Gi 97 (see, e.g., Soderblom ApJS 53,1) and Gi 755 are single MS stars. Gi 559.1 is a very rapidly rotating, chromospherically extremely active young star probably just settling on the main sequence (Soderblom & Clemens AJ 53, 920; Elias & Dorren AJ 100, 815). A widely separated companion has been suspected (Duquennoy & Mayor A&A 248, 485), but we reason that the radio emission comes from the Gi star. The surprise detection is HR 9107, a metal-deficient, high space velocity, old-disk population star just leaving the MS (see Deliyannis et al. ApJS 73, 21).

Brightness temperature estimates based on an optically thin plasma likely suggest nonthermal emission, probably gyrosynchrotron as well as other active stars. These detections extend the dichotomy between active and inactive stars into the range of solar-type stars. We are currently proposing detailed investigations of these stars. This research is supported by the Swiss National Science Foundation, NASA, EU, and NIST; the NRAO VLA is supported by Associated Universities, Inc. and the US NSF.

46.08

Theoretical Models of a Flare on AU Mic seen by EUVE Deep Survey Detectors

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The M-dwarf star AU Mic was observed by the EUVE Deep Survey Instrument from 1992 July 14-18. A large flare with a total radiated energy in the EUV of approximately 3 x 10^{36} erg was detected in the Lexan/Boron (65-190 Å) band at 12:38 UT on 15 July 1992. These observations are described further in a recent paper (Cully, Siegmund, Vedder and Valleria, Ap. J. Lett., 1993, in press). We present an analysis of this data in terms of theoretical models of flaring loops.

46.09

Magnetic Fields on ε Eridani from High Quality FTS Spectra near 1.6 μm

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We present outstanding infrared spectra of the active star ε Eridani (K2V) and two inactive reference stars, 40 Eridani (K4V) and σ Draconis (K0V). The spectra are the result of 9 hours of observations per star with the IR FTS at the 4-m Mayall Telescope at Kitt Peak National Observatory. The noise is 0.5-1.0% with an unapodized spectral resolution of 120,000. The wavelength range covered is 1.54-1.59 μm (6290-6490 cm^{-1}) in air, which includes two dense moderate strength lines, notably the Lande-g = 3 line at 1.5649 μm. This line is a superior magnetic diagnostic because of its high Lande-g factor, long wavelength, and large depth of formation. The Zeeman sensitivity of this line is at least a factor of 2-3 times greater than any optical line.

We employ a polarized radiative transfer code to simultaneously model the profiles of clean neutral iron lines in our infrared spectra and high quality optical spectra. The inactive stars are used to determine and check oscillator strengths and to assess the accuracy of our models. We then model ε Eridani both with and without a magnetic field. The observed wings of the magnetically sensitive 1.5649 μm line are clearly deeper than predicted by the B = 0 model. No such discrepancy is observed in the insensitive lines or in inactive stars. We then fit the ε Eridani profiles with various magnetic models. A model with depth independent magnetic fields yields a (preliminary) field strength of 1.9 kG covering 12% of the stellar surface. We also consider the observable effects of magnetic fields that vary with depth or across the stellar surface.

46.10

Long-term Stellar Variations Determined by UV Emission Lines


Using the IUE archive, main sequence stars are selected which have spectral observations throughout the sixteen year history of the satellite. Emission line fluxes are measured to determine if long-term stellar variation is evident. Our results are then compared to those derived by O. Wilson and A. Vaughan.

46.11

A Remarkable FUV Flare on the Pleiades G Dwarf HZ 314

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As part of a program to study the far-ultraviolet emissions of solar-type stars in young galactic clusters, we observed the rapidly-rotating Pleiades G dwarf HZ 314 with the Faint Object Spectrograph of the Hubble Space Telescope. The FUV emissions of HZ 314 were expected to be strongly enhanced, owing to the well-established link between stellar youth, fast rotation, and exaggerated magnetic activity. Indeed, HZ 314 already was known to be an intense coronal X-ray source from ROSAT pointings.

The HST/FOS program was conducted on 3 September 1992. An 88-minute exposure of the 1130-1660 Å interval at 2 Å resolution was obtained with grating G130H (Blue Digicon). The spectrum was recorded in 30-minute segments, each divided into 7 independent readouts, during three consecutive HST orbits. Over the first two orbits, HZ 314 showed a more-or-less steady emission in the high-excitation C IV λ1549 doublet, which is clearly visible in each 4-minute readout (remarkable for an 11th-magnitude star). At the beginning of the third orbit, however, the C IV emission had brightened by a factor of three from the final readout of the previous orbit. Strongly enhanced C II and Si IV also are visible. Over the subsequent 25 minutes, the lines faded back to their original level. The fast decay of the brightening suggests that the source region was compact. The surface radiance of the event must have greatly exceeded that of the 'quietest' emission of the star, which in the globally-average C IV surface flux already is comparable in its own right to a moderate solar flare. The transient C IV brightening on HZ 314 represents one of the most remarkable episodes of variability ever observed on a G dwarf, and emphasizes the extraordinary level of hydromagnetic Dynamo activity that can accompany the early evolution of solar-mass stars.

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46.12

A Search for CO Absorption Bands in IUE Spectra of Cool Stars

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Observations of the red giant supergiant (M2.1) ι Ori with the Goddard High Resolution Spectrograph (GHR S) onboard the Hubble Space Telescope (HST) have provided an unambiguous detection of a far-UV continuum on which are superposed strong molecular absorption bands (Carpenter 1991, ASP Conf. Ser. 26, p. 17). The continuum is formed in the stellar chromosphere. The absorption bands, which appear in the 1300 - 1600 Å spectral region, have been identified with the (n,0) bands (n=0...8) of the 4th-positive A-X system of CO and are likely formed in the circumstellar shell. Comparison of these GHR S data with archival IUE spectra indicates that both the continuum and the CO absorption features can be seen with IUE, especially if multiple IUE spectra, reduced with the post-1981 IUESIPS extraction procedure (i.e., with an oversampling slit), are carefully co-added to increase the signal-to-noise over that obtainable with a single spectrum. We have therefore begun a program, utilizing both new and archival IUE spectra, to survey other cool, low-gravity stars for the presence of these two new chromospheric and circumstellar shell diagnostics. We hope to identify promising targets for examination with HST spectrographs at the highest resolution and signal-to-noise needed for quantitative analysis.

The initial results of this IUE survey are presented here.