and slow sound wave can be stabilized by an Alfven wave:

$$\omega_1 = k_1 V_A, \quad \omega_2 = k_{2x} S, \quad \omega_3 = -k_{3x} V_A, \quad \mathbf{k}_2 = \mathbf{k}_1 + \mathbf{k}_0, \quad \mathbf{k}_3 = \mathbf{k}_2 + \mathbf{k}_0,$$

$$\omega_2 = \omega_1 + \omega_0, \quad \omega_3 = \omega_2 + \omega_0, \tag{7}$$

$$\nu^2 = \frac{\delta V^2}{16} \frac{V_A}{S} \frac{k_{2x}^2}{k_{1\perp}} \left\{ \frac{k_{1z}^2 (k_{1\perp} - k_{1x})}{k_1} - \frac{k_{1\perp}^2}{k_{3\perp}^2} k_{3y}^2 \right\} \frac{k_{0x}}{k_2^2}.$$

The second term in (7) describes the decay of an Alfven wave into slow and fast sound. We see that if $k_{1\perp} > k_{1x}$ and the absolute value of the first term is larger than that of the second, then this decay will be suppressed by an Alfven wave.

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*And in spite of the fact that the interaction energy of the corresponding waves differs from zero.

** "Violet" satellites appear frequently in experiments on propagation of waves of appreciable amplitude in a plasma, cf. e.g., [4].

CONCERNING ONE POSSIBILITY OF OBSERVING BRANCH POINTS CONNECTED WITH p AND p' POLES

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Submitted 7 April 1967
ZhETF Pis'ma 5, No. 12, 454-456 (15 June 1967)

In connection with papers [1,2] in which it is shown that Regge poles cannot exist as isolated points and must be accompanied by a whole series of moving branch points, the question arises of experimentally observing effects due to branch points in the scattering of high-energy particles.

Branch points connected with the ρ-pole in πN interaction can apparently be observed by investigating neutron polarization in the charge-exchange reaction $\pi^- p \to \pi^0 n$. If this effect does not indeed decrease with the energy [3], then it offers direct proof of the existence of the branch points connected with the ρ-pole [4].

Some possibilities of observing effects connected with branch points in principal poles with positive signature are discussed by V. N. Gribov [5]. We indicate here another method of observing the effects of branch points connected with p and p' poles. It can be shown that if the asymptotic behavior of πN scattering is determined by two isolated poles with positive signature (p and p') and an arbitrary number of poles with negative signature and with accompanying branch points, then the following relation holds:

$$\left[\left(P\frac{d\sigma}{dt}\right)_- + \left(P\frac{d\sigma}{dt}\right)_+ - \left(P\frac{d\sigma}{dt}\right)_{ex}\right] = F(t)\left(\frac{1}{E}\right)^{2-\alpha_p(t)-\alpha_{p'}(t)}, \quad (1) \tag{1}$$

$$F(t) = \sqrt{\frac{-t}{4m^2}}\left(\operatorname{ctg}\frac{\pi a_p}{2} - \operatorname{ctg}\frac{\pi a_{p'}}{2}\right)\left(B^0_{p'}(t) B^1_p(t) - B^0_p(t) B^1_{p'}(t)\right), \tag{2}$$

where $[P(d\sigma/dt)]_{-+ex}$ is the product of the nucleon polarization and differential cross section in elastic $\pi^{\pm}p$ scattering and in charge exchange, respectively, E is the total lab. energy of π in GeV, m is the nucleon mass, and $\alpha_i(t)$, $B^0_i(t)$, and $B^1_i(t)$ $(i = p, p')$ are the trajectories and residues of the poles in the amplitude without (0) and with spin flip. Taking the logarithm of (1), we get

$$\lg\left[\left(P\frac{d\sigma}{dt}\right)_- + \left(P\frac{d\sigma}{dt}\right)_+ - \left(P\frac{d\sigma}{dt}\right)_{ex}\right] = \lg F(t) - [2 - a_p(t) - a_{p'}(t)]. \tag{3}$$

Thus, under the indicated assumption and for given t, the logarithm of the left side of (1) should be a linear function of logE. In addition, it is obvious that if the left side of (1) has a zero at some value of t, then the position of the sero point should not depend on E. An experimentally observed nonlinearity or shift of the zero would denote a defect in the theory with two isolated poles p and p'. To be sure, these effect might be attributed to an additional pole, but neither SU(3) nor the known boson resonances indicate other candidates for higher-order poles with positive signature in πN scattering other than p and p' [6]. Therefore any violation of (1) can be regarded as an effect due to branch points.

To obtain (1), we start from the usual representation of the $\pi^{\pm}$p-scattering and charge-exchange amplitudes in the form of a sum of poles:

$$M^{\pm}_{0,1} = M^p_{0,1} + M^{p'}_{0,1} \pm \Sigma M^{\rho}_{0,1}; \quad M^{ex}_{0,1} = \frac{1}{\sqrt{2}}(M^+_{0,1} - M^-_{0,1}), \tag{4}$$

where

$$M^k_{0,1} = B^k_{0,1}\left(i - \operatorname{ctg}\frac{\pi a_k}{2}\right)\left(\frac{1}{E}\right)^{1-a_k(t)} \quad (k = p, p')$$

are the contributions of the poles p and p', and $\sum M^{\rho}_{0,1}$ is the contribution of all poles with negative signature and the associated branch points. The indices 0 and 1 pertain to amplitudes without and with helicity reversal. Expression (1) is obtained directly from formulas (4) and (5), which connect the polarization with the scattering-matrix elements:

$$8\pi\left(P\frac{d\sigma}{dt}\right)_{+-ex} = \sqrt{\frac{-t}{4m^2}}\, Im(M_0)_{+-ex}(M^*_1)_{+-ex}. \tag{5}$$

What can be said with regards to the expected nonlinearity effect?

Since the theoretical question regarding the character of the effective contribution of the branch points has not yet been solved, we confine ourselves to the consideration of the first particular case. In [2,7] there is considered a class of branch points, which leads in the case of small t to a logarithmic dependence of the residues on the energy, since B(t) is replaced by B(t, logE). We note that the situation with the ρ-pole does in no case contradict this variant, since the energy dependence of $d\sigma_{ex}/dt$ has (as shown by Ter-Martirosyan [7]) an almost pure power-law character, meaning a very weak energy dependence of $B^{\rho}_{0,1}$. The effect of the branch points consists here of only a phase difference between B_0^ρ and B_1^ρ, and it is this difference which leads to the observable polarization.

Thus, if we settle on this variant and assume that $F(t) \to F(t, \log E) \approx F(t)\log E$, then the slope (3) of $1/\log E^{-[2-\alpha_p(t)-\alpha_p'(t)]}$ can change by several times in the 5 - 60 GeV range. Although this estimate may be too optimistic(in particular, $B(t, \log E)$ may depend weakly on $\log E$), it does allow us to hope that the nonlinearity effect can be observed in the initial stages without the difficult measurements of $(d\sigma_p/dt)_{ex}$ at high energy, since the contribution of the term $(d\sigma_p/dt)_{ex}$ can hardly exceed $\sim 1\%$ of $[(d\sigma_p/dt)_+ + (d\sigma_p/dt)_-]$, owing to the smallness of $d\sigma_{ex}/dt$.

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DETERMINATION OF THE CHARACTER OF MULTIMODE GENERATION AND THE MAGNITUDE OF HOMOGENEOUS BROADENING IN SPECTRALLY INHOMOGENEOUS SYSTEMS

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Submitted 10 April 1967
ZhETF Pis'ma 5, No. 12, 456-458 (15 June 1967)

We investigate in this paper the evolution, during the course of pumping, of quasistationary generation in spectrally inhomogeneous systems in the case of spatially homogeneous distribution of the excitations in the active medium. The purpose of the investigation was to establish the character of the multimode generation and to determine the magnitude of the homogeneous broadening of the luminescence line of an individual center.

We investigated generation in the 1.06-μ band by a sample of silicate glass activated with 6% of neodymium, of 10 mm diameter and 120 mm length. To eliminate the spatial inhomogeneity of the field of the generating modes, the resonator (67 cm long) was converted with the aid of two lenses of 27 cm focal length into an almost concentric resonator, and in addition, one of the plane mirrors was replaced by a triple-prism. To study the generation spectrum in the quasistationary regime, in the most vital region of small pump excess over threshold, double discharge of the pump lamp was used. The discharge parameters were chosen such that the radiation intensities had time to attenuate by the time the instant t_1 of the start of the second increase of the pump power was reached (Fig. 1). This made it poss-

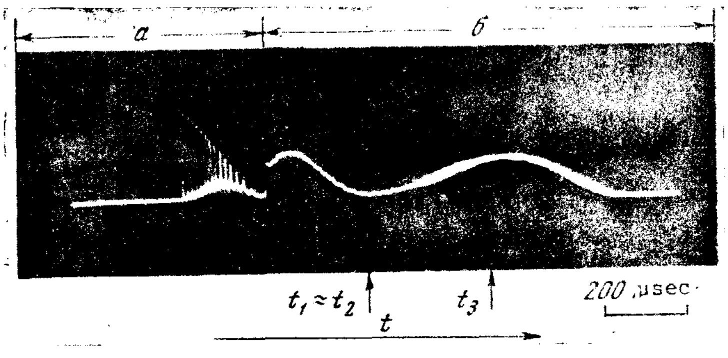

Fig. 1. Laser-emission oscillogram. The gain in section b is 10 times larger than in section a.