MIXTURE MODELING AND THE SEARCH FOR FAINT AND EXTENDED SOURCES IN THE X-RAY UNIVERSE

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Abstract

A Bayesian mixture modeling method was applied to *Chandra* Deep Field South (CDF-S) to recover the most distant celestial sources in the Universe.
The probabilistic two-component mixture model allows to separate the diffuse background from celestial sources within a one-step algorithm without data censoring. The background is modeled with a thin-plate spline [4].
The source and background estimation method was extended to allow for the luminosity intensities of celestial objects to be inverse-Gamma distributed. In addition, all the detected sources are automatically parameterized to produce a list of source positions, net counts and morphological parameters.
The present analysis is applied to the CDF-S. With its 940 ksec of exposure time, CDF-S provides one of the most deep X-ray observations made up to date. We analyze the 0.5-2 keV energy band exclusively for the search of clusters or groups of galaxies. Point-like and extended sources are separated incorporating the knowledge of the observatory's point spread function.
Combining the Bayesian mixture modeling technique with the presently most sensitive X-ray data from the Chandra Observatory (resolution $\simeq$ 1 arcsec) we can provide information about rare objects, such as clusters of galaxies, in the distant Universe.

References:

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