Contribution ID: **42** Type: **Poster**

Systematic muon capture rates in PQRPA

Thursday, October 25, 2012 6:00 PM (1h 30m)

In this work we performed a systematic study of the inclusive muon capture rates for the nuclei 12C, 20Ne, 32Mg, 28Si, 40Ar, 52Cr, 54Cr, 56Fe, and 58Ni using the Projected Random Quase-particle Phase Approximation (PQRPA) as nuclear model.
The theoretical results of the capture rates within the PQRPA have been compared with those obtained in other works using other models.
We reckon that the comparison between theory and data for
the inclusive muon capture is not a fully satisfactory test on the nuclear model that is used. The exclusive muon transitions are more robust for such a purpose.

Summary

In this work we performed a systematic study of the inclusive muon capture rates for the nuclei 12C, 20Ne, 32Mg, 28Si, 40Ar, 52Cr, 54Cr, 56Fe, and 58Ni using the Projected Random Quase-particle Phase Approximation (PQRPA) as nuclear model.
The theoretical formalism for the muon capture rates shown in Ref. [1] is used with the delta interaction as the residual interaction in nuclear structure calculations.
The theoretical results of the capture rates within the PQRPA have been compared with those obtained in other works using the models of RPA+BCS [2] and RQRPA (relativistic QRPA) [3].
This leads to a modification of the axial coupling constant gA = 1 to gA = 1.135, resulting in one better agreement with the experimental data.
The influence of the CVC (Conserved Vector Current) in the muon capture rates for the presented nuclei was explicitly verified for the first time in the literature. This showed to be more significant in lighter nuclei, still more when the Coulomb term of muon-nucleus interaction is disrespected.
A final comparison was carried through inclusive capture and exclusive muon capture rates in 12C showing that the PQRPA did not present a good experimental agreement for the exclusive capture, only for the inclusive one. We reckon that the comparison between theory and data for the inclusive muon capture is not a fully satisfactory test on the nuclear model that is used.
The exclusive muon transitions are more robust for

such a purpose. Therefore, it would be necessary more experimental data for the exclusive capture rates in other nuclei, beyond 12C, to test if a nuclear model is satisfactory [4].

References

[1] F. Krmpotic, A. Mariano and A. Samana,
Phys. Rev. C 71, 044319 (2005).
[2] N.T. Zinner, K. Langanke e P. Vogel,
Phys. Rev. C 74, 024326 (2006).
[3] N. Paar, T. Niksic, D. Vretenar, and P. Ring,
Phys. Rev. C 69, 054303 (2004); N. Paar, D.
Vretenar, T. Marketin and P. Ring, Phys. Rev. C 77, 024608 (2008).
[4] Danilo Sande Santos,Captura de mons usando PQRPA,
thesis presented for the degree of Master
of Physics Science, unpublished, Universidade
Estadual de Santa Cruz, February 2012, Bahia,
Brazil.

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Session Classification: Happy hour with posters

Track Classification: Happy hour with posters