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REDSHIFT OF THE EXTREME BL LAC 3FGL J0909.0+2310

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RESUMEN

3FGL J0909.0+2310 es una fuente brillante en rayos–γ detectada por el satélite Fermi. Su posición en el cielo y su emisión por encima de los 10 GeV lo hacen una buena candidata para ser estudiada con HAWC, el nuevo observatorio capaz de detectar fotones con energias por encima de los TeV. A partir de observaciones realizadas con OSIRIS y su espectrógrafo multi objeto montado en el Gran Telescopio Canarias obtuvimos la distancia a este interesante objeto.

ABSTRACT

3FGL J0909.0+2310 is a strong γ-ray source observed with the Fermi satellite. Its position in the sky and it's flux above 10 GeV makes it a good candidate to be observed with HAWC, the next generation of TeV observatories. We make use of the OSIRIS multi-object spectrograph mounted on the 10-m Gran Telescopio Canarias to obtain the redshift of this interesting source.

Key Words: BL Lacertae objects: individual: 3FGL J0909.0+2310 — galaxies: distances and redshifts

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1. INTRODUCTION

BL Lac objects are extreme active galactic nuclei in which the relativistic jets originating close to the central massive black hole (BH) are pointing directly to the observer. The highly beamed energy released by the central BH across the entire electromagnetic spectrum makes them visible at large distances, but at the same time dilutes severely any spectral feature from its host galaxy. Therefore, observations with 10-m class telescopes are commonly used to obtain accurate distances to these kind of sources. 3FGL J0909 is included in the First Fermi-LAT Catalog of Sources above 10 GeV, with a spectral index in the 10-500 GeV energy range of $\Gamma = 1.90 \pm 0.36$. Sources with hard spectral index and detected by Fermi above 10 GeV are targets of interest for follow up studies at the very high energies.

2. OBSERVATIONS

The observations were performed using the OSIRIS Multi Object Spectrograph in service mode under the program GTC5-15BMEX (PI DRG). The spectrum covers the range from 5100 to 10000 Å with an effective resolution of 10.86 Å. We make 3 exposures of 1310 seconds on target to facilitate later removal of cosmic ray hits. The data reduction was carried out by using a new pipeline described in Gómez-González, Mayya, & Rosa-González (2016).

3. RESULTS

By carefully extracting the GTC spectra by avoiding the featureless central engine we assign to 3FGL J0909 a redshift of z=0.432±0.002. Having a precise spectroscopic redshift determination and taking into account that photons from this object have been detected above 10 GeV, makes 3FGL J0909 an interesting target for TeV telescopes. The full version of this study where we include the spectrum of 3FGL J0909 and discuss in detail the spectroscopic groups that we detect within the OSIRIS field of view is presented in Rosa-González et al. (2016).

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