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Parity non-conservation effects on slow neutrons capture by Lead nucleus

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More than thirty years ago high values of parity violation (PV) effects in comparison with theoretical evaluations in the scattering of slow neutrons experiments on Lead nucleus were observed. From scattering experiments resulted that the main contribution to the PV effects is given by the ^{204}Pb isotope of Lead. Further in order to solve the discrepancy between theory and experiment on PV effects it was supposed the existence of a new so-called "negative" neutron P-resonance. In one of our previous work we have evaluated the PV effects on ^{204}Pb isotope and using the existing experimental data the weak matrix element was extracted. With some uncertainty we demonstrated the possibility of the existence of a new P-resonance near the neutron threshold. Then we concluded that are necessary new data on PV effects in nuclear reactions induced by slow neutrons and one of the most convenient is the capture of the slow neutrons. In this work the asymmetry of emitted gamma quanta was evaluated in the frame of the formalism of the mixing states of the compound nucleus with the same spin and opposite parities. Combining the scattering and capture experimental and theoretical data it is possible first to extract the weak matrix element of PV process and the answer to the question of the existing of a new neutron P-resonance.

The present theoretical evaluations on PV effects in nuclear reactions by slow neutrons are dedicated to the preparation of new measurements at IREN (Intense Resonance Neutron), a neutron source of LNF - JINR.

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