

## Lumière (Latest Upgraded Methodologies for the Investigation of X-Ray Emitting sources)

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# Statistical Aspects of X-ray Spectral Analysis and BXA tutorial

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Fitting models to X-ray spectra is a fundamental technique to infer information about the hot and energetic universe. Finding credible parameter ranges for a given spectral model and dataset(s) however is not a simple task. In this workshop, we will first present the recommended practices for fitting models to X-ray spectra, including an overview of the instrumentation response, the linear modelling approximation, Poisson count statistics, the Gaussian approximation, data re-binning, visualisation techniques and handling backgrounds. We will then introduce the Bayesian X-ray Analysis (BXA) software package as a powerhouse for Bayesian parameter estimation, model checking and model comparison, capable of deriving parameter constraints effectively irrespective of model complexity or data quality. We will conclude with additional applications, such as the hierarchical generation of population distributions from a sample of parameter posteriors. Realistic hands-on example exercises with accompanying data files and code will be included to apply the theoretical concepts in practice.

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