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Optimized dark matter searches in deep observations of Segue 1 with MAGIC

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Determining the nature of dark matter (DM) is one of the most exciting tasks of modern science. In most of the suggested hypothesis, DM particles should annihilate or decay into standard matter, which would produce high energy gamma-ray signal. The MAGIC telescopes search for such a DM signature in the 50 GeV - 50 TeV energy range. Suitable targets are the Galactic centre, local DM clumps, satellite dwarf spheroidal galaxies and galaxy clusters. We concentrated our effort on one of the most promising candidates, the dwarf spheroidal galaxy Segue 1, which has a mass-to-light ratio estimated to the order of 1000. The 160 hours of observation, carried out between 2011 and 2013, were analysed with a likelihood approach optimized for signals with characteristic spectral features of different DM theoretical scenarios. Our results represent the most stringent constraints to the annihilation cross-section and decay lifetime obtained from satellite galaxy observations, for masses above few hundred GeV.

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