FINAL TECHNICAL REPORT

"Luminosity Calibration of Low Redshift Quasars"

Grant No. NAG 5-175

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Dr. E. Joseph Wampler, Principal Investigator

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Final Technical Report for Grant NAG 5-175

"Luminosity Calibration of Low Redshift Quasars"

E. Joseph Wampler

Despite the title this Grant has supported research on two separate projects. The first was a collaboration between myself and Dr. Martin Gaskell at the Institute of Astronomy in Cambridge, England. We combined European (SERC) and U.S. shifts on the IUE in order to obtain the long integration times required to record spectra of faint ($\sim$16th magnitude) quasars. The second project was an attempt to obtain LWR spectra of the nearby giant radio galaxy Centarus A (NGC 5548) in an attempt to determine the chemical composition and stellar populations in this unusual galaxy.

The IUE results from the low redshift quasar study have been combined with the data from an extensive ground based survey. The results are described in the attached preprint. This paper has been accepted for publication in the January 1984 issue of the Astrophysical Journal.

We have been very pleased with the performance of the IUE spacecraft. It has proven to be surprisingly sensitive and the spectra were of high quality despite the faintness of the sources. The IUE spectra of the low redshift quasars form a very important section of the attached preprint. They showed that the correlation we found in high redshift quasar spectra between the strength of the C IV λ1550 feature and the continuum luminosity is also valid for low redshift objects. Once a model for luminosity evolution is established these data can be used to determine q_0. Under the simplest assumption: that the luminosity calibration is independent of z the data suggest that $q_0 \gtrsim 1$.

The Centarus A project has proven to be much more difficult. I had hoped to obtain a series of spectra as a function of distance from the galactic nucleus in order to study metallicity and population gradients for the stars in Cen A. However it was possible to obtain IUE spectra for only the bright nuclear region of Cen A as the surface brightness of the galaxy and the population of early type stars fell off rapidly with distance from the nuclear region. Ground based spectra obtained during the Spring observing periods in 1981 and 1982 are available much further out in the envelope. It will be possible to compare these spectra to the nuclear spectra which have been extended into the UV by IUE and obtain crude limits to the fraction of blue stars in the envelope. However these limits will not be as good as they might have been if UV spectra had been available further out in the envelope.

Even the reduction of the ground based data has been difficult. The surface brightness of the outer regions of Cen A is quite faint and great care had to be exercised in removing the contamination of the sky background. Consequently, the reduction procedure has proceeded slowly. Also to model the observed Cen A spectrum in the UV it was necessary to obtain the IUE catalog of UV spectra of standard stellar types. Because of personal changes at the IUE observatory

a magnetic tape copy of this catalog was not received until July 1983. Despite these difficulties a preliminary examination of the now largely reduced data suggests that it will be sufficient for our purposes and the main objectives of the program will be met. As the interpretation of the data has been slow the results will probably not be written up until the end of 1983.

Spectrophotometry of Two Complete Samples of Flat Radio Spectrum Quasars

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