DIRECT OBSERVATIONS OF THE HETEROGENEITY OF SUPERGIANT DISKS

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Resolved images of the disks of the largest stars observed with the largest telescopes can be constructed using the class of techniques called speckle imaging. The observations must be made with narrow passbands ($\sim$ 10 nm), short exposures ($\sim$ 20 ms) compensation for atmospheric dispersion, high magnification and good signal-to-noise ratio. One specific technique applied to α Ori (Lynds et al.,1976) shows slight but apparently real differences in the images of the disk corresponding to low and high opacity in the stellar atmosphere which we interpret as due to temperature differences. There are also significant differences in the star's diameter and/or limb darkening at the two different opacity wavelengths.

The stellar disk images can be significantly sharpened using a technique developed by McDonnell and Bates (1976). An improved image of α Ori shows a dark feature on the disk which does not seem to be associated with a temperature difference. In addition, a diameter of $0''.066 \pm 0''.006$ with a limb darkening coefficient of 0.6 ± 0.3 could be deduced by McDonnell and Bates.

More general speckle imaging techniques have been proposed (e.g. Nisenson et al., 1976) and offer the promise of improved imaging of stellar disks over a wide range of wavelengths.

References

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