Signatures of Jet Impact on the ISM in Radio Galaxy 4C+29.30

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ABSTRACT: We present results of a deep Chandra observation of a low-z radio galaxy with signs of the complex interactions between the radio plasma and ISM. The Chandra image shows regions of enhanced X-ray emission correlated with radio structures along the jet axis. The larger scale X-ray diffuse emission outside the radio source correlates with the morphology of known optical line-emitting regions. We measure the temperature of the ISM and identify regions heated by weak shocks with the Mach number of 1.6. The X-ray emitting gas is most likely heated by the radio source expanding within this galaxy. The multi-band data supply a complex view of the source, signaling feedback processes closely associated with the central active nucleus.

Radio Galaxy

The soft 0.5-2 keV X-ray emission spreads over the entire radio source with several emission regions: Central diffuse emission, Southern jet, Hot Spot and some diffuse emission related to the Southern Lobe. To the North the strong diffuse X-rays correspond to the Northern Radio Lobe and Hot Spot.

The Southern Hot Spot is the brightest X-ray emitting region. It is in radio/hard X-ray emission and very soft X-ray band, <0.25% of the total luminosity of this HS is equal to \( L_x(0.5-2\text{keV}) \approx 5.0\times10^{43}\text{ergs/s} \).

There is a strong morphological correspondence between the main radio source components and the detected X-ray emission features suggesting that the radio source heats up the gas and dissipate the initial jet energy.

• Radio features occur in pairs;
• X-ray peaks show as single features;
• The Southern Hot Spot is the brightest feature in radio and X-rays.
• Radio and X-rays peaks are offsets in secondary features, while the strongest emission sites are aligned.

Summary and Conclusions

References


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