

RESULTS ON THE EVOLUTION OF GALAXIES AND THEIR ENVIRONMENT
FROM THE ULTRAVIOLET IMAGING TELESCOPE ON ASTRO-1

Theodore P. Stecher
Laboratory For Astronomy and Solar Physics
NASA/Goddard Space Flight Center
Greenbelt, MD 20771

The Ultraviolet Imaging Telescope, part of the Astro-1 Spacelab Mission was used to obtain high-resolution surface brightness distribution data in six ultraviolet wavelength bands for the bright reflection nebula NGC 7023. The quantitative comparison of the measured surface brightness profiles with corresponding data from the visible leads us to conclude that the scattering in the near and far ultraviolet in this nebula is more strongly forward directed than it is in the visible. The dust albedo for wavelengths longer than 1400 Å is identical to that in the visible, with the exception of the 2200 Å bump in the extinction curve. In the wavelength of the bump the albedo is approximately 30% reduced compared to both longer and shorter wavelength regions, which is consistent with the true absorption nature of this feature. This means that there will be more penetration of ultraviolet radiation in the molecular clouds where star formation is proceeding. This higher radiation field changes the concentration of ions in the clouds and therefore the chemical formation rates.

The Ultraviolet Imaging Telescope also obtained near-UV and far-UV images of the giant OB association NGC 206 in M31. Photometry was obtained for thirty massive stars. Their colors and magnitudes agree, after correcting for extinction, with evolutionary predictions. The brighter stars are systematically redder than the fainter stars indicating that they are supergiants whose age is about 4 million years; the fainter bluer stars probably just formed.

We analyze UV imagery of two Sb bulges and two E galaxies obtained with UIT. The UV brightness of these systems is not produced by recent massive star formation but in relatively low luminosity objects. We also find extended, large amplitude UV color gradients which are probably related to abundance gradients within the galaxies.

For NGC 1275 the measured UV colors indicate a mass function which extends to eight solar masses but no higher. This indicates either a cessation of star formation during the last 50 million years or a truncated initial mass function.

The Ultraviolet Imaging Telescope is funded by NASA's Spacelab Office.