



Семинар
«МАЛОЧАСТИЧНЫЕ СИСТЕМЫ»
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ON THE SPECTRUM OF THREE-BODY STATES IN THE ONE-DIMENSIONAL HARMONIC TRAP

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The system of three identical particles with contact two-body interactions in the one-dimensional harmonic trap is considered. One of possible applications is an optional study of non-stationary problems, in particular, to elucidate the quasi-integrability of the experiments in the quantum Newton's cradle set-up [1].

Up to 30 energy levels of even-parity totally symmetric states are calculated as a function of the interaction strength λ . The calculations show that energy levels form a number of bunches, in which they become degenerate for two limiting values of $\lambda = 0$ and $\lambda \rightarrow \infty$, where the system is integrable. The wave-function structure is demonstrated by plotting the nodal lines for different levels and interaction strength. The critical values λ_c are found, for which topological properties of nodal lines change thus indicating the different wave-function structure if λ crosses these values. The prospects for calculation of the highly excited states are discussed.

- [1] T. Kinoshita, T. Wenger, and D.S. Weiss, "A quantum Newton's cradle", *Nature* **440**, 900 (2006).