Electron scattering longitudinal response functions in relativistic nonlinear models

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We have determined the longitudinal response functions for ^{56}Fe at a transfer of 570 MeV/c taking into account RPA correlations in the relativistic nonlinear models. Thus, an infinite sum of particle-hole excitations (in both isoscalar and isovector channels) as well as contributions coming from nonlinear terms have been taken into account. The relativistic nonlinear models considered here are the models NL1, which contain only σ self-coupling terms in the Lagrangian, TM1 including in addition an ω self-coupling term and G1, coming from an effective field theory which allows all scalar-vector coupling terms up to fourth order in the Lagrangian. These three models provide Landau parameters in nuclear matter[1] in good agreement with the empirical values deduced from physical constraints. We have compared the longitudinal response function for ^{56}Fe with the response function coming from the world data on inclusive quasielastic electron scattering[2, 3]. We have found very similar results for the three models considered, in relatively good agreement with the data.

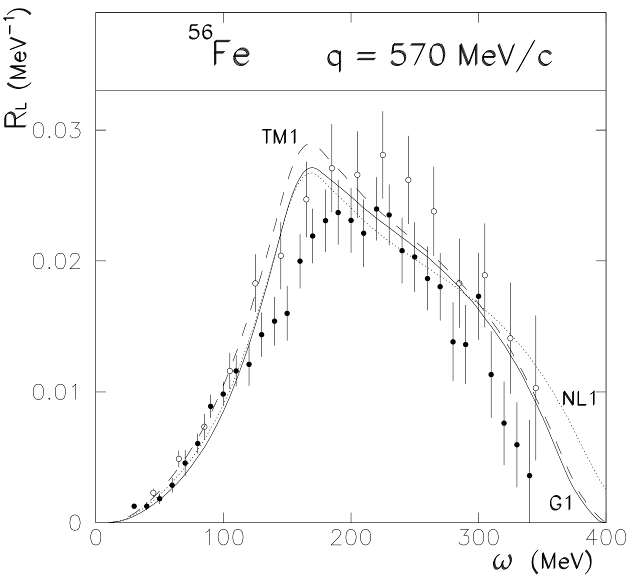

Figure 1: Longitudinal response functions in various nonlinear models. The experimental data are taken from Ref.[2] (open circles) and Ref.[3] (filled circles).

References

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