Session 26: Cool Stars
Display Session
Grand Ballrooms I & II

26.01
GHRS Spectroscopy of Cool Stars. I.
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A. Brown and J. Linksy(JILA)

The Goddard High Resolution Spectrograph (GHRS) on HST is
ideally suited to obtain large dynamic range, high signal-to-noise
spectra of chromospheric emission from late-type stars. The GHRS
Investigation Definition Team has begun to acquire such spectra as
part of its Science Verification and early Guaranteed Time Observing
Programs and we present in this and companion papers some
highlights of these data and their implications. In this paper we
include exploratory low-resolution observations of the far-UV spec-
trum of the prototypical M-supergiant ξ Ori, along with echelle
high-resolution profiles of the Mg II emission lines in both α Ori
and the K-giant δ Dra. Observations of the O I (UV 2) and S I
(UV 9) emission lines near 1302 Å in δ Dra in two medium and
one high resolution modes are also displayed and compared. For α
Ori, we identify some of the myriad weak emission features seen in
the far-UV region and present the results of a search for evidence of
emission from a "hot" transition region plasma. The influence of
circumstellar and interstellar absorption on Mg II profiles in both
stars is examined. The profiles of the O I and S I emission lines in
δ Dra, as seen with three different GHRS gratings are compared and
flow velocities of the two plasmas are measured. Our ability to
separate the stellar from geocoronal O I emission is evaluated.

26.02
GhRS Spectroscopy of Cool Stars. II.
A. Brown and J. Linksy (JILA/Univ. of Colo. & NIST), K. Carpen-
ter (NASA/GSFC), R. Robinson (CSC), D. Ebbets (BASG)

We present ultraviolet emission line spectra of the "non-coronal" K5
giant δ Dra recently obtained with the Goddard High Resolution
Spectrograph (GHRS) on HST by the GHRS Investigation Defini-
tion Team during Science Verification observations. We include ex-
ploratory low-resolution observations of the complete far-UV spec-
trum from 1150 to 1800 Å, and also intermediate- and high-resolution
(echelle) spectra of the regions containing the Mg II (UV1), O I
(UV2) and C IV (UV1) resonance multiplets. We identify many of
the weak emission lines, mostly from neutral and singly-ionized
species, seen in these spectra and present the results of a search for
evidence of emission from plasma at hotter "transition region" tem-
peratures.

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tional Institute for Standards and Technology.

26.03
GHRS Far-ultraviolet Spectra of the Coronal Giant Capella Binary
J. L. Linksy, A. Brown (JILA/Univ. of Colo. & NIST), K. Carpenter
(NASA/GSFC), R. Robinson (CSC)

We report on the first GHRS observations of coronal giants – the
G6 III and F9 III components in the 104 day period Capella system.
We observed Capella just after the phase 0.75 quadrature, when the
radial velocity separation of the components was about 50 km/s.
The low dispersion spectrum (150 km/s resolution) covering the spectral
range 1160 to 1717 Å shows a bright emission line spectrum with
numerous lines from neutral species through N V. These line fluxes
and the density-sensitive line ratios within the O III, O IV, and N III
multiplets and for C III/Si III, C III/Si IV, and O IV/Si IV are the
basis of an emission measure analysis of the average transition region
of the system. Moderate dispersion spectra (15 km/s resolution) of
the O I 1302, 1304, 1306 Å; He II 1640 Å; C III 1909 Å; N III 1746-54 Å;
O III 1660, 1668 Å; Si III 1892 Å; C IV 1548, 1550 Å; O IV 1399-1407 Å;
and Si IV 1396, 1402 Å lines provide an interesting pattern of flow
velocity and line width information as a function of line formation
atmosphere temperature and optical depth.

This work is supported by NASA Grant S-56500-D to the Na-
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26.04
Absorption Line Profiles in a Companion Spectrum of a Mass Losing Cool Supergiant
L. L. Rodrigues and E. Böhme-Vitense (U. Wash.)

Cool star winds can best be observed in absorption lines seen in
the spectrum of a hot companion, due to the wind passing in front
of the blue star. We calculate absorption line profiles that will be seen in the ultravi-
oloet part of the blue companion spectrum. Line profiles are derived for
tree different radial dependences of the cool star wind. The
three types of velocity laws are: a monotonically increasing law,
a monotonically decreasing law (exponential decline), and a basically
Solar type wind which accelerates, reaches a peak and decelerates
to a constant terminal velocity. The corresponding absorption lines
arising in the spectrum of the companion are calculated for differ-
ent parameters of the velocity law and different orbital phases of
the binary system.

We apply our calculations to S Musae binary system which con-
ists of a Cepheid and a BSV companion. Our objective is to esti-
mate the mass loss from the Cepheid (if any) using the absorption
lines seen in the spectrum of the blue companion.

The analysis of the spectra of S Mus system is complicated by a
number of factors: contamination from interstellar lines and possi-
ble wind from the companion; the gravity field of the companion;
relatively low signal-to-noise ratio of the spectra and non-uniform
(turbulent) nature of the wind.

The main conclusion of this study is that whatever the exact form of
the velocity law and whether or not star B has a wind of its own,
the mass loss rate from the Cepheid is very small, < 7 x 10^{-19}M_{O}yr^{-1}.
This result does not support the Bowen and Willson (1996) finding that
stellar pulsations drive mass loss.

26.05
CO versus Optical Radial Velocities of Carbon Stars
C. Barnbaum (UCLA)

We present optical radial velocities of 34 optically bright carbon
stars in the Solar neighborhood. These velocities were monitored
over the last 4 years and are compared with CO velocities taken
from the literature. CO measurements can, in principle, provide a
good measure of the center-of-mass motion, and although there are
differences in some reported CO velocities which are outside the
quoted errors, most are consistent to within 1 km/s. We find no
correlation between the discrepant CO measurements with either
variability class nor offset from optical velocities and conclude that
disagreements in CO velocities are a result of underestimated errors.