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Inelastic neutrino-nucleus scattering: a hybrid nuclear model approach

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We present nuclear structure calculations adopting a novel hybrid nuclear model, combining the nuclear shell model and the microscopic quasiparticle-phonon model [1]. The predictivity of the hybrid model is tested by computing inelastic neutral-current neutrino-nucleus scattering cross sections off the stable thallium isotopes, taking also into account the effect of nuclear recoil energy. The model is applied assuming neutrinos emerging from: i) the sun, ii) pion-decay at rest and iii) the diffuse supernova neutrino background. Regarding solar neutrino rates, the new results are compared with previously reported results based solely on nuclear shell model calculations [2], demonstrating the improved accuracy of the adopted hybrid model at higher neutrino energies.

References

- [1] H. Matti, D. Papoulias, J. Suhonen, accepted in Phys. Lett. B.
- [2] D. Papoulias, H. Matti, J. Suhonen, Phys. Rev. C 110 (2024), 3, 034309.

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