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USING PHOTOEMULSION IN PROTON DYNAMIC POLARIZATION CONDITIONS

Dubna, 1964

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The registration with photoemulsions of short-live or low-energy particles generated in collisions with polarized protons can be useful in some researches, e.g. for the determination of the relative parity in the reactions $\pi^- + p \rightarrow \Sigma^- + K^+$ [1], or $K^- + p \rightarrow \Xi^- + K^+$. According to [2], the determination of the spin and parity of baryon or K meson excited states is possible in certain conditions, e.g. in reactions as $\pi^- + p \rightarrow Y^* + K$, or $\pi^- + p \rightarrow \Lambda + K^*$.

An effective method for obtaining polarized protons is the dynamic one and thus polarizations as high as 70% have already been obtained [3]. In this method helium temperatures are necessary and experiments with short-live particles need the shortest distances between the photoemulsion and the crystal of $La_2Mg_3(WO_3)_{12} \cdot 24H_2O$ in which the polarization of protons is carried out. Hence it is necessary to put the emulsion in direct contact with this crystal i inside the cavity in the helium cry stat.

The registration properties of the photoemulsions at very low temperatures have been reported in our earlier works ; e.g., in [4] it was pointed out that at $0.1^{\circ}K$ the ILFORD G-5 emulsion has $(70 \pm 10)\%$ of its normal sensitivity .

It is also necessary to bear in mind that the dielectric losses in emulsions damage the cavity Q. For this we have performed some experiments to determine the modification of Q in the presence of the emulsion inside the cavity. A photoemulsion plate ($12cm^2$ area and 400μ thickness) was put in the center of a $7cm^2$ cavity tuned at 37 Mc (λ = 8mm). The measurements showed that at room temperature and at liquid nitrogen temperature the cavity Q decreased more than 20 times in comparison with the value for the free

non-loaded cavity; but at helium temperature (4,2°K) Q decfeased only 3 times. This effect can be considerably reduced by putting the emulsion plates along the cavity walls, or by lowering the temperature more(by pumping away the helium vapour temperatures about 0,8°K) can be reached). But the dynamic polarization needs only insignificant power 10-50 mW [5], so even a 3 times decrease of the λ cavity is of no importance.

Consequently, the dynamic polarization method can be successfully employed, ( ) using nuclear photoemulsions. that are in contact with the crystal containing hydrogen for the registration of interactions.

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