

The MURALES survey II. Presentation of MUSE observations of 20 3C low-z radio galaxies and first results

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Abstract

We present observations of a complete sub-sample of 20 radio galaxies from the Third Cambridge Catalog (3C) with redshift < 0.3 obtained from VLT/MUSE optical integral field spectrograph. These data have been obtained as part of the survey MURALES (a MUSE RAdio Loud Emission line Snapshot survey) with the main goal of exploring the active galactic nuclei (AGN) feedback process in a sizeable sample of the most powerful radio sources at low redshift. We present the data analysis and, for each source, the resulting emission line images and the 2D gas velocity field. Thanks to their unprecedented depth (the median 3σ surface brightness limit in the emission line maps is $6 \times 10^{-18} \text{ erg s}^{-1} \text{ cm}^{-2} \text{ arcsec}^{-2}$), these observations reveal emission line structures extending to several tens of kiloparsec in most objects. In nine sources the gas velocity shows ordered rotation, but in the other cases it is highly complex. 3C sources show a connection between radio morphology and emission line properties. Whereas, in three of the four Fanaroff and Riley Class I radio galaxies (FR Is), the line emission regions are compact, ~ 1 kpc in size; in all but one of the Class II radiogalaxies FR IIs, we detected large scale structures of ionized gas with a median extent of 17 kpc. Among the FR IIs, those of high and low excitation show extended gas structures with similar morphological properties, suggesting that they both inhabit regions characterized by a rich gaseous environment on kpc scale.

Key words: galaxies: active; galaxies: ISM; galaxies: nuclei; galaxies: jets.