PULSATION MODES AND LUMINOSITIES OF THE β CEPHEI STARS

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ABSTRACT

Assuming that frequencies observed in multiperiod β Cephei variables correspond to normal pulsation modes leads to the following conclusions: (1) a variety of low ℓ oscillations are excited in these stars, (2) at most one radial mode is seen in any of them.

Pulsation constants can be derived for two β Cephei stars without recourse to photometric calibrations. In both cases a 0.5 mag. downward revision of the Balmer line absolute magnitudes is indicated. Implications of this result for Stellingwerf's opacity bump mechanism are briefly considered.

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DISCUSSION

M. SMITH: Have any of the earlier routine surveys for β Cephei stars picked up 12 hour variations?

JERZYKIEWICZ: No. There are a few, but we believe they are apsidal periods. In one case, if you use photometric indices, the light curve is very regular with almost exactly a 12 hour period. We need radial velocity data.

PERCY: The lack of stars on the cool side of the instability strip came up when I was thinking about the Stellingwerf bump mechanism. Much to my surprise, there always did seem to be a few constant stars to the right according to Shobbrook, Jakate, and I believe for your cases. This apparently real red edge did seem to be coincident with the end of hydrogen exhaustion. In regard to the possible half magnitude discrepancy in the absolute magnitudes, could that be a discrepancy in temperatures rather than magnitudes? I find it hard to believe that a star like 16 Lac which is in an association could have an absolute magnitude uncertainly by as much.

JERZYKIEWICZ: Oh, yes. Crawford gives errors for his early B star calibration of the order of, as he says, 0.4 mag or even more. The

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calibration is based on main sequence fitting which gives errors like that.

A. COX: Even though there is pulsation driving at 150,000 K, as Stellingwerf pointed out, it is so miniscule to consider. Furthermore, the predicted instability strip is so far to the red it seems not a possibility. The required opacity bump seems well beyond the opacity uncertainties. I believe the pulsation driving due to this helium ionization is really out of the question.

STELLINGWERF: There is much less He driving in your hotter models.

JERZYKIEWICZ: I wasn't trying to say that the mechanism works, because Stellingwerf says it does not. The observed oscillations could be the fundamental mode. The observations are not against an envelope opacity mechanism, but the Stellingwerf strip does not match observations because you have the Hertzsprung gap.

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