



# X-RAY ASTRONOMY 2019

*Current Challenges and New Frontiers in the Next Decade*

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## Spectral and temporal properties of thermal Comptonization in X-rays

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Comptonization by thermal electrons at mildly relativistic temperatures appears to be one of the major radiative processes giving rise to the observed X-ray emission from accretion onto compact objects. This is evidenced by ubiquitous high-energy cutoffs in hard spectral states occurring at  $E > kT$ , which are usually well fitted by models of that process. Accurate determination of the electron temperature is important for proper understanding of the physical nature of the source, in particular for determination of the role of electron-positron pair production. Some of the existing codes, in particular 'nthcomp', underestimate  $kT$  already in the mildly relativistic regime. Here we develop a new and much more accurate public code, 'thcomp', based on a modification of the Kompaneets equation with an escape term. The accuracy of that code and of other available ones is tested using our new public Monte Carlo code, 'compton'. Using the latter, we also study timing properties of Comptonization, in particular the distribution of photon arrival times and the evolution of the average photon energy.

### Topic

Active Galactic Nuclei: accretion physics and evolution across cosmic time

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