High-resolution X-ray view of the changing wind in ultraluminous X-ray source NGC 5204 X-1

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X-ray binaries (XRBs) are pairs of stars that emit in the X-ray band as mass is transferred from a normal star to a compact object. The most extreme XRBs are the ultraluminous X-ray sources (ULXs), non-nuclear objects with X-ray luminosities above 10^{39} erg/s, exceeding the Eddington limit of a stellar-mass black hole. The nature of these objects has been highly debated with the early scenario of sub-Eddington intermediate-mass black holes progressively superseded by that of stellar-mass black holes and neutron stars accreting at super-Eddington rates. This was confirmed by the discovery of pulsations and relativistic outflows driven by radiation pressure in nearby bright sources. The outflows are detected in the form of absorption and emission lines in high-resolution X-ray spectra. Until now, exciting discoveries have been made in this field, although there are several unsolved questions, such as the dependence of the wind on the accretion rate and its effects on the source appearance. In an attempt to tackle these issues, we have triggered deep campaigns with XMM-Newton to study the disc-wind connection in variable ULXs. Here, I will show our results obtained for the cornerstone ULX NGC 5204 X-1. Using a moving Gaussian line in the spectra we identified spectral features which show a variation with the spectral state of the source. Additionally, using physically-motivated plasma models, we found for the first time 1) a significant ($> 4\sigma$) detection of outflows, 2) a biconical collisionally-ionised relativistic (about 0.3c) component and 3) a slower likely-thermal wind component.