We present the first results of an EPIC observation of the luminous X-ray source population in the face-on supergiant spiral galaxy M101. We have studied the spectral and temporal properties of the fourteen most luminous sources, all of which have intrinsic X-ray luminosities exceeding the Eddington limit for a $1.4M_\odot$ neutron star, with a subset in the ultraluminous X-ray source (ULX) regime ($L_X \geq 10^{39}$ erg s$^{-1}$).

Eleven sources show evidence of short-term variability, and most vary by a factor of $\sim 2$–4 over a baseline of 11-24 years, providing strong evidence that these sources are accreting X-ray binary (XRB) systems. Our results demonstrate that these sources are a heterogeneous population, showing a variety of spectral shapes. Interestingly, there is no apparent spectral distinction between those sources above and below the ULX luminosity threshold. Nine sources are well-fit with either simple absorbed disc blackbody or powerlaw models. However in three of the four sources best-fit with powerlaw models, we cannot exclude the disc blackbody fits and therefore conclude that, coupled with their high luminosities, eight out of nine single-component sources are possibly high state XRBs. The nuclear source (XMM-10) has the only unambiguous powerlaw spectrum ($\Gamma \sim 2.3$), which may be evidence for the presence of a low-luminosity AGN (LLAGN). The remaining five sources require at least two-component spectral fits, with an underlying hard component that can be modelled by a powerlaw continuum or, in three cases, a hot disc blackbody ($T_{in}=0.9$–1.5 keV), plus a soft component modelled as a cool blackbody/disc blackbody/thermal plasma. We have compared the spectral shapes which show little change in spectral hardness despite a factor of $\sim 30$ increase in luminosity. We find no definitive spectral signatures to indicate that these sources contain neutron star primaries, and conclude that they are likely to be stellar-mass black hole XRBs (BHXBs), with black hole masses of $\sim 2$–23$M_\odot$ if accreting at the Eddington limit.