Instabilities of relativistic mean field models and the role of nonlinear terms

A. Sulaksono,1 T. Mart,1 T. J. Bürvenich,2 and J. A. Maruhn3

1Departemen Fisika, FMIPA, Universitas Indonesia, Depok 16424, Indonesia
2Frankfurt Institute for Advanced Studies, Universität Frankfurt, 60438 Frankfurt am Main, Germany
3Institut für Theoretische Physik II, Universität Frankfurt, 60438 Frankfurt am Main, Germany

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The instability of nuclear matter due to particle-hole excitation modes has been studied in the framework of several relativistic mean-field (RMF) models. It is found that both the longitudinal and the transversal modes depend sensitively on the parameter sets used. The important impact of the vector and vector-scalar nonlinear terms on the stability of both modes is demonstrated. Our finding corroborates the result of previous studies, namely that certain RMF models cannot be used in high-density applications. However, we show that for certain parameter sets of RMF models this shortcoming can be alleviated by adding these nonlinear terms.

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