A BRIEF PROGRESS REPORT ON IUE'S NEW CALIBRATIONS

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Progress continues on the creation of new calibrations for IUE's scientific instrument. This report offers a brief update on recalibration progress.

The basic calibrations for each camera are the Intensity Transfer Function (ITF) and the absolute calibration. The ITF maps, on a pixel-by-pixel basis, the raw Data Numbers (DNs) to Flux Numbers (FNs). Then the FNs should be related linearly, with a simple multiplicative factor, to absolute fluxes. The multiplicative factor, which is a function of wavelength, is the absolute calibration.

1. The New ITFs

Progress has been made in evaluating the new LWR and LWP ITFs. In addition, the SWP ITF is in the process of being created.

Studies of the flat-field characteristics have been performed to examine the current ITF performance of the each camera and whether it has changed with time. This will help allow a determination of which older data might be best reduced using the new ITFs and which are best reduced with the currently implemented ITFs. It has been found that the most dramatic changes in the cameras occured while the first 3000 or so images were obtained on a given camera. This apparently corresponds with a "settling out" period when the camera characteristics stabilized. For the SWP and LWR cameras, that period corresponds to 1978 through early 1979. The LWP was used sporadically for several years; thus all the early images from 1978 through late 1983 were obtained during this period of change. As it turns out, all the currently implemented ITFs - LWR, SWP, and LWP - were obtained during the early period when the camera characteristics were changing.

A new study of the linearity characteristics of each camera has started. This investigation uses the linearity monitoring data to define the ITF performance versus time (e.g. Oliversen, 1984, NASA IUE Newsletter No. 24, p. 27). These data include trailed spectra of calibration stars obtained every six months and thus can be more directly related to the accuracy of IUE spectral data.

The staff are now evaluating the performance of the new LWR and LWP ITFs on the older data. It is expected that the current ITFs, in use since 1978, will calibrate the earliest data better, since they were obtained concurrently. At some point in time - to be determined, but possibly as early as 1979 for the LWR - the new ITFs perform better. How to handle comparisons between early data calibrated with one ITF and later data calibrated with another ITF is an important topic of investigation.

The SWP ITF is under construction. Once it has been created some studies will be done to insure that it is internally consistent. Additional investigations will be done to test its performance on recent and older data.

2. Absolute Calibrations

Progress continues on defining the new absolute calibrations. These new calibrations are neccesary primarily because of the new ITFs. The ITFs redefine the correspondence between DNs and FNs, so the resulting Flux Numbers for the old and new ITFs are not the same. In addition, the cameras have changed in sensitivity.

The task of analyzing the hundreds of spectra required for the absolute calibrations has been split between the NASA/GSFC and VILSPA Resident Astronomers. Goddard astronomers are working on the LWR absolute calibration, and VILPSA astronomers are starting work on the LWP.

All the data have been acquired for the ultraviolet standard stars on all three cameras. The new technique of performing fast trails was used to obtain spectra for the brighter OAO-2 standards such as Eta UMa. The performance of those fast trails is being analyzed. The LWR spectra have been reprocessed with the new LWR ITF. Current efforts are directed at defining the systematic differences between the trailed and point-source spectra and between spectra obtained at different exposure levels (spectra with optimum exposure levels at the sensitivity maximum and spectra with longer exposures to improve the signal at the ends of the spectra). Once these effects have been quantified, the spectra can be combined for each star to produce an accurate spectrum in instrumental units (Flux Numbers). Then the spectra will be compared to the adopted fluxes for each star and the calibration curve can be derived.

CALIBRATION PROGRESS CHART

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