

PARTIAL WAVE DECOMPOSITION OF FINITE-RANGE EFFECTIVE INTERACTIONS

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We discuss some infinite matter properties of two finite-range interactions widely used for nuclear structure calculations, namely Gogny and M3Y interactions. We show that some useful informations can be deduced for the central, tensor and spin-orbit terms from the partial wave decomposition of the symmetric nuclear matter equation of state. We show in particular that the central part of the Gogny interaction should benefit from the introduction of a third gaussian and the tensor parameters of both interactions can be deduced from special combinations of partial waves. We also discuss the fact that the spin-orbit of the M3Y interaction is not compatible with gauge invariance. Finally, we show that the zero-range limit of both interactions coincide with a particular form of the N3LO Skyrme interaction and we emphasise from this analogy the benefits of N3LO.