The stength ratio of the transitions to $4qp$ and $2qp$ states, expected from the simple shell model considerations, is 15:1 for the ^{100}Ag decay and 40:1 for ^{104}In [5]. The observed ratios are about 16(5) for ^{100}Ag decay and larger than 600 for the ^{104}In decay. The core polarization should not affect the shell model prediction of this ratio much but may, according to [5], reduce them somewhat, Thus the agreement for the $4qp/2qp$ ratio in ^{100}Ag decay may be accidental but the strong suppression of transitions to $2qp$ for ^{104}In decay seems to be a puzzle.

The results obtained indicate that the studies of odd-odd nuclei in the ^{100}Sn-region performed with the total absorption technique may yield an important contribution to the understanding of the GT-strength quenching.

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THE MARBURG UNIVERSITY — PNPI OFF-LINE MASS SEPARATOR

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The goal of the Marburg University - PNPI joint programme is to investigate atomic and nuclear properties of longlived promethium isotopes. Previous optical experiments with isotope ^{147}Pm had unsatisfactory accuracy due to the Doppler broadening of spectral lines. Therefore most of the badly resolved hyperfine structures in the measured spectra are still unexplained [1]. The usage of mass separated beams of promethiums ions and Collinear Laser-Ion Beam Spectroscopy with a continuous wave dye laser give results free of Doppler broadening and thus provides very accurate hfs data [2]. A good knowledge of the promethium atomic properties, in particular, their hfs data, is necessary to extract information of nuclear momentums of shortlived promethiums isotopes.

Mass separator Mars-II of Marburg University was transported to Gatchina and installed in the IRIS experimental area. In 1995, the off-line mass separator was put into operation. It has 90 deg. sector magnet with a bending radius of 1 m, an ion energy is 20 keV [3] . Besides, the separator includes an ion source, electrostatic focusing lenses and collector chambers.

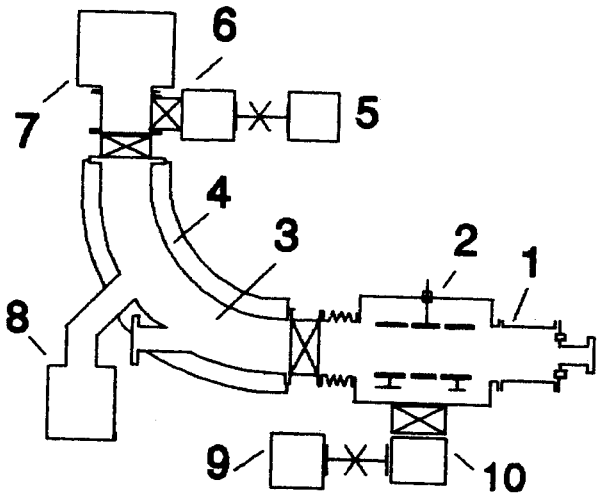

Fig.1. *1* – ion source, *2* – focusing chamber, *3* – magnet chamber, *4* – magnet, *5,9* – oil pumps, *6,10* – oil diffusion pumps, *7* – collector chamber, *8* – ion-sputtering pump

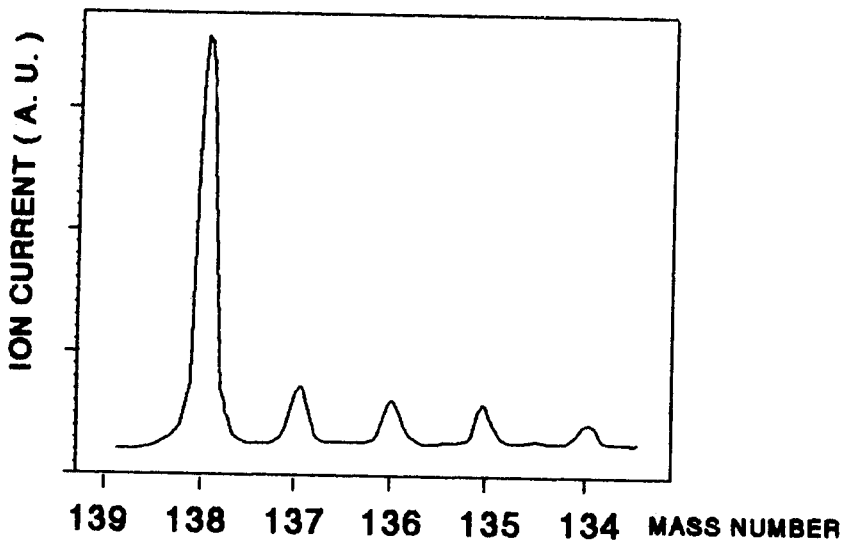

Fig.2. Mass spectrum of stable bariums ions

The vacuum system consists of 3 oil pumps, 2 oil diffusion pumps, a turbo molecular pump and an ion-sputtering pump (see Fig.1.).

The results of testing experiments confirm the expected parameters. The observed mass spectrum of stable Barium's ions at the focal plane can be seen in Fig.2. The distance between the mass lines 138 and 134 at the collector was about 32 mm. The half width of the mass line was about 1.5 mm, and its height about 4 mm. These characteristics lead to the value of the mass resolution near to 700. The measured efficiency of the mass separator is about 80%.

At present a few sources, which are planned to be installed at the on-line mass separator IRIS, in particular, a new version of the laser ion source [4] at the off-line mass separator, are tested.

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(p,2p) AND (p,np) REACTIONS ON ^{90}Zr AND ^{208}Pb NUCLEI AT 1 GEV. EVOLUTION OF PARAMETERS OF DEEP NUCLEAR SHELLS

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These experiments [1] are continuation of a series of the fulfilled earlier analogous experiments on a study of neutron and proton hole states of $2s - 1d$-shell nuclei ($16 \leq A \leq 40$) in $(p, 2p)$ and (p, np) reactions at 1 GeV proton beam of Gatchina synchrocyclotron [2]. Using the missing mass correlation spectrometer with overall energy resolution FWHM = 3.5 MeV, described in previous papers, the difference sections $d^3\sigma/d\Omega_1\ d\Omega_2 dT_1$ of quasielastic knock out of proton and neutron from different shells of magic nuclei ^{90}Zr and ^{208}Pb were measured. The obtained energy spectra of hole states of these nuclei are shown in the figures.

At separation of deep s and p levels with large dead widths it was used that in the maximum of knock out of a nucleon from s levels the contributions of p levels in cross section are suppressed, and near the maximum of knock out from p levels the contributions of s levels are suppressed. In order to separate the unresolved peaks, caused with spin-orbit splitting of shells ($1p_{3/2}$, $1p_{1/2}$, $1d_{5/2}$, $1d_{3/2}$, $1f_{5/2}$, $1f_{7/2}$ ...), their relative strengths were fixed in accordance with ratios of their spectroscopic factors. For 2p and 2d states it was succeeded to determinate only the centers of weights of their spectral distributions. The results are presented in the table.

Using these data and the results, obtained in previous experiments, empirical A-dependencies of energies and widths of proton and neutron deep hole states are discussed.