Optical/Near-IR Observations of a Deep Chandra Field Around the Blazar 1156+295

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Abstract

We present follow-up observations of a 60 ksec ACIS-I Chandra exposure centered on the gamma-ray blazar 1156+295. We have imaged the central 100 square arc minutes of the field in optical down to $B/R \sim 26$, and the central 48 square arc minutes in K down to $K \sim 21$. We present and analyze the X-ray spectra, colors, and population statistics of the serendipitous sources found in the field. Our results are largely consistent with those of Mushotzky et al. (2000) and the Chandra Deep Fields. However, we find that a somewhat larger fraction ($\sim 25\%$) of our X-ray sources have no optical counterparts down to $R \approx 26.5$. Several ($\sim 60\%$) of the objects with no optical identification, however, are detected in K at the level $K \sim 19 - 21$. These objects could be very high redshift ($z > 5$) ojbects, or lower redshift ($1 < z < 3$) EROs. The X-ray spectra of the objects with $R - K > 5$ are typically very hard. The optical colors for most of the Chandra sources are *blue* ($B - R < 1$), indicating some level of unobscured starburst or AGN activity. At faint X-ray flux levels ($< 2 \times 10^{-15}$ erg cm^{-2} sec^{-1}), a new class of optically bright, red sources appears. Preliminary spectroscopy suggests that these are examples of the nearby "normal" galaxies found in other fields. The X-ray spectra of these sources are also typically hard. As an example of possible cosmic variance, however, we find that the fraction of optically bright sources with X-ray counterparts is significantly lower than that found by Barger et al. 2000 (~ 1 *vs.* 10%). An accurate determination of the average value of this fraction is crucial for AGN lifetime and black hole accretion efficiency arguments.

CATEGORY: EXTRAGALACTIC DIFFUSE EMISSION AND SURVEYS