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LHAASO J2108+5153u: what causes the non-thermal emission?

Gamma astronomy, in the last few decades, has given us a lot of new information while leaving us with many unanswered questions. Afull understanding of a large number of observed gamma-ray sources is still far from being achieved. The sources detected by the LHAASO Observatory, in the range of Very High Energies (VHE), have been published in its first full catalogue in 2024. Out of the 90 sources, around 25 do not yet have an associated counterpart in other wavelengths, and even when an association exists, most still lack an acceptable model that explains them. The source LHAASO J2108+5153u is one of them, with no confirmed counterpart and possible associations proposed, including a supernova remnant-molecular cloud system or a pulsar wind nebula, although no conclusive evidence currently supports any of these scenarios. In this work, we study this source and its surrounding region, revisit the different proposed scenarios, and model non-thermal radiative processes, while contrasting our results with observational data. In particular, we focus on a new hypothesis motivated by recent radio-wave observations, which reveal a previously unresolved double-jet structure in the region and open up a new possibility regarding the nature of the system. The double-jet structure seen in radio might be explained by a galactic microquasar, among other possibilities. We explore such a source in connection with the VHE emission detected.

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