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Detection of X-ray Emission from Gravitationally Lensed Submillimeter Sources in the Field of Abell 370

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abstract

We report the detection by Chandra of and, two distant submillimeter sources, (z=1.06 and z=2.81, respectively) with significances (>7σ) X-ray detections of the high-redshift submillimeter source population. The X-ray positions are coincident with the optical positions to within one arcsecond. The X-ray spectra, while of low signal-to-noise ratio, are quite hard. Absorbed power law models with fixed photon indices of Γ = 2.0 imply local absorbing columns \( > 2 \times 10^{23} \) cm\(^{-2}\) and unabsorbed luminosities \( > 10^{44} \) erg s\(^{-1}\) in both sources. These results imply that nuclear activity is responsible for the bulk of the luminosity in, and for at least 20% of the luminosity of, consistent with previous optical observations. We also place an upper limit on the X-ray flux of a third submillimeter source, . Considered together with previously published Chandra upper limits on X-ray flux from submillimeter sources, our results imply that 20\(^{+30}_{-10}\) % of submillimeter sources exhibit X-ray emission from AGN (90% confidence), consistent with expectations of their contribution to the diffuse X-ray background.
\[ \alpha (850\mu m-2\text{keV}) \]

Redshift

Arp 220

NGC 6240

LRG J0239-0134

SMM 0239-0136

\( N_t = 5.23 \text{cm}^{-2} \)