



# A Spectroscopic Study of DD UMa: Ursa Major Group Member and Candidate for BRITE

A. Elmaslı, L. Fossati, C. P. Folsom, B. Albayrak, H. Izumiura

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The Ursa Major group is a nearby stellar supercluster which, while not gravitationally bound, is defined by co-moving members. DD UMa is a  $\delta$  Scuti star whose membership in the Ursa Major group is unclear. The objective of this study is to confirm the membership of DD UMa in the Ursa Major group, as well as perform a detailed spectral analysis of the star. Since DD UMa is a low-amplitude  $\delta$  Scuti star, we performed a frequency analysis. We determined fundamental parameters, chemical abundances, and derive a mass and age for the star.

For this study we observed DD UMa at the Okayama Astrophysical Observatory with the high-resolution spectrograph HIDES, between the 27<sup>th</sup> of February and the 4<sup>th</sup> of March, 2009. Additional observations were extracted from the ELODIE archive in order to expand our abundance analysis. Group membership of DD UMa was assessed by examining the velocity of the star in Galactic coordinates. Pulsational frequencies were determined by examining line profile variability in the HIDES spectra. Stellar fundamental parameters and chemical abundances were derived by fitting synthetic spectra to both the HIDES and ELODIE observations.

DD UMa is found to be a member of the extended stream of the Ursa Major group, based on the space motion of the star. This is supported by the chemical abundances of the star being consistent with those of Ursa Major group members. The star is found to be chemically solar, with  $T_{\text{eff}}=7450 \pm 150$  K and  $\log g=3.98 \pm 0.2$ . We found pulsational frequencies of 9.4 c/d and 15.0 c/d. While these frequencies are insufficient to perform an asteroseismic study, DD UMa is a good bright star candidate for future study by the BRITE-constellation.

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