Ultra-high Resolution Imaging of Cepheid Pulsation

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Abstract

Classical Cepheids continue to provide the most accurate distances in the local group of galaxies. Their value as tracers of medium to recent star formation has been increasing in the past years, as galaxy evolution has matured as a field. Their value arises from the use of their regular radial pulsations. Getting the precise parameters of the pulsation (apart from period and amplitude) is still a difficult and unresolved problem. The coming few years are going to contribute direct interferometric observations of the pulsation of Cepheids. However the basic issues of wave propagation in the Cepheid atmosphere can only be studied with spectroscopic signatures in the optical (e.g., CaII H&K) and UV (e.g., MgII h&k). Significant emission and its variability during the pulsational cycle have been known since the pioneering IUE observations. More recently it was shown that the combination of UV and optical spectral lines trace accurately wave propagation in a Cepheid atmosphere. A significant insights into pulsation processes in Cepheids, and consequently on the pulsation effects on their atmospheres and distance estimates, could be gained from spatially resolved spectroscopic imaging using sub-milliarsecond resolution. We show examples of the advances that can be achieved using a long-baseline space-based UV-Optical interferometer. Work partially supported by NSF grant AST98-76734.