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A STUDY OF THE URANIUM STARS AND RELATED OBJECTS

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G.C.L. Aikman and Wesley A. Fisher

ABSTRACT

Most of the chemically peculiar A-stars of the magnetic sequence show U II lines in their spectra, while those of Th II are weak or absent altogether. A non-nuclear explanation of these observations (diffusion or magnetic accretion) may well be possible, but for the present, we cannot exclude the possibility that the atmospheres of these stars contain debris from recent r-process events. The implications for the recent chemical history of the galaxy could be profound.

The goals of this paper are threefold: The first is to present theoretical calculations (in LTE) of U II and Th II line strengths based on realistic gf-values and partition functions. The second is to give a thorough discussion of the observational material upon which the uranium identification is based, including an "Atlas" of direct intensity tracings of the region of the strongest U II lines with all features identified insofar as that has been possible. We have made a classification of the CP stars based on the U II and lanthanide line strengths. Finally, we briefly discuss the interpretation of this material in terms of nuclear and differentiation (non-nuclear) mechanisms.

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