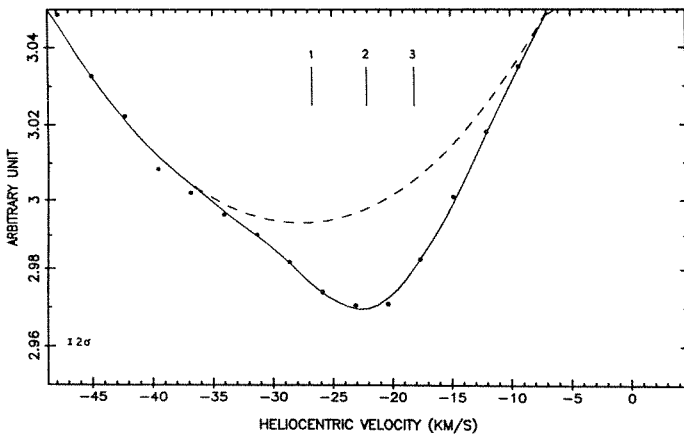


ALPHA AQUILAE Ca II - K



LEGENDE DE LA FIGURE:

Meilleur profil de la raie interstellaire de Ca II-K observée vers Aquilae (Altair). L'absorption interstellaire apparaît au fond de la raie stellaire élargie par rotation. La largeur équivalente totale interstellaire est environ 1.7 m angstrom. Trois composantes sont détectées sur cette ligne de visée de 5 pc (Ferlet, Lallement et Vidal-Madjar, 1986, *Astron. Astrophys.*, sous presse).

aussi, des raffinements théoriques ont été produits dans les modèles détaillés du ISM. Par conséquent, il est devenu vital de s'attacher à la compréhension observationnelle de la structure du ISM, aux abords du Soleil et sur des échelles de longueurs petites.

A l'heure actuelle, la seule façon d'atteindre ce but réside dans l'observation à partir du sol, à haute résolution spectrale et rapport signal sur bruit élevé. Ferlet et Vidal-Madjar (IAP, Paris) ont commencé un tel échantillonnage des raies d'absorption interstellaires de Ca II et Na I vers beaucoup d'étoiles proches en utilisant le foyer Coudé avec le Réticon. Les premiers spectres de Ca II ont été interprétés avec une méthode de comparaison à des profils théoriques, et toutes les composantes mesurées ont servi de base à une analyse synthétique cinématique. Un exemple en est donné sur la figure dans le cas de la ligne de visée vers Altair, à 5 pc.

Quatre mouvements cohérents de matière sont détectés, et leur vecteur vitesse respectif calculé. Trois de ces "nuages" approchent le Soleil à moins de 5 pc, à moins de 20 pc pour le quatrième. La situation particulière du Soleil dans une région (relativement) dense est confirmée; la structure complexe et maintenant à condensation multiple de cette région de 5 à 20 pc est mise à jour. En comparaison, le volume allant de 20 à 100-150 pc semble être moins peuplé (Lallement, Vidal-Madjar et Ferlet, 1986, soumis à *Astron. Astrophys.*)

A SPECKLE INTERFEROMETRY SURVEY TO DETERMINE THE FRACTION OF CLOSE BINARIES AMONGST HUBBLE SPACE TELESCOPE GUIDE STARS

Shara (Space Telescope Science Institute), McAlister and Hutter (Georgia State) and Franz (Lowell) carried out a survey of a sample of 673 stars from the Yale Bright Star Catalog (BSC) using speckle interferometry to establish the binary star frequency within the sample. This effort was motivated by the need for a more observationally-determined basis for predicting the frequency of failure of the Hubble Space Telescope (HST) fine guidance sensors to achieve guide star lock due to duplicity.

The BSC stars are bright enough to yield very high signal-to-noise data, and close enough so that the CFHT diffraction limit is quite well matched to the HST fine guidance sensors' sensitivity range to close binary stars.

The chief astronomical result of this survey of 427 dwarfs and 246 evolved stars is the detection of 52 newly discovered binaries and measurements of 61 previously known systems. The frequency of close visual binaries in the separation range 0".04 to 0".25 is nearly three and one-half times that previously known.

The main functional result of this run is the determination that 20% of HST guide stars will be binaries which will prevent fine guidance sensor lock...twice the previous estimates. NASA, Lockheed and ST ScI are cooperating on the definition and design of necessary HST flight software changes to prevent substantial amounts of lost HST observing time due to binary guidestars.

Shara (ST ScI) wants to take this opportunity to publicly thank the CFHT director for his extremely strong support of HST. The planned improvements could not have been justified without the results of this run, which was partially composed of director's discretionary time.

A "side" benefit of this run was the continuous semi-quantitative monitoring of the seeing by inspection of the speckle frames. Seeing conditions were in general excellent with FWHM seeing disks estimated to be typically less than 0".7, occasionally less than 0".5, and only 2".0 under the worst seeing conditions encountered during part of the night of 8 July 1985 UT, when occasional cirrus clouds appeared. Of particular interest is the atmospheric redistribution or correlation time, found to be comparable to that these investigators have

experienced on many nights over the years on Kitt Peak. There was certainly no indication of the very "fast seeing" that is occasionally mentioned from Mauna Kea. Although four nights are certainly insufficient for site comparison, it can unequivocally be stated that the seeing conditions encountered at the CFHT telescope on these four nights were the best these investigators have ever seen anywhere in nearly ten years of speckle observing. They have over 1,000,000 speckle images from their run to substantiate this claim!

PROBING THE INSIDES OF STARS

An unusual glimpse into the insides of stars is provided by measuring the amount of the element lithium that is present on the surface of stars.

Using both the CFHT 3.6-m and IFA 2.2-m telescopes, Dr. Ann M. Boesgaard and University of Hawaii graduate student Michael J. Tripicco have found some very surprising results concerning the lithium content of the stars in the young Hyades star cluster.

Astronomers can make direct observations of the surfaces and upper atmospheres of stars, but knowledge of the internal regions is primarily based on models made by theoreticians using huge modern computers. Observations of the lithium content provide virtually the only direct check on the models of stellar interiors.

Lithium is a unique indicator of a star's internal structure because it is readily destroyed by thermonuclear fusion reactions which occur deep inside a star. Boesgaard and Tripicco have found a dramatic and regular variation in the lithium content which depends on a star's mass. Hyades cluster stars that are 10% more massive than the sun have normal lithium as do stars that are 40% more massive. But in between, stars that have 20-30% more matter than the sun show an astonishing deficiency in lithium: down to 1% of the normal amount.

Stars which have a normal surface concentration of lithium have outer envelopes which do not extend very deeply into the interior. Therefore, lithium is not circulated down to the layers where it would be destroyed by nuclear reactions. However, the Hyades stars in the narrow mass interval of 20-30% greater than the sun have had most of their lithium

destroyed. Deep circulation of matter by convection and turbulence must have occurred.

What makes stars of this particular mass range so different? Boesgaard and Tripicco suggest that the deep circulation is related to the star's rotation rate. It is just in this mass range where there is a sudden drop in stellar rotation speed. High-mass stars rotate rapidly while stars like the sun are slow rotators. The transition occurs for stars 20-30% more massive than the sun.

In their paper in The Astrophysical Journal Letters (March 15, 1986 issue), the authors also speculate that the lithium destruction might have taken place when the young Hyades stars were much younger; that is, when they were only a million or so years old, rather than their present age of 800 million years.

One puzzling aspect of this discovery is the comparison with other stars in our galaxy that are not members of star clusters. Boesgaard and Tripicco have recently completed a survey of such stars and find that at least one-third of those in this mass range are completely normal in their lithium content. Most of those so-called "field stars" are even older than the Hyades stars. Their ages are between 1 and 5 billion years, while the sun is 4.5 billion years old.

Twenty years ago astronomers studied lithium in the Hyades stars at the Lick Observatory in California. They could see that some stars in this mass range were somewhat deficient in lithium but the measurements, made on photographs, were not very precise. Boesgaard and Tripicco have made use of recent technological advances in high precision detectors for their work. They used the Canada-France-Hawaii 3.6-meter telescope with its Reticon detector and the University of Hawaii 2.2-meter telescope with a Texas Instrument charge-coupled device.

New observations are already underway at the Canada-France-Hawaii Telescope and are scheduled at the Palomar 200-inch telescope. Boesgaard is studying the lithium content in stars in other star clusters of different ages and different metal contents to understand more about the internal workings of stars.

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