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Machine-Based Spectral Classification of Weak CN and Carbon Stars in M31[1] SUHAS KOTHA, Evergreen Valley High School, RACHEL RAIKAR, PURAGRA GUHATHAKURTA, University of California Santa Cruz, ANTARA BHATTACHARYA, Navy Children School, Mumbai, Maharashtra, India, ALLISON CHANG, Palo Alto High School, Palo Alto, CA — Stellar evolution has been researched for decades, yet certain phases of the stellar life cycle remain poorly understood. Recent analyses of spectroscopic and photometric data of stars in the Andromeda Galaxy (M31) from the Spectroscopic Landscape of Andromeda's Stellar Halo (SPLASH) and the Panchromatic Hubble Andromeda Treasury (PHAT) surveys have revealed an unusual population of "weak CN" stars that represent such a phase. Their defining feature is a weak double-peaked spectral absorption line around 8000 angstroms indicating the presence of the CN molecule; this same feature appears more strongly in carbon stars. Using data from SPLASH and PHAT, we investigated this association by developing an algorithm that spectrally classified stars as "carbon", "weak CN", or "other". The algorithm performs a clustering analysis comparing spectral features present in the visually classified stars. The results were plotted in color-magnitude diagrams (CMDs) to compare the training set with the algorithm; the algorithm classified more accurately. The results obtained have been instrumental in establishing weak CN stars as a well-defined stage of stellar evolution and will contribute to a greater understanding of the physical properties of carbon and weak CN stars.

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