Overview of the study of radio-AGN in the local Universe with LOFAR. The most massive galaxies are always switched on.

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Abstract

The LOFAR Two-metre Sky Survey (LoTSS) is an ongoing radio-continuum survey of the northern sky at 150 MHz. With a resolution of 6 arcseconds and a median sensitivity of 71 microJy per beam it provides a source density that is about 10 times higher than the most sensitive existing very wide-area radio-continuum surveys. The first public data release covering 20\% of the final area is soon to be published (early 2019) in a special issue of Astronomy & Astrophysics.

We studied the radio-AGN sources of the Sloan Digital Sky Survey (SDSS) 7th Data Release covered by LoTSS. A method to separate radio-AGN is presented. Its robustness was checked by producing and comparing the luminosity functions with previous studies. The prevalence of radio-AGN activity is confirmed to show a strong dependence on stellar mass and black hole masses. At the higher stellar masses ($>10^{11} M_{\odot}$) the rate of radio-AGN activity reaches a 100 \%; thus, the most massive galaxies are always switched on at some level. The full Eddington-scaled accretion rate distribution (a proxy for the duty cycle) was probed for massive galaxies finding that more than 50 per cent of the energy is released during the $\leq 2$ per cent of the time spent at the highest accretion rates, $L_{\text{mech}}/L_{\text{Edd}} > 10^{-2.5}$. These results will be also published in the special issue of Astronomy & Astrophysics. Additional updated information can be found in https://www.jsabater.info/sea2018/