Upper limits on the WIMP annihilation cross section from a joint analysis of dwarf spheroidal satellite galaxy observations with the MAGIC telescopes

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MAGIC
Major Atmospheric
Gamma Imaging
Cerenkov Telescope

Multi-year dSphs observation program for dark matter searches:

- diversification of the targets, in order to lower the weight of the systematic uncertainties introduced by each dSph
- enlargement of the available data sample
- enlargement of the data sample used for a future combination of the data with the ones of other gamma-ray experiments [Glory duck project]

Targets

Draco [newly observed], Coma Berenices [newly observed], Segue 1 [already published], Ursa Major II [already published]

DM analysis

- analyzed individual dSphs and a combined data sample of 354.4 h of data
- applied a binned likelihood analysis
- considered the extension and the emission morphology of each target

Results

- no signal detected in the gamma regime in either of the dSphs
- 95% CL upper limits on the velocity-averaged annihilation cross-section of WIMP for individual dSphs and for the combined data sample
- most constraining upper limits obtained in the MAGIC experiment and most stringent at TeV DM masses among other gamma-ray experiments
- robustness of the results: compatibility of the upper limits for the combined data sample using different realizations of the J-factor for each dSph

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