This leads to the following results: 1) The photoproduction of $\eta$ mesons in the s-states should be suppressed; 2) the cross section for the production of $\Lambda$ hyperons on a proton should greatly exceed the cross section for the photoproduction of $\Lambda$ hyperons on a neutron; 3) many more charged $K^+$ mesons than neutral $K^0$ mesons should be produced in the reactions $\gamma + N \to \Sigma + K$.

We can also obtain expressions for the amplitudes of the processes $\gamma + N \to B^* + P$ in terms of the parameters $a_2$, $a_3$, and $a_4$. Leaving out the explicit forms of these expressions, we note only that the relations that follow from them for the amplitudes coincide fully with the relations which are valid in SU(3) symmetry, while the relations which are specific for the SU(6) symmetry intermix the amplitudes for baryon photoproduction and baryon resonances. If we retain only the amplitude $a_3$, we find that the cross sections for the production of charged mesons together with the isobar greatly exceed the cross sections for the production of neutral mesons - a perfectly natural fact from the point of view of the model of electric dipole absorption.

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## FABRY-PEROT INTERFEROMETER FOR THE SHORT MILLIMETER AND SUBMILLIMETER BANDS WITH METALLIC GRIDS HAVING PERIODS SMALLER THAN THE WAVELENGTH

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Submitted 30 July 1965

We have made extensive use of elements which have a periodic structure with a period smaller than the wavelength (1) in quasioptical installations with monochromatic generators of short millimeter and submillimeter waves. These elements are made of parallel metal wires stretched over metal rings. The condition $a > \lambda > \ell > 2r$ was satisfied, with a the inside diameter of the metal ring (aperture), $\lambda$ the wavelength, $\ell$ the period of the wires, and r the wire radius.

In particular, we have constructed a Fabry-Perot interferometer using such grids as mirrors. One grid of the interferometer was rigidly secured, and the other could be moved slowly, with the aid of a special precision mechanism, so that both grids (2) remained parallel to each other. The interferometer could operate both in reflection and transmission. Such an interferometer has an unusually large bandwidth. Thus, a single model could be used for measure-

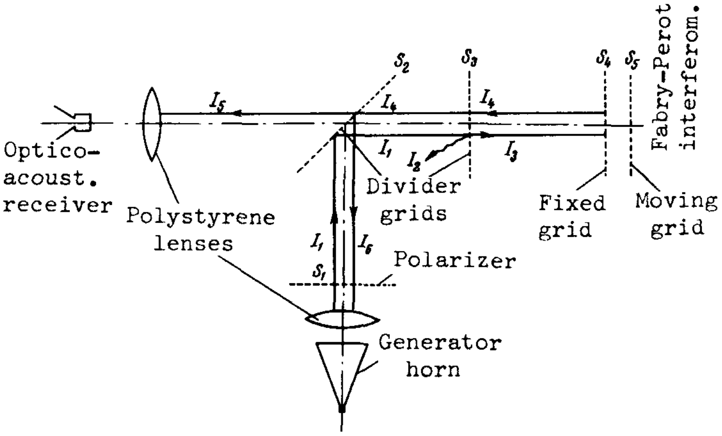

Diagram of Fabry-Perot interferometer operating with reflected signal.

$S_i$ - grids of parallel wires. The relative orientation of the wires and of the direction of the vector $\vec{E}$ is indicated by lines near the indices $I_i$ and $S_i$ (the grid $S_3$ is slightly inclined, to bring the reflected beam $I_3$ outside the limits of the apparatus); $I_i$ - radiation intensity in the beams. The relative distribution of the intensities in the beams in the absence of resonance was $I_1 = 1$, $I_2 = I_3 = I_4 = 1/2$, $I_5 = 1/4$, and $I_6 = 1/4$. The transmission coefficient is calculated from the ratio of the intensity of the beam $I_5$ at resonance and far from resonance. The wavelength and the Q of the interferometer in first order are determined from the change of the signal $I_5$ when the movable grid $S_5$ is displaced, while the Q is determined from the variation of the signal as the generator frequency is made to swing.

ments in the entire range from 4 to 0.5 mm. We had at our disposal grids with apertures (a) 100 and 50 mm, wire spacing ($l$) from 150 to 40 μ, and wire thickness (2r) from 15 to 8 μ. When operating with tungsten grids, we obtained a Q-factor ($q_0$) of approximately 50 in the first order at λ = 0.5 mm, and up to 750 at λ = 2 mm.

We made a more thorough investigation of the dependence of $q_0$ on the different parameters at λ = 2 mm. We used gold-plated grids with a = 50 mm, $l$ = 40 μ, and 2r = 8 μ, obtaining $q_0 = 1250$ in the first order, corresponding to a total energy loss $\Delta W = 2.5 \times 10^{-3}$ per single reflection. Rough calculations have shown that the energy loss due to diffraction ($N = a^2/b\lambda = 200$) was of the order of $\Delta W_1 = 7 \times 10^{-5}$ [5]. Loss due to non-parallelism of the grids, at an angle of approximately 1', was of the order of $\Delta W_2 = 5 \times 10^{-4}$ [6]. Loss due to non-complanarity of the wires ($\Delta d \sim 0.5$ μ) was approximately $\Delta W_3 = 1 \times 10^{-3}$. The measured transmission of the grid was approximately $T = 5 \times 10^{-4}$. If all the remaining losses are assumed to be ohmic and produced in the grids themselves, we get $\Delta W_{ohm} \leq 5 \times 10^{-4}$. From the relation $1 = R + T + G$ (where $G = \Delta W_{ohm}$) we find that the reflection coefficient of the grid is $R = 0.9999$. In any case, we can assume with assurance that $R > 0.998$ for the grids we used at 2 mm.

We think that similar reticular elements can be extensively used in quasioptical apparatus for the short millimeter and submillimeter bands, and can serve as a basis for the construction of elements that are in some sense similar to individual waveguide parts.

| Grid parameters | | $T_{theor}$ [3] | $T_{theor}$ [3] | $T_{theor}$ [3] | $T_{theor}$ [3] | $T_{exp}$ |
|---|---|---|---|---|---|---|
| $l$, μ | 2r, μ | λ = 0.5 mm | λ = 1 mm | λ = 1.5 mm | λ = 2.1 mm | |
| 40 | 8 | $8 \times 10^{-3}$ | $2 \times 10^{-3}$ | $9 \times 10^{-4}$ | $4.5 \times 10^{-4}$ | $5.5 \times 10^{-4}$ |
| 70 | 15 | $2 \times 10^{-2}$ | $5 \times 10^{-3}$ | $2.2 \times 10^{-3}$ | $1.2 \times 10^{-3}$ | $1.6 \times 10^{-3}$ |
| 80 | 10 | $1 \times 10^{-1}$ | $2.5 \times 10^{-2}$ | $1 \times 10^{-2}$ | $5.5 \times 10^{-3}$ | $7 \times 10^{-3}$ |
| 125 | 15 | $2 \times 10^{-1}$ | $6 \times 10^{-2}$ | $2.8 \times 10^{-2}$ | $1.4 \times 10^{-2}$ | $1.4 \times 10^{-2}$ |
| 150 | 15 | $5 \times 10^{-1}$ | $1.2 \times 10^{-1}$ | $5.5 \times 10^{-2}$ | $3 \times 10^{-2}$ | $3 \times 10^{-2}$ |

The table lists data on the wavelength dependence of the transmission coefficient T for grids with different parameters ($l$ - grid spacing, 2r - wire thickness). The polarization of the vector $\vec{E}$ is parallel to the wires. Using this table, we can choose the grid parameters such that it can be used successfully as a polarizer, analyzer, attenuator, filter, etc. In addition to the described Fabry-Perot interferometer, we also constructed a beam-splitting device with variable splitting coefficient, and a device of the Michelson interferometer type for measurements at liquid-nitrogen temperature.

The authors are very grateful to Corresponding Member A. M. Prokhorov, in whose laboratory this work was performed, for continuous interest and support. The authors also thank Corresponding Member N. D. Devyatkova for help during the course of this work.

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1) The theory of the passage of waves through such elements is considered in detail, for example, in [1-4].

2) The wires can be made parallel by producing a diffraction pattern with a gas laser.

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## SMALL-ANGLE SCATTERING OF PROTONS BY $Mg^{24}$

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Inelastic scattering of protons with excitation of the first-excited level of $Mg^{24}$ (Q = 1.37 MeV) was investigated by Nemets and Prokopets [1] at an incident-proton energy 6.8 MeV. The results of the experiment show that whereas at medium and large scattering angles the scattering proceeds for the most part via compound nucleus production, at small angles an appreciable role should be played by some other mechanism.

To explain the experimental data obtained at these small angles with the aid of the theory of the Coulomb interaction it is necessary to assume a very large interaction radius. Taking into account the possible experimental errors at these angles, we decided to study inelastic small-angle proton scattering with semiconductor detectors, the use of which elimi-