision dominated
thermal conduction, \( \kappa \propto T^{5/2} \), this implies \( \Lambda \propto T^{-1/2} \),
which happens to be an excellent fit to \( \Lambda \) (McWhirter
et al. 1975, Astron. Ap. 40, 63). As long as these re-
quirements are met, solar coronal models can be applied to
any other star by multiplying all length parameters
by \( R \), velocities by \( \sqrt{M/R} \), temperatures by \( M^{-1} \),
pressures by \( M^{-1/2} \), and energy fluxes by \( M^{-1/2} \),
where \( M \) and \( R \) are the stellar mass and radius in solar
units.

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NGS-003-057 to the University of Colorado.

01.03 Implications of Solar Flare Observations on
Stellar X-Ray Flares. S. K. ANTIOCHOS, Stanford,
B. M. HAISCH, Lockheed, R. A. STEIN, JPL.

From detailed observations of solar flares, it appears
that at the time of soft X-ray maximum, the measured
temperature decay time, the inferred radiation cooling
time scale, and the inferred conduction cooling time
scale are all of roughly equal magnitude. We discuss
the observational and theoretical support for this result
and determine its implications for stellar flares. By
using this result in conjunction with Einstein observa-
tions, it is possible to test the hypothesis that a
stellar x-ray burst is due to a solar-like flare, and to
derive physical parameters such as density and size
scale for the flaring region. We illustrate such an
analysis with two well-observed Einstein flares, one in
the Hyades and one in Prox. Cen.

01.04 What Are Solar Irradiance Observations Of Global
Oscillations Telling Us? M. F. MOODARD, M. S. HUDSON, UCSD.
The power spectrum of total solar irradiance
variations from the Solar Maximum Mission clearly shows
the dominant five-minute acoustic mode oscillations of
low degree. Modal rms amplitudes up to four
parts-per-million of the mean solar flux are observed. The
coherence lifetimes of the modes are, in some cases, as
long as three days, at apparent odds with some recent
theoretical findings. The ratio of the modal irradiance
amplitudes to previously measured velocity amplitudes is
in rough agreement with theory. Substantial long-term
changes in the modal frequencies have not been observed.
The 1-1 and 2 multiplets are not resolved into the
distinct frequency components observed by the group at
the University of Birmingham, probably because our data is
much noisier than theirs. However the composite line
profile of the 1-1 multiplets is significantly broader
than that of the singlets, consistent with the claim of
anomalous "rotational" splitting.