intensity of the high-frequency field was varied within considerable ranges. The maximum values of the absorption efficiency in the region of the upper hybrid frequencies reached 50–90%; the corresponding electron heating was recorded in this frequency range. The absorption efficiency in the lower hybrid frequency band was 20%. Approximately the same heating of the electron and ion components of the plasma was observed in this region. Thus, the experiments confirm the existence of an effective mechanism of absorption by a plasma of high-frequency waves, connected with the linear conversion of the waves, and the possibility of utilization of this mechanism for plasma heating.

Up till now, the experiments on UHF-wave absorption by a plasma and on plasma heating have been carried out on small experimental facilities. On going over to UHF plasma heating in large systems with prolonged plasma confinement, a number of new problems arises[11]. First of all, it is necessary to ensure the elimination or the limitation of the opacity region which impedes the penetration of the wave into the conversion region. Analysis and experiments show that this can be achieved in the region of the upper hybrid frequencies (using a non-uniform magnetic field), as well as in the region of the lower hybrid frequencies (using a longitudinal moderation of the waves fed into the plasma). The question further arises as to the most effective mechanism of absorption of plasma waves. The determination of this mechanism significantly depends on the actual distribution of the magnetic field and the concentration of the charged particles over the volume of the plasma. The most complicated problems to analyze are the problems of the influence of nonlinear effects on UHF heating and of the influence of heating on the confinement of the plasma. The answer to these questions can be given only as a result of experiments. Experiments on UHF plasma heating in toroidal installations of relatively large dimensions are now in progress at the A. F. Ioffe Physico-technical Institute of the USSR Academy of Sciences. It is expected that the results of these experiments will allow us to determine the prospects of the application of UHF heating in quasi-stationary toroidal magnetic traps.

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D. S. Chernavskiĭ. Elastic and Inelastic Interactions of High-energy Hadrons.

The current state of the physics of strong interactions is characterized by the following. The elastic scattering of hadrons at energies $E_{lab} \lesssim 70$ GeV has been well studied, from the experimental as well as theoretical point of view. The theoretical basis here is the method of complex orbital momenta (the Regge method) (for details, see[1]).

The situation is different with processes of extreme inelasticity; the experimental data on these processes were largely obtained in cosmic rays and are of qualitative nature. On the other hand, owing to the advances made in the construction of accelerators, accurate quantitative data for energies $E_{lab} \approx 50-500$ GeV are expected to be available in the very near future. Several theoretical schemes and models exist which claim to describe inelastic interactions.

Until recently, little attention was paid to the connection between the schemes of the inelastic processes and the properties of the elastic scattering amplitude. Meanwhile, having the scheme of an inelastic process, we practically have the picture of the elastic process, in the same way as knowing the characteristics of an absorbing body, we know the pattern of diffraction scattering. Thus, the theory of inelastic processes should at the same time correctly describe elastic scattering.

A similar program of unified description is being pursued in the theory of peripheral interactions based on the Bethe-Salpeter equation (for details, see[2]). Although the above-mentioned requirement does not make the theory of peripheral interactions closed and unique, it severly limits the arbitrariness and leads to some objective (not depending on the arbitrariness) results. The following is the principal one: from the condition of constancy of the total cross section at high energies arises in the theory a new parameter having the dimensions of mass and equal, in order of magnitude, to $\mathfrak{M} \approx 2-3$ GeV.

This parameter appears in inelastic interactions in the following fashion: the distribution over the invariant masses of the irreducible blocks of the multiperipheral scheme turns out to be fairly broad. The mean value of the mass of a pion cluster turns out to be large—of the order of 2 GeV. On the disintegration of such a cluster, many pions are produced (for details, see[3]).

Such a picture is in good agreement with the experimental data obtained in cosmic rays on the production of fireballs (for details, see[4]). At an energy $E_{lab} \lesssim 25$ GeV, which has been investigated on accelerators, fireballs are clearly not produced, in view of which the phenomenon itself is not considered as absolutely proved.

According to theoretical estimates, the formation of fireballs should clearly manifest itself in experiments on the Serpukhov accelerator, i.e., in nucleon-nucleon interactions at an energy $E_{lab} \approx 50-70$ GeV and in pion-nucleon interactions at $E_{lab} = 40-60$ GeV.

Thus, from the point of view of inelastic interactions, we are approaching a more informative energy region.

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