Analyzing the Photometry of Star Cluster Messier 39: Creation of Color Magnitude Diagram, Age Calculation, and Distance Measurement

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Studying star clusters within the Milky Way is crucial to gaining a deeper understanding of the universe. Star clusters need to constantly be analyzed and cataloged, so changes regarding stellar evolution in our universe can be understood and categorized. These findings will provide scientists with essential knowledge to elucidate the mechanisms of stellar evolution within our galaxy and beyond. To contribute to this understanding, star cluster Messier 39 (M39) was studied using remote 12-inch telescope control at the Leitner Observatory. Once the images were taken, code was written in Python and each star in the cluster was categorized with an associated color b-v (temperature) value and V magnitude (brightness). This analysis produced a Color Magnitude Diagram (CMD) found to be made of mostly population II, main sequence stars based on comparison to the Hertzsprung Russell Diagram. Finally, isochrone fitting code was written in Python to find the distance modulus and calculate the age of M39 to be .04 Gyr and the distance from Earth to be 331.13 parsecs. These calculations are extremely important for helping to advance astronomical research and will be submitted to the Milky Way Star Clusters Catalog (MWSC).

Awards Won:
Fourth Award of $500