



# - RAY ASTRONOMY 2019

*Current Challenges and New Frontiers in the Next Decade*

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## Quantifying the rate of dual-AGN with BAYMAX

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Despite the importance of dual active galactic nuclei to wide-ranging astrophysical fields such as galaxy formation and gravitational waves, the rate of dual AGNs has yet to be accurately measured. However, the rate of dual AGNs can inform us of the role galaxy mergers play in triggering AGN, timescales for post-merger SMBHs to sink to the center of the potential well (or, the effectiveness of dynamical friction), as well as merger-related feedback physics. Dual AGNs that are widely separated relative to the instrument PSF and have near unity flux ratios are easy to identify, however dual AGNs with small separations and/or flux ratios can only be distinguished from a single AGN with advanced statistical analysis. As a result, very few dual AGNs have been confirmed, and most have physical separations  $> 1$  kpc. We have developed BAYMAX (Bayesian Analysis of Multiple AGN in X-rays), a tool that uses a Bayesian framework to quantitatively evaluate whether a given source in a Chandra observation is actually a single or dual point source, for flux ratios  $0.1 < f < 1.0$  (representing the flux ratio of the secondary to the primary AGN) and angular separations below  $0.5''$ . Specifically, we present results from BAYMAX analyzing Chandra observations of a variety of sources such as: the lowest-mass dual AGN candidate to date (SDSS J091449.05), and a sample of AGN classified as dual from optical narrow-line diagnostics but whose X-ray emission remains ambiguous. With BAYMAX we are (1) discovering a dual AGN population where past spatial resolution limits have prevented systematic analyses and (2) unveiling the true nature of confirmed dual AGNs in the literature. Overall, BAYMAX will be an important tool for correctly classifying candidate dual AGNs, and, for first time, studying the dual AGN population across cosmic time.

### Topic

Active Galactic Nuclei: accretion physics and evolution across cosmic time

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