2. Beta-decay study of nuclei using a gamma-ray total absorption spectrometer.

In the nuclei near a beta stability line the main part of the Gamow-Teller (GT^+ and GT^-) -strength comes to the energy region above a QEC-value, and only low energy tails of strength distributions are accessible for the beta decay. In a contrast, for the strongly neutron deficient nuclei, the GT^+ strength was expected on the basis of shell-model calculation to be within the QEC window which makes the study of the beta decay of exotic nuclei particularly interesting. However, in studying the beta decay of heavy nuclei there is a difficulty of performing the complete high-resolution experiment due to the high level density and correspondingly the very fragmented gamma-ray intensity. As a high efficiency alternative to the Ge detectors, a NaI detector of a large volume was suggested. The idea was to measure the total energy of gamma radiation following the beta decay with a radioactive source situated in the center of the large detector in order to provide the solid angle close to 4□. Such a "Total Absorption Gamma ray Spectrometer" (TAGS) was put in operation at the IRIS facility of PNPI in 1980 and had revealed the resonant behavior of the GT^+ strength for the decay of odd and odd-odd nuclei in the rare earth region. The further experiments in the rare-earth region have given an evidence for a smooth isotopic dependence of the resonance position that remained even while crossing a neutron magic gap N=82.

The investigation of GT strength function was continued at the total absorption spectrometer installed at the on-line mass-separator GSI Darmstadt. The experiments were concentrated on the nuclei near the doubly magic ^{100}Sn. Because the beta decay in this region is dominated by only transformation □$g_{9/2}$ □ $vg_{7/2}$, the strength function was expected to have a simple structure accessible for the theoretical analysis. The first data have been obtained for the chain of silver isotopes. A most intrigue result is very strong suppression of the total GT^+ strength that exceeds the value expected from the comparison with the suppression of GT^- resonance excited in the reaction on the stable nuclei. The resonance excitation energies and widths have been successfully reproduced in the frame of an advanced shell-model approach using a realistic nucleon-nucleon interaction, but the model can not explain the experimental value of the suppression of GT^+ strength. To explain this features, the further study of the beta decay near ^{100}Sn are carried out.

(For more detail review see article A.A. Bykov et al., Bull. Russian Academy of Science, Series of Physics, 1980, V. 44, P.918 and " Beta Decay of 98Ag: Evidence for the Gamow-Teller Resonance near 100 Sn", Z. Hu, L. Batist et al., Phys. Rev. C 62 064315 (2000).