Table

Weak p-resonance parameters obtained in the fit procedure of three interference effects

E_n,eV	J_p	Γ^p_f,eV	$\Gamma^p_{n1}\cdot 10^5$,eV	$\Gamma^{p\frac{1}{2}}_n/\Gamma^p_n$
0.16	2	0.14	1.1	1.0
0.35	3	0.35	28	0.8
0.87	3	0.79	57	0.9
1.33	3	0.15	8.4	0.9
1.70	3	0.15	15	1.0

** It is necessary to point out that one needs the only p-resonance 0.16 eV to fit P-odd asymmetry data in ^{233}U. All the other p-resonances take part according to the theory in P-even asymmetry effects forming only.

It can be seen all three interference effects being in a good agreement with the theory and to one another. We have been interested to get such an agreement as the attempts to perform combined analysis of three P-even interference effects in γ-ray angular distributions near isolated p-wave resonances [6] suffered a major set-back.

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NEUTRON ENERGY DEPENDENCE OF P-EVEN EFFECT OF FORWARD-BACKWARD ASYMMETRY OF ^{239}Pu FISSION FRAGMENT EMISSION IN THE RANGE 0.02-175 eV

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P-even effect of forward-backward asymmetry in ^{239}Pu fission fragment angular distribution has been observed and measured as a function of neutron energies inside energy interval

0.02-175 eV. These investigations in contrast to ones in ^{233,235}U fission [1] performed before seems to have some special interest because resonance density in ^{240}Pu, being 5 times less than in ^{234,236}U, makes this case more sensitive to the main theoretical presumptions, like fission phases for example [2,3].

Table

Average asymmetry coefficients for energy bins in ^{239}Pu fission

Δ E_n,eV	1–20	20–40	40–60	60–80	80–100	100–120	120–140
$< \bar{\alpha}_{nf}^{fb} > \cdot 10^4$	2.0	-0.2	-8.9	-10.2	3.0	-0.5	-52.9
	(0.2)	(0.7)	(0.7)	(0.8)	(1.0)	(1.3)	(1.5)
$< \bar{\alpha}_{nf}^{fb} >$(1 eV − 175 eV)= $(0.14 \pm 0.19) \cdot 10^{-4}$							

Δ E_n,eV	140–160	160–175
$< \bar{\alpha}_{nf}^{fb} > \cdot 10^4$	30.8	35.3
	(1.8)	(2.7)

Measurements have been performed at the pulsed neutron source LUE-40/IBR-30 (JINR, Dubna) using fast ionization chamber with a high efficiency, loaded with ^{239}Pu. Experimental results obtained are presented in Fig.(a,b,c). One can see the asymmetry coefficient fluctuations which are especially strong at the energies about 120-175 eV, may be being the result of many p-resonances with the same or similar properties grouped together. Asymmetry coefficient values averaged over equal narrow neutron energy bins are shown in the Table.

With the expected increase of that values as the energy increases, the average weighted value for the whole neutron energy range investigated was obtained to be near zero:

$$< \bar{\alpha}_{nf}^{fb} >_{(1-175)} = (0.14 \pm 0.19) \cdot 10^{-4}$$

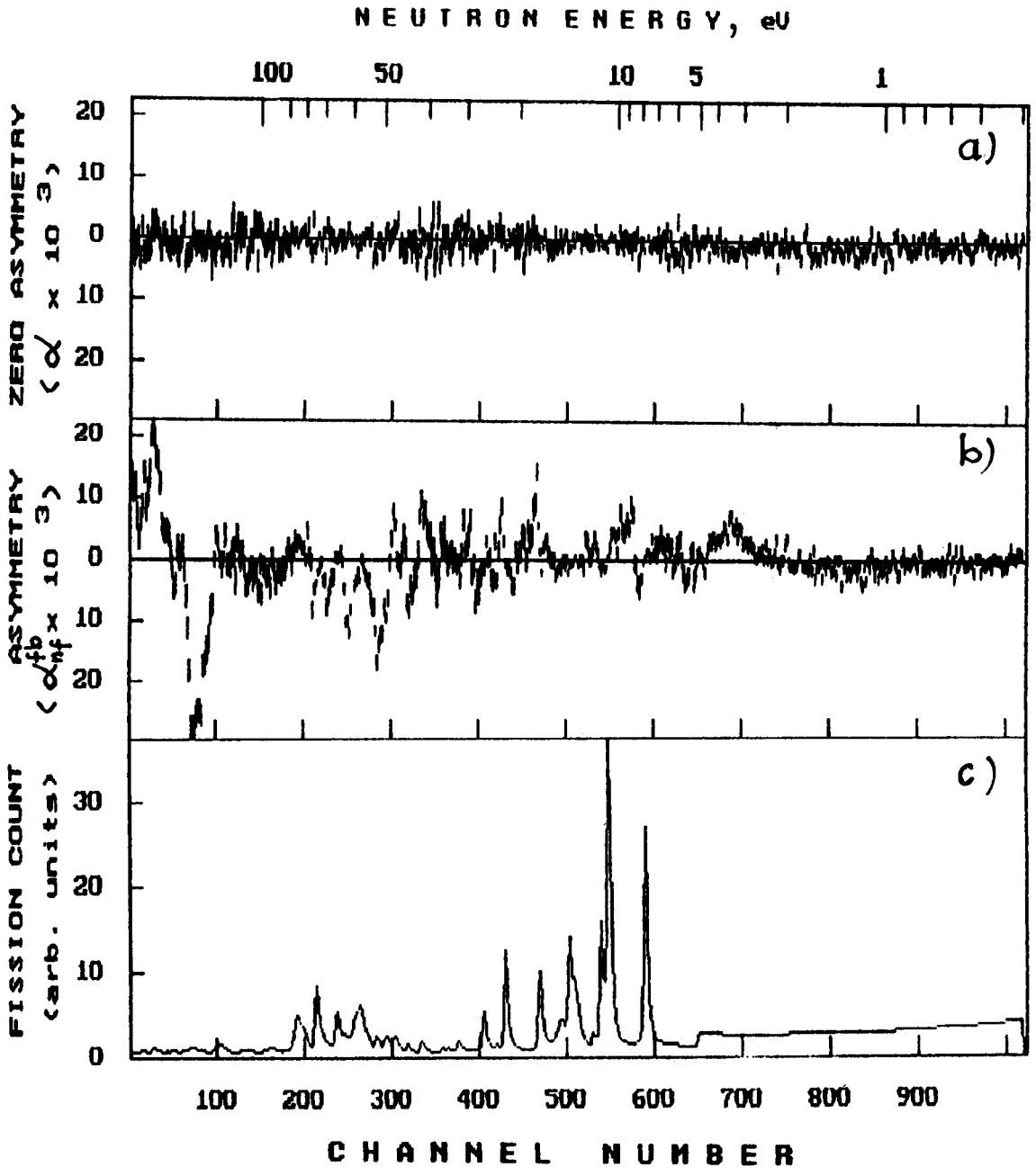

Fig. Experimental results for neutron energy dependencies: a) effect of instrumental asymmetry, b) P-even forward-backward asymmetry effect in ^{239}Pu, c) total counts of fission events in ionization chamber

The first attempt of joint analysis of P-even forward-backward asymmetry together with P-even left-right and P-odd asymmetry coefficients as a function of neutron energy inside the range (0.02-8)eV has met with some obstacle as contrasted to the case of ^{233}U fission analysed earlier [1] (look in this book as well). It can be considered as some support above-mentioned remark about possible extra sensitivity of ^{239}Pu data to the theoretical suppositions.

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STUDY OF dμd AND pμd FUSION IN D_2 AND HD MIXTURES

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This experiment was introduced last year as a new investigation of muon catalyzed fusion with greatly increased absolute precision [1]. The main improvements, developed in Gatchina, include a redesigned high pressure ionization chamber with 15 cm^3 sensitive reaction volume and ~50 keV FWHM energy resolution, a temperature control system operating with $\pm$0.1 K stability, and a chemical gas treatment apparatus producing ultra clean samples of HD molecules with concentrations $c_{HD} \sim 94\%$ [2]. In two experimental runs we collected fusion data over a temperature range from 28 K to 350 K at gas densities from 3%-8% of liquid H_2.

Preliminary results of the 1994 run were presented at the international μCF-95 conference in Dubna [3]. Fig.1 shows the temperature dependence of spin separated $d\mu d$ formation rates in D_2, λ_F, characteristic for the resonant formation mechanism. For comparison previous measurements and the theory curves are also shown. Our new data will determine the *dd* fusion rate and the $d\mu d$ resonance energy to very high precision allowing rigorous tests of the theory.

Fig.2 displays the new data about the μd spin flip rate $\lambda_{3/2,1/2}$. The curves represent the theoretical expectations, (a) from the inelastic scattering process only (dashed line),