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Study of Discrete Symmetry Breaking Effects in Neutron-induced Compound States

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The neutron absorption in eV region is dominated by capture process via well-resolved compound states. The breaking of the spatial inversion symmetry is known to be largely enhanced in p wave compound resonances according to the interference in the entrance channel between neighboring resonances with different angular momentum of incident neutrons. The entrance channel interference naturally implies the interference between components with different channel spins. Such interference is theoretically predicted to cause an enhancement in the observation of T-odd spin correlation terms which may contained in meson-nucleon interactions. Assuming the CPT-theorem, the enhanced sensitivity to T-violation introduces a new type of CP violation search beyond the standard model, which may be competitive with other experimental searches such as the neutron electric-dipole-moment measurement. We discuss the study of the interference mechanism to quantify the experimental sensitivity to T-violation and discuss possible experiments with the pulsed neutron beam from intense spallation neutron sources.

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