

IUE OBSERVATIONS OF O-B ASSOCIATIONS IN THE LMC

My program ID is GPTLP, which stands for Galactic Photometry by T. L. Page, proposed over three years ago. In the interim, the problem and my interests changed, and on 15 January 1979, I suddenly learned that my eight shifts would start 25 January rather than 15 March, as originally scheduled (due to Don Morton's change in travel plans from Australia). So I arrived at GSFC on 23 January with a drastically changed observation list based on the "S201 Catalog of Far-UV Objects" and the "S201 Far-UV Atlas of the Large Magellanic Cloud", NRL Reports on 8173 and 8206, published by George Carruthers and me in 1978. Both report on far-UV imagery (1050 to 1600Å) obtained from the Moon on Apollo 16.

The Atlas shows 46 regions in the LMC where the far-UV flux and H α intensity measured by Karl Henize¹, and the 21-cm flux measured by McGee and Milton² are anomalous. These regions are mostly dominated by O-B associations catalogued by Lucke and Hodge.³ Some of them are small HII regions within the hydrogen clouds identified by McGee and Milton; others are O-B associations with strong far-UV flux either in front of or behind the McGee-Milton hydrogen clouds; and others are O-B associations definitely outside the hydrogen clouds. (Page and Carruthers have submitted a paper on this to the Ap.J.).

The purpose of our IUE observations was to obtain spectra (1150 to 3000Å) of our star in each O-B association to confirm the high local hydrogen density in the HII regions and the low hydrogen density in the vicinity of the other O-B associations. It may help other IUE guest observers to report how this went. The Project Scientist, Al Boggess, readily approved my revised observation list. Then, I faced two difficulties: I had no detailed finder charts of the stars in Lucke-Hodge O-B associations, which range from $m_V = 12$ to 14 and more; and how could I estimate exposure times?

The first problem was solved by trial and error. The IUE image showed a cluster of stars and we tried a long-wavelength low-dispersion (LWR) exposure of 20 or 30 minutes. (The exposure times recommended by the IUE resident astronomers turned out to be low by a factor of two). About half the time, the star we picked out was not O or B type because the IUE image is in visual wavelengths. When that happened, we switched to another nearby star and usually got one with good intensity at 1900-2000Å. Then we got a short-wavelength low dispersion (SWP) spectrum of the same star at twice the exposure time (40 to 60 minutes).

The third problem was radiative background, which increases drastically on the second shift of GSFC when IUE comes into perigee. This is presented on the IUE console; when it reaches 1.5 to 2.0 volts, SWP exposures must be limited to 30 or 40 minutes and LWR exposures to 60 to 80 minutes. So I learned to schedule SWP (1150 to 1900Å) exposures on the first shift (11 AM to 7 PM in January) and only LWP exposures (1900 to 3000Å) on the second shift (7PM to 3 AM in January).

Set-up time on each new target is 25 to 30 minutes or more, depending on the distance of the slew across the sky. Since my O-B associations were all within the LMC, the only slew was the first, to get there from the position of the last ESA target. It is desirable to check coordinates every now and then by setting on an SAO star of known coordinates (1950 R.A. and DEC). On one occasion, when my low-resolution Apollo-16 S201 coordinates were off by 5 arc-minutes from proper 1950 coordinates, I lost an hour of observing time while we found a bright SAO star to re-set the IUE coordinate system.

On two occasions, I got by chance two stars in the IUE large aperture. It turned out to be possible to process these separately, giving a wavelength scan of two separate spectra for the price of one. One of these pairs was given high-priority processing, which meant that I received a CalComp I(λ) plot within three days instead of the usual two to three months.

During eight shifts (64 hours) on IUE, I got SWP and LWR spectra of stars in 13 O-B associations in the LMC and LWR spectra of four galaxies requiring exposures of 120 minutes or more. I hope to complete reduction of these spectra within six months.

References

- ¹Henize, K.G. 1956, Ap.J. Suppl. 2, 315
- ²McGee, R.X. and J.A. Milton, 1966, Australian Jour. Phys. 19, 343
- ³Lucke, P.B. and P.W. Hodge, 1970, Astron. Jour. 75, 171

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