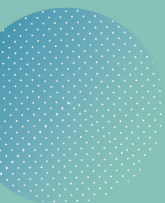




INSTITUTO DE FÍSICA
DE PARTÍCULAS Y DEL COSMOS

IPARCOS



Preprint Series in Particles and Cosmos Physics

nº IPARCOS-UCM-23-010

Controlling the artificial radiance of the night sky: The Añora urban laboratory

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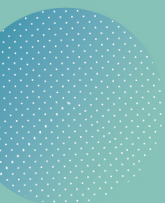
February 2023

Plaza de las Ciencias, 1 28040 Madrid, Spain

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Abstract

We provide radiometric evidence of the relevance of nearby light sources on the artificial brightness of the night sky. To obtain the required data we developed a method based on the use of power-regulated urban lighting systems, which also provides relevant information on the propagation of light pollution at short distances from the sources. A controlled experiment was carried out in the Andalusian municipality of Añora (1526 inhab.) in which the radiant power of its regulated public outdoor lighting system was modified in a pre-defined way during the central part of the night while continuously recording the zenith sky brightness in the TESS-W photometric band from two separate locations inside the town. We determined that the power-regulated streetlight sources contribute a 60–62% to the total zenith sky brightness at these observing locations in clear and moonless nights when operated at their maximum power rating, being the remaining sky radiance due to constant local sources and sources from neighboring towns. These results, in combination with georeferenced information on the sources' location and properties, impose some constraints on the functional form of the effective point-spread functions (PSF) of the zenith sky brightness at short distances from the sources. For the conditions of our experiment we have found that the expected exponents of power-law PSFs are close to -1.

