Automated Spectral Analysis

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At Armagh Observatory we continue to make incremental improvements to our core model atmosphere and synthetic spectrum software, STERNE and SPECTRUM. These are employed in the analysis of low-, intermediate and high-dispersion dispersion multi-wavelength data for extreme helium stars and subdwarf B stars, including binaries. In order to make these analyses more objective, we tested a variety of χ^2-minimization procedures. These operate both with precomputed model grids and by recomputing synthetic spectra as required. As a consequence we have been able to analyse large datasets efficiently. Key results have led to the detection of secular contraction and the direct measurement of masses in extreme helium stars. This has been pivotal in identifying extreme helium stars as the product of mergers between CO and He white dwarfs. A time-resolved analysis of the short-period pulsator V652 Her involved the automatic measurement of effective temperatures and surface gravities from over 50 high-dispersion optical spectra. Semi-automatic techniques are even more important for the analysis of binary stars, including the discovery of a new hydrogen-deficient binary, BI Lyn. While our techniques have been developed using LTE models, it is likely that the efficiency gains could be even greater when extended to non-LTE models.