Forward–Backward Asymmetry of the 3-Dimensional WIMP Effective Velocity Distribution

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Abstract: In the last (more than) three decades, more than 40 experiments have been built or are being planned to search for different WIMP (Weakly Interacting Massive Particle) candidates by direct detection of their (elastic) scattering signals off target nuclei in low–background underground laboratory detectors. In my last talk, I introduced our double–Monte Carlo scattering–by– scattering simulation package for 3-dimensional elastic WIMP–nucleus scattering and presented (the annual modulations of) the angular distributions of the recoil direction (flux)/energy of WIMP–scattered target nuclei observed in different (celestial) coordinate systems. Then, in this talk, I will go to demonstrate the astrophysical properties of WIMPs scattering off target nuclei. The differences between these scattering–participated WIMPs and the entire halo WIMPs and, in particular, an interesting (asymmetric) "forward–backward asymmetry" of the 3-D WIMP Galactic effective velocity distribution, will be discussed in detail. The impact of our observations as well as some textpaper–challenged materials will also be mentioned.