

# Probing the nature and local environments of Ultraluminous X-ray sources

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## Abstract

We have demonstrated that: (1) the positional errors of ULXs between the Chandra and HST images can be achieved better than  $0.''2$ , (2) comparison of colors and magnitudes with the evolutionary tracks and isochrones can be used to study the starformation history of the local environments of ULXs, and (3) our irradiation model of the donor star and accretion disk in ULX binaries will be able to constrain the binary parameters of ULXs. Based on these techniques, we propose a pilot study to determine the nature and local environments of thirty ULXs in nearby galaxies, for which high signal-to-noise ratio HST data with broadest photometric coverage are available in the archive. Analysis of high-resolution radio and infrared images of most of these galaxies are in progress, which will be used to search for the counterparts of ULXs and mainly for the starformation studies of the local environments of ULXs.

This program will strongly support our new Chandra survey of ULXs for distance-limited complete sample of 147 galaxies, approved in Cycle 7. In addition, the results of this program will generate large number of sources with multiwavelength properties, for a complete sample of galaxies, which can be used in future to address many other challenging issues of astronomy and astrophysics.

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