

ABSTRACT

Classification Method of Sloan Digital Sky Survey Stars on the Morgan-Keenan-Kellman System

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The method used to classify stars taken by the Sloan Digital Sky Survey (SDSS) on the Morgan-Keenan-Kellman (MKK) system is described. Spectra of stars from the SDSS database, the Dark Sky Observatory, and the Steward Observatory, were plotted using Excel to enable simple and accurate analysis. The ratios of important absorption lines from standards, as given by *An Atlas of Stellar Spectra*, were observed both qualitatively and quantitatively. By visually comparing the similarities of stellar digital spectra the way MKK did with photographic plates, rough classifications could be made. However, to make this method more quantitative, the ratios of absorption lines were measured and recorded. Once the area of the absorption line was found, the equivalent width was calculated to compare the relative strengths of the different absorption lines. In some cases, there were strong relations relating the ratios of interest as specified by *An Atlas of Stellar Spectra* to spectral type and luminosity class. In other cases no correlation was apparent. O stars were found to rely solely on the ratio $\lambda 4471:\lambda 4541$. As subclass went from O4 to O9, the ratio increased. For B stars, it was found that the ratio $\lambda 4026:\lambda 3935$ shows a strong correlation amongst spectral type; the ratio decreases as the spectral type goes from B0 to B9. To classify A stars, it is necessary to use the ratio $\lambda 4385:\lambda 4481$ as well as the strength of $\lambda 4103$. The ratio $\lambda 4385:\lambda 4481$ increases from A0 to A3 and the strength of $\lambda 4103$ decreases from A3 to A9. F0 to F8 stars can be differentiated with the ratio $\lambda\lambda 4030-4034:\lambda\lambda 4128-4132$; the ratio increases as subclass goes from F0 to F8. G stars might be the easiest to classify. The ratios $\lambda 4045:\lambda 4103$ and $\lambda 4226:\lambda 4342$ both increase very reliably as the subclass goes from G0 to G2. Amongst the G stars, $\lambda 4144:\lambda 4103$ increases as subclass goes from G3 to G8. As the subclasses of K stars go from K2 to K5, the ratio $\lambda 4226:\lambda 4325$ increases fairly consistently. Although the most difficult to measure, the strength of the blend $\lambda 4900-5200$ increases very dependably as subclass goes from M0 to M4.5. Correlations of the data taken from MKK standards to SDSS data are present and can be applied to the classroom.