Here $\rho, \vartheta_1, \vartheta_2, \ldots, \vartheta_{n-1}$ are polyspherical coordinates for n-particle system. For angular part of Laplace operator using rotation and permutation symmetries eigenfunctions for 3, 4 and 5 identical particles were constructed. Derivation of all formulae is given in a simple and transparent form. Angular distributions of cross sections in elastic and inelastic scattering of nucleons on light nuclei are discussed.

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ALPHA DECAY $^{225}Ac \rightarrow {}^{221}Fr$

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Considerable attention has been given to nuclei with A = 220 – 230 recently. In this region there occurs transition from the spherical to the deformed nuclear shape, which gives rise to some specific features in the nuclear structure. In particular, negative parity levels with low excitation energies have been found in even-even nuclei from this region [1, 2].

One of the nuclei allowing experimental investigation of the above properties is ^{221}Fr. The nuclide ^{221}Fr is from the region of isotopes which does not include stable nuclei and thus it cannot be studied in several-nucleon transfer reactions. In addition, the neutron excess in this nucleus makes it impossible to study the nucleus in reactions with heavy ions. Experimental information on the ^{221}Fr level structure can only be gained from investigation of the ^{225}Ac ($T_{1/2}$= 10 days) alpha decay or the ^{221}Rn ($T_{1/2}$= 25 min) beta decay. In the latter case the possibilities of the investigation are restricted by difficulties in making of ^{221}Rn sources. Therefore, most information on the structure and properties of ^{221}Fr is derived from investigation of the ^{225}Ac α -decay [3].

In-depth investigation of (α - γ)- coincidences at the ^{225}Ac decay is carried out. Twenty-one new weak γ - rays are found; 18 γ-rays earlier ascribed to the ^{225}Ac decay are not confirmed. The quantitative analysis of the (α - γ)- coincidences makes it possible to find the intensity of ^{221}Fr levels by the α decay and multipolarities of five weak γ-transitions. The conversion electron spectrum is investigated in the range of 5 ÷ 24 keV with a high (some 20 eV) energy resolution. A new M1 type 10.6-keV γ-transition is found. The proposed ^{225}Ac decay scheme includes 31 excited ^{221}Fr states. Parities are established for 16 of them. Possible

spin values are proposed for ^{221}Fr levels. Properties of excited ^{221}Fr states are satisfactorily described by the quasiparticle-phonon nuclear model without the assumption of static octupole deformation.

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DIFFERENTIAL CROSS SECTION MEASUREMENT OF REACTION ^{7}Li(p,α)^{4}He IN THE ASTROPHYSICAL RANGE OF ENERGY

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In astrophysical processes the reaction ^{7}Li(p,α)^{4}He is the final stage of the cycle of the conversion of hydrogen into helium. There are several sets of data on measurements of total cross sections of the reaction ^{7}Li(p,α)^{4}He in the region of E_p = (0.01 ÷ 10) MeV [1 ÷ 7]. Data of works [6, 7] differ from those of others by 2 times.

In the present work there were carried out measurements of yields of cross sections of the reaction ^{7}Li(p,α)^{4}He and also their angular distributions. The accelerated protons beam passed through the target with thin carbon base, and the Faraday cup, disposed behind the target detected the beam current.

^{7}Li targets of different thicknesses (several tens of micrograms) were prepared by means of spraying of lithium isotope onto thin carbon films. Measurements of spectra were carried out with the help of the detector of charged particles at energies of protons E_P = 350, 550 and 750 keV. At every energy there was measured the angular distribution of alpha particles (products of nuclear reaction) in the range of from 20^0 to 170^0 with the step of 15^0. During the measurements the lithium - targets was placed at the angles of 45^0 or 135^0 to the incident protons beam depending on the angle of the detector location. During the measurements there was an intensive background from elastic scattering of beam protons. In order to eliminate this background, between the detector and the target, close to the detector there was placed the aluminum foil of the thickness of 3.5 mg/cm^2. By such the thickness of the aluminum foil the threshold of the proton energy absorption is ~ 1MeV. As a result, the background from protons disappeared completely, but there was taken place the spreading of the spectral line of