Review of: "Slow diffusion around pulsar -ray halos and its impact on cosmic rays propagation"

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Potential competing interests: No potential competing interests to declare.

This article treats a relevant topic for the community of astroparticles. The authors study the impact of suppressed diffusion around pulsar wind nebulae (assuming that all these sources are have a similar diffusion coefficient as found for TeV halos) in the flux of positrons at Earth. Then, they also study the impact of having slow diffusion in the disk for the positron signals that could be originated by dark matter annihilation in the Galaxy.

My critical points are the following: First, it is assumed that all pulsars have similar suppression of the diffusion coefficient, which may be not true at all (in fact, we have detected very few TeV halos yet). This could be discussed in more depth given that is the main assumption in the paper. In addition, the two-zone diffusion model that the authors employ has some uncertainties associated that are not discussed in detail here and may be very significant. Then, in the section about the dark matter signals the authors miss some very important results in literature that would make their conclusion totally opposite: There are current limits derived from gamma-ray observations that totally exclude the <sigma v> vs mass contour that the authors derive. Specially the HESS limits (ArXiv:2207.10471) are much more constraining and not shown . Also radio observations would exclude those contours (see Fig. 3 of ArXiv:2209.15590). This must be at least commented, and would change completely the conclusions of this work. On top of this, it would be necessary to add some more discussion about this “slow disk model”.