

PARTICLES
AND
NUCLEI
XIII INTERNATIONAL
CONFERENCE

Perugia (Italy)
28 June - 2 July 1993

BOOK OF ABSTRACT
VOL. I

PARTICLES AND NUCLEI
XIII INTERNATIONAL CONFERENCE

Perugia (Italy) 28 June - 2 July 1993

BOOK OF ABSTRACT
VOL. I

**Latest Results of the Electron-Deuteron Scattering Experiments
at the VEPP-3 Storage Ring**

D.M. Nikolenko, S.G. Popov, I.A. Rachek, D.K. Toporkov,
E.P. Tsentalovich, B.B. Wojtsekhowski

BINP, Novosibirsk, Russia

K.P. Coulter, R. Gilman*, R.J. Holt, E.R. Kinney**, R.S. Kowalczyk,
D.H. Potterveld, L. Young

Argonne National Laboratory, Argonne, Illinois, USA

V. V. Nelubin

INP, St.-Petersburg, Russia

A.N. Osipov, V.N. Stibunov

INR, Tomsk, Russia

C.W. de Jager, J.A.P. Theunissen, H. de Vries

NIKHEF-K, Amsterdam, The Netherlands

Experiments on 2 GeV electron scattering from polarized deuterons are carried out on the VEPP-3 storage ring at the Budker Institute of Nuclear Physics in Novosibirsk, using a windowless storage cell fed by an atomic beam source as an internal target. Here, the preliminary results of an elastic and inelastic scattering investigation (e-d and p-p coincidences channels) will be presented. The tensor analyzing power of elastic scattering was measured for momentum transfers up to 4 fm^{-1} .

* Present address: Rutgers University, Piscataway, New Jersey, U.S.A.

** Present address: Colorado University, Boulder, Colorado, U.S.A.

Study of (γ ,pf) reaction
with intermediate energy tagged photons

A.S.Botvina, A.S.Iljinov, D.I.Ivanov,
G.Ya.Kezerashvili*, V.A.Kuznetsov, L.V.Lanin,
M.V.Mebel, V.G.Nedorezov, A.S.Sudov

Institute for Nuclear Research, Moscow, 117312

*Institute of Nuclear Physics, Novosibirsk, 630090

The measurement of fast light particles indicating the first step of the intermediate energy photonuclear interaction (quasideuteron absorption or pion production on bounded nucleons and intranuclear cascade) in coincidence with heavy fission fragments as a signature of the thermodynamic equilibrium in nucleus is very interesting to understand the structure of heavy nuclei.

The experiment to study the (γ ,pf) reaction in actinide nuclei was performed at the facility ROKK-2 of the storage ring VEPP-3 INP (Novosibirsk) [1] using the fission detector FD [2]. This work was performed with bremsstrahlung tagged photons in the energy range 60-240 MeV with the energy resolution $\Delta E_{\gamma} = \pm 30$ MeV.

Fission fragments were measured by a large aperture low pressure multiwire proportional chambers (MWPC) [3] placed between the targets in the gamma beam. Light charged particles were detected by 8 ΔE -E plastic scintillation telescopes placed around MWPCs and fission targets. The response function of the telescopes was evaluated by Monte-Carlo simulation and tested with cosmic rays and Co60 and Cf252 sources.

We performed two series of measurements in the beam:

1) U235 and U238 targets (100 $\mu\text{g}/\text{cm}$) on Al_2O_3 backings (70 $\mu\text{g}/\text{cm}^2$) placed between MWPCs to measure complementary fission fragments in coincidence;

2) U238 and ${}^2\text{Np}237$ targets (500 $\mu\text{g}/\text{cm}^2$) on Al backings (1.4 mg/cm^2).

In both series the light charged particles were detected within the angle of emission 90 ± 40 degree in respect to the beam axis.

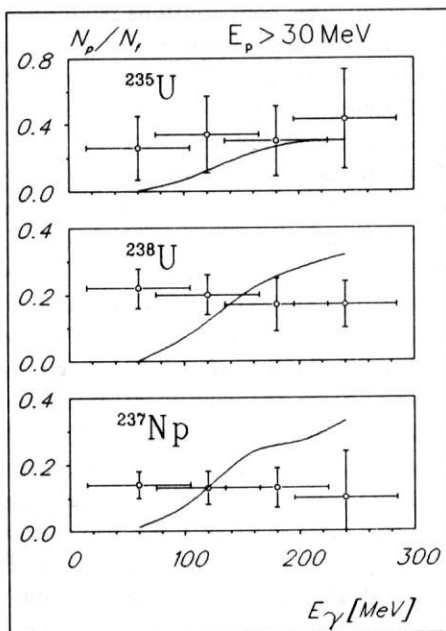
The analysis of experimental data was carried out with ΔE -E technique. The experimental energy threshold

defined by the thickness of ΔE detector was equal to 30 MeV.

Relative probabilities of proton emission per fission decay for U235, U238 and Np237 as function of photon energy E_γ are shown in figure. In the limits of rather large error bars they were found to be near 20% for all nuclei.

Such a noticeable yield of cascade protons is important to explain the difference (in limits of 30% in accordance with experimental and theoretical data [4]) in fissilities of U238 and Np237 nuclei at intermediate energies. Qualitatively that means that after emission of proton before fission decay uranium nucleus passes to protactinium and neptunium to uranium, respectively.

As nuclear fissibilities of uranium and neptunium isotopes are closed to unit in the tagging energy region [5] we can compare the data on proton emission with another reactions. The most interesting comparison could be done for the stopped pion absorption, because the absorbed pion mass is closed to the energy of tagged photons. The noticeable difference in probability of fast proton emission between pion [6] and 150 MeV photon [this work] induced reactions was not observed.



1. G.Ya.Kezerashvili. Proc.of the 8-th Seminar on Electromagn..Int.of Nuclei at Low and Medium Energies. Moscow (1992) p. 216.
2. B.M.Alexandrov et al. NIM A288 (1990) 399
3. V.A.Zapevalov, D.I.Ivanov et al. PTE 5 (1990) 72.
4. A.S.Iljinov et al. Nucl. Phys. A268 (1976) 513.
5. A.S.Iljinov et al. Nucl. Phys. A539 (1992) 263.
6. M.G.Gornov et al. Preprint LINR -1185 (1986) SPV.