

Heavy Barions and new Interacting Boson Fermion Fermion Model results

mercoledì 11 ottobre 2023 15:00 (20 minuti)

In the first part of the presentation, we present a study of the spectra and strong decay widths of heavy baryons. The masses of single heavy baryons up to the D-wave are calculated within a constituent quark model, employing both the three-quark and quark-diquark schemes. We calculated the decay widths of the ground and excited single heavy baryons into the heavy single baryon-(vector/pseudoscalar) meson pairs and the (octet/ decuplet) baryon-(pseudoscalar/vector) heavy meson pairs. Moreover, we discuss why the presence or absence of the ρ -mode excitations in the experimental spectrum is the key to distinguishing between the quark-diquark and three-quark behaviours, as it was originally pointed out in \cite{Santopinto2019}. Our quantum number assignments and predictions for mass spectra and strong-decay widths are in agreement with the available data \cite{Bijker:2020tns,Garcia-Tecocoatzi:2022zrf,Garcia-Tecocoatzi:2023btk}. Hence, our findings provide valuable guidance for future measurements in experiments conducted at LHC, Belle, and Belle II.

In the second part of this talk, we present a new application of the Interacting Boson Fermion-Fermion Model (IBFFM) for describing double charge exchange reactions. The study of double charge exchange reactions induced by heavy ions involving candidate nuclei for neutrinoless double beta decay is a complex task carried out by the NUMEN collaboration \cite{NUMEN:2022ton}. This investigation faces the intricacies of complex odd-odd intermediate nuclei in sequential double charge exchange processes. We offer a comprehensive description of heavy odd-odd nuclei using the (IBFFM). Additionally, we outline the methodology for describing transfer operators within this framework. Finally, we explore the potential applications of our results in future reaction codes for describing double charge exchange reactions. “

\begin{thebibliography}{100}

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\bibitem{NUMEN:2022ton}

F.-Cappuzzello, H.-Garcia-Tecocoatzi, E.-Santopinto, \textit{et al.} [NUMEN], “Shedding light on nuclear aspects of neutrinoless double beta decay by heavy-ion double charge exchange reactions,” Prog. Part. Nucl. Phys. \textbf{128}, 103999 (2023) doi:10.1016/j.pnpnp.2022.103999 \end{thebibliography}

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