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PROGRESS REPORT

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The activities are going on at the Institute of Physics with Nuclear Research Centre, Bulgarian Academy of Sciences, Sofia

I. A group /N.Kashukeev, N.Kalinkova et al./ is developing a programme of photo-fission studies at the IRT-I000 reactor in Sofia /see Progress Report, Bulgaria I969/. Test results on correlation measurements of energy, mass and angular fission fragment distributions after neutron irradiation have been obtained. A double pulse ionization chamber with grids and electronic collimation has been applied. Minsk-2 electronic computer data processing has been used.

The energy distribution results are the following ones:

	Time-of-flight method	Present experiment
Light fragment energy	99.4 $\pm$ I.0 MeV	I00.I4 MeV
Heavy fragment energy	68.2 $\pm$ 0.7 MeV	69.64 MeV
Width at I/2h, L	I3.8 MeV	I2 MeV
Width at I/2h, H	20 MeV	I9 MeV
Ratio of most probable energies	I.46	I.46

The total kinetic energy distributions of fission fragments for all fragment masses and fixed mass ratios m_I/m_2 have been obtained. The average total kinetic energy for all m_I/m_2 is I68.5 MeV, distribution width - 26 MeV. The total kinetic energy decrease in the symmetric fission region is estimated to 2I.5 MeV.

The most probable mass ratio is m_I/m_2 = I.48. The min/max ratio in the mass distribution has an order of magnitude I/400.

The fragment ranges for Ar + 4% CO_2 and Ar + 4% CH_4 have been studied. The angular distribution has been found to be isotropic, which is a check for angular distribution measurement possibilities.

2. A group /V.Hristov, A.Stanolov, L.Alexandrov/ continues its investigations on neutron diffusion and thermalization in heterogeneous water lattices by pulse methods, using a fast chopper at the IRT-1000 reactor in Sofia.

Several series of experiments on thermal neutron heterogeneous absorption by non-stationary diffusion /parameters D and C/ have been performed, and the data are under processing. The purpose is to verify recent theoretical results by Kazarnovsky, Ilieva /Institute of Physics, USSR Academy of Sciences, Moscow, to be published/. Cubic light water lattices with a geometric parameter B^2 = 0.0695 - 0.3965 cm^{-2} have been used, containing cylindrical aluminium tubes /lattice spacing I.8 cm, tube radius 0.5 cm/ with water solution of H_3BO_3, $\Sigma_a \approx 0.2$ cm^{-1}.

Experiments on the dependence of neutron temperature on B^2, and experiments on M_2 /thermalization parameter/ by the moderator poisoning method with a non- I/V absorber are under preparation.

3. A group /N.Antonov, D.Damianov, V.Hristov, T.Troshev/ has performed experiments on two-group fast neutron diffusion parameters for a heterogeneous water medium with empty cylindrical tubes /lattice spacing I.8 cm, tube radius = 0.5 cm and ratio of tube to water volumes p = 0.3198/ at the IRT-1000 reactor in Sofia.

The first group relaxation lengths $\lambda_{11}, \lambda_{\perp}$ have been determined by the removal cross-section method. The second group coefficients L_{11}^2/L_o^2, $L_{\perp}^2/L_o^2$ and the coefficient of anisotropy $L_{11}^2/L_{\perp}^2$ have been obtained by the exponential method.

The results are as follows:

		Experiment	Theory /Behrens/
	$\lambda_{\parallel}$	I6.75 cm	-
3 MeV < E	$\lambda_{\perp}$	I6.75 cm	-
	$\bar{\lambda}$	I6.75 cm	I4.I8 cm
	$L_{\parallel}^{2}/L_{o}^{2}$	2.I6	I.95
I.44 eV < E < 3 MeV	$L_{\perp}^{2}/L_{o}^{2}$	I.79	I.79
	$L_{\parallel}^{2}/L_{\perp}^{2}$	I.20	I.09

compared with the theory by Behrens D.I. /Proc.Phys.Soc.A62,607,I949/.

One observes that the $\lambda_{\parallel} \approx \lambda_{\perp}$ measured values are slightly higher than the calculated homogeneous value $\bar{\lambda}$. This could be explained as a diffusion prolongation according to the theory of Behrens. One also observes that the $L_{\parallel}^{2}/L_{o}^{2}$ value/ and accordingly $L_{\parallel}^{2}/L_{\perp}^{2}$ / is slightly higher than the calculated one. The measured and calculated $L_{\perp}^{2}/L_{o}^{2}$ values coincide.

4. A group /Z.Zhelev et al./ is working on decay properties and level schemes of neutron defficient isotopes obtained on a 660-MeV proton accelerator /in Dubna/.

5. A group /E.Nadjakov et al./ is working on decay properties and level schemes of neutron defficient isotopes obtained on heavy ion accelerators /U-300 and U-200 in Dubna/.

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