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J-factor estimation of Draco, Sculptor and Ursa Minor dSphs with the member/foreground mixture model

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Dwarf spheroidal galaxies (dSphs) are promising targets for indirect detection experiments since they contain a large amount of dark matter (DM). For the precise calculation of the amount of annihilation signal flux from dSph, we must know the DM mass density distribution of target dSphs, estimated from the observation of the stellar motion.

In the DM profile estimation, the major uncertainty of DM profile comes from the foreground contamination of the Milky Way stars in front of dSph. In the conventional analyses, the contaminated stars are partially removed based on their membership probability estimated by a clustering technique called EM algorithm. However, even if we use this technique, some contaminated stars still remain in the data set, which leads to the incorrect sensitivity of indirect detection experiments.

In this work, we adopt a new method to deal with the contamination effect based on the mixture model of the dSph member and foreground stars.

Using this method, we estimate the DM density profile of Draco, Sculptor, and Ursa Minor, the top three DM rich dSphs, with reliable errorbars properly including the uncertainty of the contamination effect.

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