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Analysis of the cathodoluminescence of zircon crystals and photometry of planetary nebulae using Python[1] CHLOE JONES, KRISTIN RABOSKY[2], STACY PALEN[3], ELIZABETH BALGORD[4], Weber State University
— The field of spectroscopy can help unlock many mysteries about the composition and history of a given substance. Cathodoluminescence, a branch of spectroscopy correlating specific wavelengths to specific impurities, is a valuable tool to both physicists and geoscientists, allowing for the analysis of individual zirconium crystal grains a few micrometers in size. Photometric techniques help astronomers analyze the light received from macroscopic objects such as planetary nebulae stretching trillions of kilometers across many lightyears away. Both techniques use imaging through different colored filters to obtain spectroscopic data from the objects of interest. Light intensity data embedded in these images can be extracted by using image analysis software and then can be correlated to the emission spectra, and therefore the composition, of the object in question. Python is an excellent tool for creating a consistent and efficient method for image and graphical analysis. In this project, we identified the characteristics that make spectroscopy applicable across fields, described the coding process for analyzing data, and applied the idea of elemental "fingerprints" to gather information regarding sample composition.

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