Detecting Reddening by Dust for Star Clusters in the Andromeda Galaxy

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To learn more about the origins and evolution of stars and galaxies, astronomers study star clusters, the birthplaces of stars. Our ability to study these clusters can be hampered by the effects of interstellar dust, tiny particles of solid matter that dim and redden starlight, distorting measurements of important intrinsic properties of stars such as temperature, luminosity, age, and mass. To accurately study star clusters, astronomers must unveil them from their dusty cover. In my project, I developed a technique to detect reddening by dust for star clusters in the Andromeda Galaxy, by comparing the clusters' apparent and intrinsic colors. I calculated the apparent colors from photometric data taken with the Hubble Space Telescope as part of the PHAT survey, the most comprehensive survey of any external galaxy to date. I calculated the intrinsic colors from spectroscopic data taken with the Keck II 10 meter telescope as part of the SPLASH survey, which contains spectra for star clusters identified in PHAT. The Andromeda Galaxy offers a unique external viewpoint. While it is difficult to study our Galaxy, as we are inside of it, by studying similar, nearby galaxies, such as Andromeda, we can learn more about both the formation and evolution of our own Galaxy and that of more distant galaxies, which are too dim to study. The technique that I developed to detect reddening by dust for star clusters in Andromeda is a significant step towards greater precision in measurements pertaining to star and star cluster formation and evolution in that galaxy. My technique will be applied to an additional 150 star clusters, in Andromeda. It will also be used as part of the process of correcting for reddening by dust and learning more about the physical properties of the dust