Investigation of statistical correlation of negative parity energy levels in ^{170}Tm nucleus

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Abstract

In this paper, the statistical properties of 1^- to 7^- negative parity levels in the ^{170}Tm nucleus are considered with emphasis on the nearest neighbor spacing distribution in the framework of random matrix theory. The latest available experimental data for different negative parity energy levels in the $E \leq 3000$ keV region are used to classifiy in different sequences and are analysed. The Berry – Robnik distribution function and the least square extraction method have been used to determine the parameter of distribution function in considered sequences. The results
 show the adaptation of the statistical behavior of all considered negative parity levels with the Wigner distribution function and therefore, the statistical correlation of such levels. Also, the strong correlations are yield for the sequences prepared by levels with odd spin values while the 2^- levels show a weak correlation and a Poisson-like behavior. The dependence of the statistical behavior of the negative parity levels to the energy was investigated which suggests the maximum correlation in the $1300 < E < 2100$ keV energy region.

Keywords: random matrix theory (RMT), statistical correlation, unfolding, negative parity

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