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Searching for the hot and diffuse baryons in the Universe via surface brightness fluctuations of cosmic X-ray background

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Surface brightness fluctuation analysis has become a new frontier in studying cosmic X-ray background (CXB) due its ability to disentangle contributions of different CXB components via their different angular correlation properties and energy spectra. This analysis can be utilized to search for contribution of low surface brightness objects, such as faint and distant cluster of galaxies and the warm-hot intergalactic medium (WHIM), as fluctuation studies with *Chandra* surveys have demonstrated. Such an approach complements and contrasts the more established approach relying on making an inventory of individual objects in deep X-ray surveys. Thanks to its large effective area and significant investment of observing time made in wide-angle surveys, *XMM-Newton* is well placed for searches of hot and diffuse baryons in the Universe via CXB fluctuation analysis. However, its complex and varying instrumental background has been impeding such searches. In this talk we present results of a first CXB surface brightness fluctuation study with *XMM-Newton* data of the XXL fields. These data permitted us to obtain the most accurate power spectrum measurement of CXB fluctuations on the angular scales from $\sim$4 arcsec to $\sim$6 degrees to date. We will also present the energy spectra of CXB fluctuations at different angular scales which may hold the key to a possible detection of the WHIM. These results are an important milestone for CXB fluctuation studies with future, larger *XMM-Newton* surveys and with the upcoming *SRG/eROSITA* all-sky survey (eRASS), and cross-correlation studies with SZ data from Planck, ACT and SPT.

Topic

Hot and diffuse baryons

Affiliation

Institut d'Astrophysique Spatiale, CNRS/Universite Paris-Sud, Orsay, France

Author: Dr KOLODZIG, Alexander (Institut d'Astrophysique Spatiale, CNRS/Université Paris-Sud, France)

Co-authors: Prof. GILFANOV, Marat (Max Planck Institute For Astrophysics, Garching, Germany; Space Research Institute, Russian Academy of Sciences, Moscow, Russia); Prof. SUNYAEV, Rashid (Max Planck Institute For Astrophysics, Garching, Germany; Space Research Institute, Russian Academy of Sciences, Moscow, Russia)

Presenter: Dr KOLODZIG, Alexander (Institut d'Astrophysique Spatiale, CNRS/Université Paris-Sud, France)

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