studying the dependence of these functions of the transmission of the momentum to the nucleon, the "meson-neutrino structure" of the nucleon can be determined. The effective measurements of the "meson-neutrino structure" are apparently the same as the "meson structure". The results obtained here are well suited for the β-decay and for those processes of decay of hyperons and K-mesons, in which, together with particles which are in strong interaction, also μ, e- and ν - particles participate. From the point of view of the verification of the causation principle the study of angular- and energy distribution of the electrons and myons in the processes of decay of the hyperons and K-mesons is of special interest. There are 1 figure, and 2 Slavic references.

ASSOCIATION: United Institute for Nuclear Research (Obʺyedinennyy institut yadernykh issledovaniy).

SUBMITTED: May 22, 1957

AVAILABLE: Library of Congress

CARD 3/3

20-117-5-17/54

AUTHOR: Logunov, A. A.,

TITLE: Dispersion Relations for Virtual Processes (Dispersionnyye sootnosheniya dlya virtual'nykh protsessov)

PERIODICAL: Doklady AN SSSR, 1957, Vol. 117, Nr 5, pp. 792-794 (USSR)

ABSTRACT: The laying down of the dispersion relations for the vertex parts shows good prospects, that is for the "blocks" occurring in the matrix elements of the processes. The most simple examples are the "blocks" of photoproduction and of the Compton effect, they are given here in a schematic set-up. The "block" of photoproduction possesses a virtual quantum (the second quantum is assumed to be real) as well as two virtual quanta, respectively. The "blocks" presented here differ from the real processes of photoproduction and of the Compton effect by the circumstance, that here the relation $k^2 \neq 0$ holds. They are obsiously parts of the matrix elements of real physical processes. Numerous other examples may be given. It is possible to obtain dispersion relations for the "block" of photoproduction, which may be used for establishment of approximate equatins just as in the case of real photoproduction. The range of negative energies in the dispersion relations may be commuted into the range of positive energies, if the parity of the "block" of photoproduction with respect to the

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Dispersion Relations for Virtual Processes. 20-117-5-17/54

energy is drawn into account. This parity obviously is analoguous to the parity of the amplitude of real photoproduction. The domain of integration in the dispersion relations is split into two parts. The single nucleon states (n=0) are the only ones that contribute towards the first domain, whereas all states with $n \geq 1$ contribute exclusively to the second domain. By means of an expression given here it is possible to reprsent the phases of the "block" of photoproduction through the phases of the process of meson-nucleon scattering. There are 3 figures and 3 Slavic references

ASSOCIATION: United Institute for Nuclear Research (Ob"yedinennyy institut yadernykh issledovaniy)

PRESENTED: July 18, 1957, by N.N. Bogolyubov, Academician

SUBMITTED: July 6, 1957

Card 2/2

16(2),21,(7)
AUTHORS: Logunov,A.A., and Tavkhelidze,A.N. SOV/155-58-3-32/37

TITLE: Generalized Dispersion Relations (Obobshchennyye dispersionnyye sootnosheniya)

PERIODICAL: Nauchnyye doklady vysshey shkoly. Fiziko-matematicheskiye nauki, 1958, Nr 3, pp 178-185 (USSR)

ABSTRACT: The present paper continues the earlier investigations of the authors [Ref 1,2,3,4]. The authors propose a method for obtaining dispersion relations for the reactions a+b→a'+c+d. At the beginning of the reaction there is a nucleon and a boson, at the end there is a nucleon and two bosons. In contrary to [Ref 1,2,3,4] the authors do not assume that the energies of c and d are equal. The ratio of these energies is fixed as Polkinghorn has done. An explicit calculation is made for the double Compton effect (γ+p→2γ+p). The paper contains three paragraphs: §1 Kinematics of the process, §2 Investigation of the anti-Hermitean part of the amplitude of the process, §3 Dispersion relations.
There are 6 references, 3 of which are Soviet, 1 American, 1 Italian, and 1 German.

ASSOCIATION: Ob"yedinennyy institut yadernykh issledovaniy (Joint Institute of Nuclear Research)

SUBMITTED: April 4, 1958
Card 1/1

21(7),16(2),16(1) SOV/155-58-3-33/37

AUTHORS: Logunov,A.A.,Bilen'kiy,S.M.,and Tavkhelidze,A.M.

TITLE: On the Theory of Dispersion Relations for Complex Processes (K teorii dispersionnykh sootnosheniy dlya slozhnykh protsessov)

PERIODICAL: Nauchnyye doklady vysshey shkoly. Fiziko-matematicheskiye nauki, 1958, Nr 3, pp 186-195 (USSR)

ABSTRACT: The present paper contains the proof of the dispersion relations for the process $\gamma+p\to 2\gamma+p$ in the case when the non-observable domain is missing. At first with the aid of the principle of causation (in the formulation of N.N.Bogolyubov [Ref 5]) the lagging and the leading amplitudes of the process are constructed; the first one is combined with the direct process, the second one is combined with the recurrent process. These functions are defined for real values of energy lying above the threshold of the process. Then the functions $\Phi^r(\varrho,E)$ and $\Phi^a(\varrho,E)$ (compare [Ref 6]) are constructed which in the upper and lower halfplane E, respectively, are analytic and which agree on an interval of the real axis. These functions define a single function being analytic in the whole complex E-plane with the exception of

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On the Theory of Dispersion Relations for Complex Processes SOV/155-58-3-33/37

certain cuts along the real axis. At the banks of the cuts the $\phi^r(\varrho,E)$ and $\phi^a(\varrho,E)$ for $\varrho \to 0$ tend to the lagging and leading amplitude, respectively. The dispersion relations appear as conclusions by the application of the Cauchy theorem to these functions.
There are 6 references, 4 of which are Soviet, 1 Italian, and 1 American.

ASSOCIATION: Ob"yedinennyy institut yadernykh issledovaniy (Joint Institute of Nuclear Research)

SUBMITTED: April 25, 1958

Card 2/2

~~21(7)~~ 24.6000 SOV/155-58-4-33/34

AUTHOR: Logunov, A.A.

TITLE: Analytic Properties of the Anti-Hermitian Part of the Amplitude of Virtual Processes (Analiticheskiye svoystva antiermitovoy chasti amplitudy virtual'nogo protsessa)

PERIODICAL: Nauchnyye doklady vysshey shkoly. Fiziko-matematicheskiye nauki, 1958, Nr 4, pp 207 - 216 (USSR)

ABSTRACT: The author starts from the representation of the anti-hermitian part of the amplitude of a virtual photo generation by the Fourier transform of a certain function $F_{\alpha,\omega}(x)$ (see Vladimirov [Ref 3_7]), he introduces the nucleus operators and reduces the investigation of the considered part of the amplitude to a theorem on distributions at first formulated by Bogolyubov and recently proved in more general case by Vladimirov [Ref 3_7].

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Analytic Properties of the Anti-Hermitian Part of the Amplitude of Virtual Processes

SOV/155-58-4-33/34

There are 5 Soviet references.

ASSOCIATION: Ob"yedinennyy institut yadernykh issledovaniy (United Institute for Nuclear Research)

SUBMITTED: April 10, 1958

Card 2/2

~~21(1)~~ 24.6000

AUTHORS: Logunov, A.A., Solov'yev, L.D.

SOV/155-58-4-34/34

TITLE: Dispersion Relations for Virtual Photo Generation (Dispersionnyye sootnosheniya dlya virtual'nogo fotorozhdeniya)

PERIODICAL: Nauchnyye doklady vysshey shkoly. Fiziko-matematicheskiye nauki, 1958, Nr 4, pp 217 - 225 (USSR)

ABSTRACT: The authors consider the dispersion of an electron at a nucleon with generation of a π - meson ($N + e \rightarrow N + e + \pi$). Approximately it concerns the radiation of a photon by an electron, whereby the interaction of the photon with the nucleon leads to the generation of the meson. The process is denoted as virtual photo generation. Dispersion relations for the amplitude of the process are obtained. It is assumed that for high energies the amplitude is constant as a function of the energy. The assumption leads to the occurrence of (in general) undetermined constants in the dispersion relations. By the postulate of gradient invariance, however, these constants can be uniquely expressed by integrals of the imaginary part of the amplitude. The relativistic spin structures for the amplitude can be chosen so that the dispersion relations in the relativistically invariant form do

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Dispersion Relations for Virtual Photo Generation SOV/155-58-4-34/34

not explicitly contain these constants. The single paragraphs of the paper deal with: The matrix element of the electron dispersion on the nucleon with π - meson generation 2. Amplitude of the virtual photo generation 3. Dispersion relations in the coordinate system with $\vec{p} + \vec{p}^{1} = 0$ 4. Mononucleonic term 5. Dispersion relations in a relativistically invariant form.

There are 1 figure, and 11 references, 6 of which are Soviet, and 5 American.

ASSOCIATION: Ob"yedinennyy institut yadernykh issledovaniy (United Institute for Nuclear Research)

SUBMITTED: April 10, 1958

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21(1)
SOV/155-58-5-20/37

AUTHOR: Logunov, A.A.

TITLE: On the Theory of the Dispersion Relations for Virtual Processes

PERIODICAL: Nauchnyye doklady vysshey shkoly. Fiziko-matematicheskiye nauki, 1958, Nr 5, pp 108-119 (USSR)

ABSTRACT: In [Ref 1] the author considered the dispersion relations for virtual processes (e.g. $\gamma + p \to e^+ + e^- + p$) . With the aid of the method of N.N. Bogolyubov the present note gives a rigorous theoretical foundation of these relations in the case of virtual photo generation. § 1 Reaction amplitude of the virtual photo generation § 2 Analytic properties of this amplitude in the fictive domain § 3 Analytic continuation with respect to the variable ν .
The author thanks N.N. Bogolyubov, Academician, and V.S. Vladimirov for valuable discussion.

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On the Theory of the Dispersion Relations for Virtual Processes SOV/155-58-5-20/37

There are 2 figures, and 7 Soviet references.

ASSOCIATION: Ob"yedinennyy institut yadernykh issledovaniy (United Institute for Nuclear Research)

SUBMITTED: May 5, 1958

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21(1)

AUTHORS: Logunov, A.A., Tavkhelidze, A.N., Chernikov, N.A. SOV/155-58-5-21/37

TITLE: On the Question of the Dispersion Relations for Reactions With Variable Number of Particles

PERIODICAL: Nauchnyye doklady vysshey shkoly. Fiziko-matematicheskiye nauki,1958,Nr 5,pp 120-123 (USSR)

ABSTRACT: In [Ref 1] Logunov set up dispersion relations for processes with variable number of particles. In [Ref 2,3] the analytic properties of the amplitude were treated. The authors use the results from [Ref 1,2,3] in order to give in the present paper for reactions of the double Compton effect a further extension of those dispersion cases for which the dispersion relations do not contain the nonobservable energy range. § 1 Kinematics of the process § 2 Dispersion relations.
The authors thank N.N. Bogolyubov, Academician for discussion. There are 1 figure, and 3 Soviet references.

ASSOCIATION: Ob"yedinennyy institut yadernykh issledovaniy (United Institute for Nuclear Research)

SUBMITTED: March 26, 1958

Card 1/1

LOGUNOV, A. A., BOGOLYUBOV, N. N. and BELEN'KIY, S. M.

"Dispersion Relations for Weak Interactions," Nuclear Physics, 5, No. 2, Jan 1958. (North Holland Publ. Co. Amsterdam)

Joint Inst. of Nuclear Research, Laboratory of Theoretical Physics, Dubna, USSR.

Abst: Dispersion Relations for weak interaction processes are obtained in the present paper.

It is shown that in processes which involve not only weakly interacting but strongly interacting particles as well, the dispersion relations are equivalent to the statement that the unknown amplitude functions, which are determined by strong interactions, depend only on momentum transfer between strongly interacting particles.

LOGUNOV, A. A. and FRENKIN, A. R.

"On the Dispersion Relations for the Compton Effect." Nuclear Physics, Vol. 7, No. 6, , p. 573-578 (No. Holland Publ. Co.) 1958.

Abstract: A basis underlying the deduction of the dispersion relations for the Compton effect on nucleons in the absence of an unobservable energy region is presented.

Joint Inst of Nuclear Research, Laboratory of Theoretical Physics, Dubna, USSR.

LOGUNOV, A. A. and TAVKHELIDZE, A. N.
Joint Institute of Nuclear Research, Laboratory of Theoretical Physics, Dubna, USSR.

"Some Problems Encountered in the Theory of the Dispersion Relations." Nuclear Physics, v. 8, pp. 374-393. (1958) (North-Holland Publsishing Co., Amsterdam)

Abstract: Dispersion relations are obtained for a reaction involving a variable number of particles (a fermion and boson prior to the reactions and a fermion and two identical bosons after the reaction.) Cases are indicated for which an unobersvable energy region is absent in the dispersion relations. A justification of the dispersion relations in the absence of an unobervable energy region is presented for the particular process $\gamma + p \rightarrow \gamma + p$.

AUTHOR: Logunov, A. A. SOV/20-120-3-17/67

TITLE: Dispersion Relations for Reactions Involving a Variable Number of Particles (Dispersionnyye sootnosheniya dlya reaktsiy s peremennym chislom chastits)

PERIODICAL: Doklady Akademii nauk SSSR, 1958, Vol. 120, Nr 3, pp. 501 - 503 (USSR)

ABSTRACT: On the basis of the example of the process ($\gamma + P + 2\gamma + P$) this paper examines the problems of the theory of dispersion relations with a variable number of particles. These considerations may also be applied to other reactions. In this connection the electromagnetic corrections of higher order are not taken into account, but attention is focused upon the investigation of the principal term of the amplitude. By basing on the causality principle in accordance with N.N.Bogolyubov (Ref 3) and the properties of the translation invariance of the matrix elements it is possible to write down the retarded and the advanced amplitudes of the double Compton effect. Also for the anti-Hermite part of the amplitude of the process a formula is written down. For reasons of greater simplicity the

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author investigates the case of equal energies. The dispersion relations are of particular interest if the not observable energy range is lacking, for in this case the dispersion relations connect only observable quantities. In the dispersion relations which connect the Hermite- (Ermit) and the anti-Hermite part of the process, there exists an unobservable domain. The amount originating from the unobservable domain can be calculated, for which purpose a formula is given. To the non-observable part a contribution is made by the one-nucleon state (in the interval $|E| < E_c$). The continuous spectrum on the whole

comprises part of the non-observable energy range. In conclusion, the author thanks N.N.Bogolyubov, Member, Academy of Sciences, USSR, for valuable discussions of this paper, and he also expresses his gratitude to A.N. Tavkhelidze and N.A. Chernikov for their valuable advice. There are 3 references, 2 of which are Soviet.

Dispersion Relations for Reactions Involving a Variable Number of Particles SOV/2o-12o-3-17/67

ASSOCIATION: Ob"yedinennyy institut yadernykh issledovaniy (United Institute of Nuclear Research)

PRESENTED: February 17, 1958, by N.N.Bogolyubov, Member, Academy of Sciences, USSR

SUBMITTED: February 5, 1958

1. Particles--Spectra 2. Particles--Scattering 3. Spectroscopy --Theory 4. Mathematics--Applications

Card 3/3

AUTHORS: Logunov, A. A., Tavkhelidze, A. N. SOV/20-1[illegible]-11/67

TITLE: The Analytical Properties of the Amplitude of a Process Involving a Variable Number of Particles (Analiticheskiye svoystva amplitudy protsessa s peremennym chislom chastits)

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol. 128, Nr 4, pp. 739-742 (USSR)

ABSTRACT: A. A. Logunov in the course of an earlier paper investigated the dispersion relations for processes involving a variable number of particles. In the present instance the method developed by N. N. Bogolyubov (Ref 2) is used for the purpose of proving these relations for the case in which there exists no energy domain that cannot be observed. First the Fourier representations of the retarded and of the advanced matrix element of the double Compton effect are explicitly written down. The authors investigate the function $T(E, \vec{Q}, \Delta) = T^{ret}(E, \vec{Q}, \Delta) - T^{adv}(E, \vec{Q}, \Delta)$, the energy spectrum of which is here illustrated in form of a drawing. The S-singularity of the function $T(E, \vec{Q}, \Delta)$ can be eliminated by selecting a suitable polynomial given here. The further

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The Analytical Properties of the Amplitude of a Process Involving a Variable Number of Particles

contents of this purely mathematical paper is a detailed description of the various stages of the computation. The expression found is explicitly written down. In conclusion the authors thank N. N. Bogolyubov, Member, AS USSR, for his valuable discussion of this paper. There are 3 figures and 2 references, 2 of which are Soviet.

ASSOCIATION: Ob"yedinennyy institut yadernykh issledovaniy (United Institute of Nuclear Research)

PRESENTED: February 17, 1958, by N. N. Bogolyubov, Member, Academy of Sciences, USSR

SUBMITTED: February 5, 1958

1. Mathematics

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[illegible], [illegible], Doc Phys-[illegible] Sci --([illegible] "[illegible] of dispersion [illegible] for non-[illegible]." [[illegible], [illegible]] 90 pp (Joint Inst of [illegible] Studies. [illegible] Physics), [illegible] copies [illegible] 24 [illegible] Mechan?.

Bibliography: [illegible] 77-90 ([illegible]) ([illegible], [illegible], [illegible])

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16.8100 3

~~16(1)~~ 05699

AUTHORS: Vladimirov, V.S., Logunov, A.A. SOV/38-23-5-3/8

TITLE: On Analytic Properties of Generalized Functions of Quantum Field Theory

PERIODICAL: Izvestiya Akademii nauk SSSR, Seriya matematicheskaya, 1959, Vol 23, Nr 5, pp 661 - 676 (USSR)

ABSTRACT: The authors prove the following generalization of a well-known theorem of Bogolyubov :
Fundamental theorem : Let four translation-invariant functions of 4 four-dimensional vectors

$$F_{ij}(x_1, x_2, x_3, x_4) \qquad i,j = r, a$$

be given with the following properties :
a.) F_{ij} are invariant with respect to the transformations of the complete Lorenz group
b.) F_{ij} satisfy the causality conditions

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$$F_{rr} = 0 \quad \text{if} \quad x_1 \lesssim x_3 \quad \text{or} \quad x_2 \lesssim x_4$$

$$F_{ra} = 0 \quad \text{if} \quad x_1 \lesssim x_3 \quad \text{or} \quad x_2 \gtrsim x_4$$

$$F_{ar} = 0 \quad \text{if} \quad x_1 \gtrsim x_3 \quad \text{or} \quad x_2 \lesssim x_4$$

$$F_{aa} = 0 \quad \text{if} \quad x_1 \gtrsim x_3 \quad \text{or} \quad x_2 \gtrsim x_4$$

c.) the following spectral conditions are satisfied

$$\tilde{F}_{rj} = \tilde{F}_{aj} \quad \text{if} \quad p_1^2 < (M+\mu)^2 \,, \; p_3^2 < \gamma_1^2 \mu^2 \qquad j = r,a$$

$$\tilde{F}_{ir} = \tilde{F}_{ia} \quad \text{if} \quad p_2^2 < (M+\mu)^2 \,, \; p_4^2 < \gamma_2^2 \mu^2 \qquad i = r,a$$

$$\tilde{F}_{ij} = 0 \quad \text{if} \quad (p_1 + p_3)^2 < (M+\mu)^2 \quad \text{or} \quad p_{1o} + p_{3o} < 0$$

where $\tilde{f}(p) = \tilde{f}(p_1, p_2, p_3, p_4)$ is the Fourier transform of

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On Analytic Properties of Generalized Functions of Quantum Field Theory

$f(x) = f(x_1,x_2,x_3,x_4)$, $\gamma_j > 1$, $M + \mu \geq \gamma_j$, $\mu > 0$, $j = 1,2$

Then a function $\phi(z_1,z_2,z_3,z_4,z_5;\tau)$ with the following properties can be constructed :

1.) ϕ is a generalized function of the real variable t and vanishes for $t < \frac{1}{2}(M+\mu) = t_0$

2.) ϕ is holomorphic in D_t with respect to $z = (z_1,\ldots,z_5)$ for $t \geq t_0$. D_t contains all points

(1.2) $z_1 = M^2$, $z_2 = M^2$, $z_3 = \tau + \tau_1^0$, $z_4 = \tau + \tau_2^0$,

$z_5 = -4\Delta^2$,

where τ is arbitrary real ≤ 0 and Δ^2 runs through the interior of the ellipse

(1.3) $A(t,\tau) + B(t,\tau)\cos\delta + i\,C(t,\tau)\sin\delta$, $0 \leq \delta \leq 2\pi$.

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Here it is

$$A(t,\tau) = \frac{1}{4}\,\varphi^2(t,\tau+\tau_1^0) + \frac{1}{4}\,\varphi^2(t,\tau+\tau_2^0) - \left(\frac{\tau_1^0-\tau_2^0}{8t}\right)^2$$

$$B(t,\tau) = \frac{1}{2}\,\psi(t,\gamma_1,\tau+\tau_1^0)\,\psi(t,\gamma_2,\tau+\tau_2^0) +$$

$$+\frac{1}{2}\sqrt{\psi^2(t,\gamma_1,\tau+\tau_1^0)-\varphi^2(t,\tau+\tau_1^0)}\cdot\sqrt{\psi^2(t,\gamma_2,\tau+\tau_2^0)-\varphi^2(t,\tau+\tau_2^0)}$$

$$C(t,\tau) = \frac{1}{2}\,\psi(t,\gamma_1,\tau+\tau_1^0)\sqrt{\psi^2(t,\gamma_2,\tau+\tau_2^0)-\varphi^2(t,\tau+\tau_2^0)} +$$

$$+\frac{1}{2}\psi(t,\gamma_2,\tau+\tau_2^0)\sqrt{\psi^2(t,\gamma_1,\tau+\tau_1^0)-\varphi^2(t,\tau+\tau_1^0)}\ ,$$

where

$$(1.4)\quad \varphi^2(t,\tau) = \left(t+\frac{M^2-\tau}{4t}\right)^2 - M^2 \quad \text{and}$$

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$$(1.5)\quad \Phi(t,\gamma,\tau) = \sqrt{\varphi^2(t,\tau) + \frac{(2M+\mu)(\gamma^2\mu^2-\tau)}{4t^2-(M+\mu-\gamma\mu)^2}}\,\mu \qquad \text{if}$$

$$\tau \geqslant \gamma\mu\left(M+\mu-\frac{4t^2}{M+\mu-\gamma\mu}\right) = \frac{(2M+\mu)\mu}{4t} + \frac{1}{4t}\sqrt{(2t+M+\mu)^2-\tau}\cdot$$

$$\cdot\sqrt{(2t-M-\mu)^2-\tau} \qquad \text{if}$$

$$\tau \leqslant \gamma\mu(M+\mu-\frac{4t^2}{M+\mu-\gamma\mu})\ .$$

The numbers $M, \mu, \gamma_j, \tau_j^c$ are chosen so that $\Psi > 0$ for $\tau \leqslant 0,\ t \geqslant t_0$.

3.) For real (p_1,p_2,p_3,p_4) from (1.1) $p_1 + p_2 + p_3 + p_4 = 0$, for which the magnitudes

$$z_1 = p_1^2\ ,\ z_2 = p_2^2\ ,\ z_3 = p_3^2\ ,$$

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On Analytic Properties of Generalized Functions of Quantum Field Theory SOV/38-23-5-3/8

$z_4 = p_4^2$, $z_5 = (p_1 + p_2)^2$ belong to D_t, there holds the representation $\tilde{F}_{ij}(p_1,\ldots,p_4) =$

$$= \phi\left[p_1^2,\ p_2^2,\ p_3^2,\ p_4^2,\ (p_1 + p_2)^2,\ \frac{1}{2}\sqrt{(p_1 + p_3)^2}\right],$$

$i,j = r,a$, for $t = \frac{1}{2}\sqrt{(p_1 + p_3)^2} \geq t_0$ and $p_{10} + p_{30} \geq 0$.

Sobolev is mentioned in the paper. The authors use results of Jost, Lehman [Ref 20] and Dyson [Ref 12] .
There are 21 references, 11 of which are Soviet, 4 American, 3 Italian, 1 French, 1 German, and 1 Swedish.

PRESENTED: by N.N. Bogolyubov, Academician

SUBMITTED: October 30, 1958

Card 6/6

24(5) SOV/56-37-3-33/62

AUTHORS: Bogolyubov, N. N., Logunov, A. A., Shirkov, D. V.

TITLE: The Method of Dispersion Relations and the Perturbation Theory

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1959, Vol 37, Nr 3(9), pp 805-815 (USSR)

ABSTRACT: The present paper is in close relationship to a paper by Redmond (Ref 1), in which expressions are derived for the Green function, which correspond to the perturbation theory and, at the same time, contain no known logarithmic singularities. In the introduction Redmond's method is described, and on the basis of the example of the Green boson- and meson functions the setting up of these expressions and the elimination of non-physical poles is discussed. The method employed by the authors is discussed on the basis of the elimination of "logarithmic" poles from the Green photon function. In contrast to Redmond's method, which is based upon the interrelation of the spectral representations for the Green function and for the polarization operator, the authors proceed from the principle of summating the information deduced from the perturbation theory under the sign of the Källèn-Lehmann spectral integral.

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If the contributions from the "main logarithmic diagrams" are summated in this manner, expressions are obtained for the photon propagation function in quantum electrodynamics and for the meson propagation function in the theory of charge symmetry; these expressions have all essential properties of Redmond's result: Regular analytical behavior in the complex plane of the momentum variable p^2, and a singularity with respect to the variable e^2 (square of the charge) at the point $e^2 = 0$. Whereas, however, Redmond's result yields only the lowest order in the perturbation theory, the expressions of the present paper correspond to expansion terms in perturbation theory in the range of large p^2 of arbitrary order. Consideration of the lowest logarithmic terms shows that the range of applicability of the new formulas is the same as in the older formulas which have logarithmic singularities. For the occurrence of a logarithmic pole the following causes are determined: Either the initial Lagrangian is not physical, i.e. its function system does not satisfy the demands of the spectrum, or the approximation meth-

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The Method of Dispersion Relations and the Perturbation Theory

od is not advantageously chosen. The reduction of the expressions found to a renormalization-invariant form is demonstrated in part 4 of this paper on the basis of the example of Green's photon function, and in part 5 a possibility of applying the summation method within the framework of non-renormalizable theories is discussed (on the basis of the example of the nonlinear fermion theory). The results obtained by this paper are summarized, and the authors thank Professor D. I. Blokhintsev, B. V. Medvedev, and M. K. Polivanov for discussions. There are 13 references, 5 of which are Soviet.

ASSOCIATION: Ob"yedinennyy institut yadernykh issledovaniy (Joint Institute of Nuclear Research)

SUBMITTED: April 17, 1959

Card 3/3

S/020/60/135/004/009/037
B019/B077

24.4500 (1160, 1395, 1534)

AUTHOR: Logunov, A. A., Tavkhelidze, A. N., Torodov, I. T., and Chernikov, N. A.

TITLE: Majorization of Feynman Graphs

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol. 135, No. 4, pp. 801 - 804

TEXT: The authors present the results of a further development of the idea of the majorization of Feynman graphs as suggested by Nambu and Symanzik (Refs. 1, 2). Every Feynman graph D represents a quadratic form φ_D of the external momenta p_a. On the condition that the law of conservation holds for the four-momenta k in the inner lines of the graph k_i are linear functions of p_a and of the independent inner momenta t_i. If the following relation is valid for $K_D(\alpha, p, t)$:

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Majorization of Feynman Graphs

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$$K_D(\nu,p,t) = \sum_{\nu=1}^{l} \alpha_\nu (k_\nu^2 - m_\nu^2) = \sum_{i,j} a_{ij} t_i t_j - 2\sum_i b_i t_i + c \qquad (1),$$

where l is the number of inner lines of the graph, then the quadratic form can be determined from:

$$Q_D(\alpha,p) = \begin{vmatrix} a_{ij} & b_i \\ b_j & c \end{vmatrix} \Big/ |a_{ij}| \qquad (2)$$

On the basis of known results, the following lemma and two more theorems are proved: lemma: the quadratic form Q_D is equal to the least value of the quadratic form K_D if the vectors k_ν fulfill the law of conservation of momentum in every unit of the graph, and if they assume a value from

Card 2/4

Majorization of Feynman Graphs

S/020/60/135/004/009/037
B019/B077

the quantity P of all vectors of the type $p = \sum_a A_a p_a$ (A_a are real numbers). Theorem 1 reads as follows: Any graph can be majorized by any of its subgraphs. Theorem 2 reads as follows: If a graph D contains a polygon of (n+1) sides which has the mass M on n sides and the mass $m \leq M$ on one side, a new graph D' will be obtained if the change of mass is of the forms $M \rightarrow m$ and $m \rightarrow M$ with

$$G(D') \subseteq G(D).$$

As an example the authors investigated the amount R of all graphs with a strong coupling in the pion-nucleon part. In every intersection of this graph only three lines do combine: 2 or 0 baryon lines, and 1 or 3 meson lines. It is shown that any graph of the sub-part R** can be majorized by one of the two diagrams shown in Fig. 2. R** is that sub-part of R where a nucleon polygon and pion lines appear in its graphs, and where the external points a and b are characteristic points. N. N. Bogolyubov is thanked for a valuable discussion. There are 2 figures and 5 references: 1 Soviet, 3 US, and 1 Italian.

Card 3/4

Majorization of Feynman Graphs

S/020/60/135/004/009/037
B019/B077

ASSOCIATION: Ob"yedinennyy institut yadernykh issledovaniy (Joint Institute of Nuclear Research)

PRESENTED: June 21, 1960, by N. N. Bogolyubov, Academician

SUBMITTED: June 7, 1960

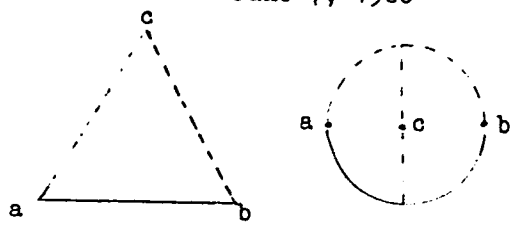

Fig. 2

Card 4/4

LOGUNOV, A.A.; TODOROV, I.T.; CHERNIKOV, N.A.

Surface of singular points in the Feyman diagram. Godishnik fiz mat 55 no.2:117-137 '60/'61 [publ. '62].

ARBUZOV, B.A.; LOGUNOV, A.A.; TAVKHELIDZE, A.N.; FAUSTOV, R.N.; FILIPOV, A.T.; ZARUBINA, I.S.[transletor]; SARANTSEVA, V.R., tekhn.red.

Regge poles and perturbation theory. Dubna Ob"edinennyi in-t iadernykh issledovanii, 1962. 4 p.
(No subject heading)

ARBUZOV, B.A.; LOGUNOV, A.A.; TAVKHELIDZE, A.N.; FAUSTOV, R.N.

The asymptotic behaviour of the scattering amplitudes and the renormalization group method. Dubna, Ob"edinennyi in-t iadernykh issledovanii, 1962. 7 p.
(No subject heading)

LOGUNOV, A.A.; LYU I-CHEN'; TODOROV, I.T.; CHERNIKOV, N.A.; SARANTSEVA, V.R., tekhn. red.

[Dispersion relations and analytic properties of partial amplitudes in the perturbation theory]Dispersionnye sootnosheniia i analiticheskie svoistva partsial'nykh amplitud v teorii vozmushchenii. Dubna, Ob"edinennyi in-t iadernykh issl., 1962. 31 p. (MIRA 15:10)
(Mesons—Scattering) (Nucleons—Scattering)
(Perturbation)

LOGUNOV, A. A., TODOROV, I. T. and CHERNIKOV, N. A.

"Analytical Properties of the Feynman Graphs"

report presented at the Intl. Conference on High Energy Physics, Geneva, 4-11 July 1962

Joint Institute for Nuclear Research
Laboratory of Theoretical Physics, Dubna, 1962

LOGUNOV, A. A., MESHCHERYAKOV, V. A., and TAVKHELIDZE, A. N.

(2)

"On the approximate χ_5-invariance in strong interaction theory"

report presented at the Intl. Conference on High Energy Physics, Geneva, 4-11 July 1962

Joint Inst. for Nuclear Research
Lab. of Theoretical Physics, Dubna, 1962

LOGUNOV, A.A.; TODOROV, I.T.; CHERNIKOV, N.A.; SARANTSEVA, V.R., tekhn. red.

[Surface of singular points of a Feynman diagram] Poverkhnost' osobykh tochek diagrammy Feinmana. Dubna, Ob"edinennyi in-t iadernykh issl., 1962. 29 p. (MIRA 15:3)
(Quantum electrodynamics)

34,780
16,5000

17278
S/056/62/042/005/023/050
B102/B104

AUTHORS: Logunov, A. A., Todorov, I. T., Chernikov, N. A.

TITLE: Generalization of Symanzik's theorem on majorization of Feynman graphs

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 42, no. 5, 1962, 1285-1293

TEXT: In an earlier paper (DAN SSSR 135, 801, 1960) the authors showed that a majorization method developed by them made it possible to reduce the consideration of all strongly connected Feynman graphs of one process to that of a finite number of graphs. Such a graph may be considered to be strongly connected, if, upon one of the internal lines being broken, it does not become dissociated, the square of the outer momenta being regarded as independently variable. The set of classes R_0 of all diagrams is sought in a maximum enclosed Euclidean area of outer momenta wherein the Feynman integral does not display any singularities. For NN scattering $R_0 = 7$, for the meson-meson scattering $R_0 = 3$, and for the meson-nucleon scattering $R_0 = 14$. The method of determining class R_0 is discussed

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at length. For the purpose of comparing the diagrams of class R_0 a detailed examination is made of the quadratic form of general Feynman graphs and an explicit expression for this form is arrived at terms of the identity matrix. This matrix with n rows and l columns then forms the main characteristic of any graph having n nodes and l internal lines. An expression is also derived for the conjugated (inverse) quadratic form. Further, the minimum expressions are obtained for the Feynman parameters (α) relating to the conjugated quadratic form and finally the results are transferred to the Symanzik theorem of graph majorization, which is thereby proved. The generalization of this theorem is discussed. The results following from the particular and the generalized Symanzik theorem are discussed for the special case of a NN scattering. It can be shown that the set R_0 of the graphs for the NN scattering are majorized by the two former (I, II, Fig. 1). All strongly connected graphs of the meson-nucleon scattering can be majorized by the sum of the four graphs in Fig. 2. There are two figures.

ASSOCIATION: Ob"yedinennyy institut yadernykh issledovaniy (Joint Institute of Nuclear Research)

SUBMITTED: December 9, 1961

S/020/62/142/002/012/029
B104/B138

AUTHORS: Logunov, A. A., Mushcheryakov, V. A., and Tavkhelidze, A. N.

TITLE: Approximate γ_5 invariance of the theory of strong interactions

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 142, no. 2, 1962, 317-318

TEXT: The hypothesis is verified, that the matrix elements of all physical processes are invariant with respect to γ_5 transformation of spinor particles at high energies and great momentum transfers. For scattering processes of the type $0 + 1/2 \longrightarrow 0 + 1/2$, the requirement of γ_5 invariance has the consequence that a Fermi ion polarized longitudinally before the scattering process is also longitudinally polarized after it. The same is true for a nonpolarized Fermi ion. In particular, a similar result is obtained for nucleon-nucleon scattering. From an examination of the terms of lowest order in the perturbation theory it is shown that the mass terms are of no significance at high energies and considerable momentum transfers. Thus a γ_5 invariant interaction leads to γ_5 invariant matrix elements. N. N. Bogolyubov, S. M. Bilen'kiy, S. S. Gershteyn,

Card 1/2

Approximate γ_5 invariance ... S/020/62/142/002/012/029
B104/B138

M. M. Meshcheryakov, A. M. Baldin, R. M. Ryndin, and Ya. S. Smorodinskiy are thanked for advice and discussions. There are 4 references: 1 Soviet and 3 non-Soviet. The four references to English-language publications read as follows: M. Gell-Mann, Preprint, 1961; Y. Fujui, Progr. Theor. Phys., 21, 232 (1959); I. I. Sakurai, Ann. of Phys., 11, 1 (1960); Y. Namby, J. Ionn - Lasinio, Phys. Rev. 122, no. 1, 345 (1961).

ASSOCIATION: Ob"yedinennyy institut yadernykh issledovaniy (Joint Institute of Nuclear Research)

PRESENTED: August 14, 1961, by N. N. Bogolyubov, Academician

SUBMITTED: July 20, 1961

Card 2/2

LOGUNOV, A.A. (Dubna); LYU I-CHEN' [Liu I-ch'ên] (Dubna); TODOROV, I.T. (Dubna); CHERNIKOV, N.A. (Dubna)

Dispersion relations and analytic properties of partial amplitudes in perturbation theory. Ukr. mat. zhur. 15 no.3: 250-276 '63. (MIRA 16:12)

LOGUNOV, A.A.; LIU I -CEN; [Liu I-ch'ên]; TODOROV, I.T.; CERNIKOV, N.A.

Dispersion relations and the analytic properties of partial amplitudes in the pertubation theory. Analele mat 17 no.4:82-112 O-D '63.

S/056/63/044/004/039/044
B102/B186

AUTHORS: Arbuzov, B. A., Logunov, A. A., Tavkhelidze, A. N., Faustov, R. N., Filippov, A. T.

TITLE: A quasioptical model and the asymptotic behavior of the scattering amplitude

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 44, no. 4, 1963, 1409 - 1411

TEXT: As shown in Ref. 1 (Preprint OIYaI, E-1145, 1962), a two-particle system may be described in quantum field theory by a Schrödinger-type equation with generalized complex potential, which in the case of scalar particles reads

$$V^{\pm}(q, q', E) = \frac{1}{\pi}\int_{\mu^2}^{\infty} \frac{U^{\pm}(E, \nu)}{\nu + (q-q')^2}\, d\nu, \qquad (2).$$

This quasioptical treatment yields the scattering matrix and also the structure of bound and resonance states. The wave function is only a function of transferred three-momenta (q,q'), and the energy

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$$(E^2 - q^2 - m^2)\,\psi_\pm(q) = \frac{1}{V q^2 + m^2}\int V^\pm(q, q'; E)\,\psi_\pm(q')\,d^3q', \qquad (1),$$

$V^{+(-)}$ is the potential for even (odd) states with respect to cos θ; $U(E,\nu)$ is the spectral function which is complex in the region $E^2 \geq m_1^2$. The amplitude $M(E,t)$ of the process is assumed to satisfy the dispersion relation and its projection onto even and odd states is given by

$M^\pm(E,t) = \int_{\mu^2}^{\infty} \frac{\sigma^\pm(E,\nu)}{\nu+(q-q')^2}\,d\nu$. The imaginary part of V characterizes inelastic scattering. Regge has shown that when the potential is a superposition of Yukawa potentials, the scattering amplitude with $t \to \infty$ may be given by

$$M(E, t) = g(E)\,t^{\alpha(E)}, \qquad t = -(q-q')^2, \qquad (4),$$

where q and q' are initial and final momenta. It is now shown that a

potential of type (2) leads to Regge asymptotic behavior (4). The solution of the amplitude equation

$$T^{\pm}(q, q') = V^{\pm}((q-q')^2, E) + \int \frac{V^{\pm}((q-p)^2, E)\, T^{\pm}(p, q')}{[(E+|e|)^2 - m^2 - p^2]\sqrt{p^2+m^2}}\, d^3p. \qquad (5)$$

is sought as a function like

$$T^{\pm}(q, q') = \frac{1}{\pi}\int_0^{\infty} \frac{\tau^{\pm}(q'^2, q^2, \nu)}{\nu - s}\, d\nu. \qquad (6).$$

The equation of the spectral function τ for the asymptotic region ($s\to\infty$) has a solution of the form

$$\tau^{\pm}(q'^2, q^2, \nu, E) = \tau_{\alpha}^{\pm}(q'^2, q^2, E)\, \nu^{\alpha(E)}. \qquad (9),$$

where τ_{α} will satisfy

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$$\tau_\alpha^\pm(u, s, E) = \int R_\alpha^\pm(u, u', s, E) \frac{\tau_\alpha^\pm(u', s, E)}{(E^2 - m^2 - u')\sqrt{u' + m^2}}\, du'.$$

$$R_\alpha^\pm(u, u', s, E) = \int U^\pm(E, \nu)\, d\nu \int_0^1 \frac{dx \cdot x^\alpha}{(1-x)^{1/2}} \frac{\theta(u' - ux - \nu x/(1-x))}{[u' - ux - \nu x/(1-x)]^{1/2}}. \qquad (10).$$

From the latter relation the eigenfunction τ_α and the eigenvalue α, which is a function of E, can be determined. For $E^2 < m_1^2$, $U(E,\nu)$ is real and therefore also α. Eq. (6) together with (9) yields

$$T(q'^2, q^2, s, E) = s^{\alpha(E)} \tau_\alpha(q'^2, q^2, E) \frac{[1 + e^{-i\pi\alpha(E)}]}{\sin \pi\alpha(E)}. \qquad (11)$$

for large s. A similar result is obtained from (1) in partial-wave representation.

ASSOCIATION: Ob"yedinennyy institut yadernykh issledovaniy (Joint Institute of Nuclear Research)

SUBMITTED: January 3, 1963

Card 4/4

L 12408-63 EWT(1)/FCC(w)/BDS AFFTC/ASD/ESD-3 IJP(C)

ACCESSION NR: AP3001394 S/0020/63/150/004/0764/0766 59

AUTHOR: Arbuzov, B. A.; Logunov, A. A.; Tavkhelidze, A. N.; Faustov, R. N.

TITLE: Regge poles and the Bethe-Salpeter equation

SOURCE: AN SSSR. Doklady, v. 150, no. 4, 1963, 764-766

TOPIC TAGS: Regge poles, Bothe-Salpeter equation

ABSTRACT: The properties of Regge poles were investigated by these authors on the basis of the perturbation theory. It was also shown by them that this analysis is connected with certain difficulties. The purpose of the present work is the study of the structure of Regge singularities on the bais of an equation of the Bethe-Salpeter type. Orig. art. has: 19 equations.

ASSOCIATION: Ob*yedinenny*y institut yadernykh issledovaniy (Joint Institute for Nuclear Research)

SUBMITTED: 15Nov62 DATE ACQ: 01Jul63 ENCL: 00

SUB CODE: 00 NO REF SOV: 000 OTHER: 006

Card 1/1

ACCESSION NR: AP4025941 S/0056/64/046/003/1079/1089

AUTHOR: Logunov, A. A.; Nguyen, Van Kh'yeu; Todorov, I. T.; Khrustalev, O. A.

TITLE: Asymptotic relations between cross sections in local field theory

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 46, no. 3, 1964, 1079-1089

TOPIC TAGS: local field theory, cross section, asymptotic cross section relations, Phragmen Lindelof theorem, Pomeranchuk theorem, antiparticle, neutral pion scattering, kaon scattering, pion proton scattering, kaon proton scattering

ABSTRACT: It is shown that, by starting from the Phragmen-Lindelof theorem and using the general principles of relativistic local quantum field theory, several asymptotic relations can be established

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not only between the total cross sections of various processes but also their differential cross sections. Starting with the related processes of scattering of scalar particles

$$a_1 + b_1 \rightarrow a_2 + b_2 \qquad \text{(I)}$$

$$\bar{a}_2 + b_1 \rightarrow \bar{a}_1 + b_2 \qquad \text{(II)}$$

(the bar denotes the antiparticle), the asymptotic properties of the scattering amplitude are derived under certain assumptions and, in particular, the Pomeranchuk theorem is obtained for this case. The method is then extended to include the case when the particles b have spin 1/2 while the particles a have spin zero and to process which are described in the e^2 approximation in terms of electromagnetic form factors. All the deductions are based on the assumption that the cross sections do not oscillate at high energies. It is con-

ACCESSION NR: AP4025941

cluded that the differential cross sections of processes (I) and (II) are asymptotically equal, that the total cross sections of interaction of particles and antiparticles are equal if the forward elastic scattering amplitude does not grow too rapidly, that the forward differential scattering cross section is proportional to the square of the total cross section in the case of scattering of neutral pions or kaons by protons, and that the limiting values of the form factor are equal when the momentum transfer (t) becomes infinite. "In conclusion the authors are deeply grateful to N. N. Bogolyubov for interest in the work and for stimulating discussion, and also to S. M. Bilen'kiy, D. I. Blokhintsev, V. S. Vladimirov, M. A. Markov, N. N. Meyman, Kh. Ya. Khristov, and P. Suranyi for useful remarks." Orig. art. has: 43 formulas.

ASSOCIATION: Ob"yedinenny*y institut yaderny*kh issledovaniy (Joint Institute of Nuclear Research)

Card 3/4

ACCESSION NR: AP4031148 S/0056/64/046/004/1266/1280

AUTHORS: Arbuzov, B. A.; Logunov, A. A.; Filippov, A. T.; Khrustalev, O. A.

TITLE: The Fredholm method in the relativistic scattering problem

SOURCE: Zh. eksper. i teor. fiz., v. 46, no. 4, 1964, 1266-1280

TOPIC TAGS: particle scattering, relativistic particle, particle spin, Fredholm method, Regge pole, asymptotic property

ABSTRACT: The investigation of the analytic properties and asymptotic form of the amplitudes for elastic scattering of two spinless particles with equal masses, obtained from solutions found by the Fredholm method, are described. The motivation is to develop a method for studying the analytic properties of the scattering amplitude and its asymptotic behavior as a function of the cosine of the scattering angle in the c.m.s. directly, without assuming the exis-

Card 1/3

ACCESSION NR: AP4031148

tence of a Mandelstam representation. The problem is treated over a restricted energy range but with arbitrary momentum transfer. The scattering amplitude and the bound states of the particles are described by a Schrodinger-type equation with a generalized complex potential. The analytic properties of the scattering amplitude are studied as a function of the complex energy (or momentum) and angular momentum. The asymptotic form of the partial amplitude is found and it is shown that a transition to the total amplitude is possible by using the Watson-Sommerfeld transformation. The analyticity of the total amplitude as a function of momentum transfer is demonstrated, and conditions for the Regge asymptotic behavior at infinite momentum or angular momentum are formulated. Some of the results which can be gained from the investigation are discussed in the conclusion. "The authors are sincerely grateful to Academician N. N. Bogolyubov for stimulating discussions and also to O. I. Zav'yalov and M. K. Polivanov for valuable information." Orig. art. has: 3 figures and 20 formulas.

Card 2/3

ACCESSION NR: AP4031148

ASSOCIATION: Ob"yedinenny*y institut yaderny*kh issledovaniy (Joint Institute of Nuclear Research)

SUBMITTED: 20Jul63 DATE ACQ: 07May64 ENCL: 00

SUB CODE: NP NR REF SOV: 008 OTHER: 011

Card 3/3

LOGUNOV, A.A.; MESTVIRISHVILI, M.A.; SILIN, I.N.

[Asymptotic behavior of the scattering amplitude at large transfers of momentum] Asimptoticheskoe povedenie amplitudy rasseianiia pri bol'shikh peredavaemykh impul'sakh. Dubna, Ob"edinennyi in-t iadernykh issledovanii, 1965. 27 p. (MIRA 19:1)

L 24243-66 EWT(1)
ACC NR: AP6005465 SOURCE CODE: UR/0053/66/088/001/0051/0091

AUTHOR: Logunov, A. A.; Nguyen Van Kh"yeu; Todorov, I. T. 31 B

ORG: Institute of High-Energy Physics (Institut fiziki vysokikh energiy); Joint Institute of Nuclear Research (Ob"yedinennyy institut yadernykh issledovaniy)

TITLE: Asymptotic relations between the scattering amplitudes in local field theory

SOURCE: Uspekhi fizicheskikh nauk, v. 88, no. 1, 1966, 51-91

TOPIC TAGS: quantum field theory, asymptotic property, scattering amplitude, strong nuclear interaction, scattering cross section, particle production, differential cross section, meson, baryon, fermion, photoproduction, Compton effect

ABSTRACT: This is a review article devoted to the derivation of rigorous asymptotic relations between the scattering amplitudes in high-energy interactions and the resultant relations between such characteristics as cross sections, polarizations, and others, from the point of view of their agreement with the most recent experimental data. Special attention is paid to the hypotheses on whose basis the asymptotic relations are derived. The authors review systematically the asymptotic relations derived by many earlier investigators, as well as related papers dealing with the derivation of asymptotic relations in the presence of higher symmetries of strong interactions and in processes involving particle production. The section headings are: 1. Estimated upper bounds of the growth of the cross section at high energies. 1.1. Limitation imposed by the microcausality principle on amplitude growth. 1.2. Conditions of polynomial boundedness of the causal amplitude of elastic scattering. 1.3.

Card 1/2 UDC: 539.12.01

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ACC NR: AP6005465

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Estimates of the growth of the cross sections. 2. Asymptotic properties of the scattering amplitude of scalar particles. 2.1. The Phragmen-Lindelof theorem and asymptotic equality of differential cross sections. 2.2. Case of elastic scattering. Equality of total cross sections. 3. Asymptotic properties of meson-baryon scattering. 3.1. Symmetry properties of the amplitude. 3.2. Asymptotic equality of differential cross sections. 3.3. Asymptotic relations between polarizations of fermions in the final state. 3.4. The complete experiment in the case of elastic meson-nucleon scattering. 4. Asymptotic properties of baryon-baryon scattering amplitudes. 4.1. Symmetry properties of the amplitudes. 4.2. Asymptotic equality of the differential cross sections. 4.3. Asymptotic properties of the polarization effects. 5. Asymptotic properties of photoproduction and Compton-effect amplitudes. 5.1. Photoproduction of mesons on baryons. 5.2. Compton effect. 6. Asymptotic relations between forward elastic scattering amplitudes. 7. Higher symmetries of strong interactions and asymptotic relations between the amplitudes of meson-baryon scattering and photproduction. 7.1. Meson-baryon scattering and photoproduction in schemes with higher symmetries. 7.2. Higher symmetries and relations between amplitudes. 7.3. Asymptotic relations for cross sections and polarizations. 8. Asymptotic relations between amplitudes of processes with variable particle number. 8.1. Kinematics. 8.2. Properties of asymptotic amplitude. 8.3. Asymptotic equality of differential cross sections. 9. Asymptotic behavior of form factors. 10. Conclusion. Orig. art. has: 246 formulas and 1 table.

SUB CODE: 20/ 1 ORIG REF: 023/ OTH REF: 032

Card 2/2 dda SUBM DATE: none

LOGUNOV, A.I.

Integral inequalities for Volterra type equations with retarded argument. Dokl. AN SSSR 150 no.2:256-258 My '63. (MIRA 16:5)

1. Predstavleno akademikom L.S.Pontryaginym.
(Integral equations) (Inequalities (Mathematics))

LOGUNOV, A.I.; TSALYUK, Z.B. (Izhevsk)

Uniqueness of solutions to Volterra type integral equations with delayed argument. Mat. sbor. 67 no.2:303-309 Je '65.

(MIRA 18:8)

ACCESSION NR: AP5007553

AUTHOR: Logunov, A. I.; Tsalyuk, Z. B.

TITLE: Uniqueness of solutions of Volterra integral equations with delaying argument

SOURCE: AN SSSR. Doklady, v. 160, no. 5, 1965, ...

TOPIC TAGS: differential equation, difference equation

ABSTRACT: The authors generalize and develop a result of A. D. Myshkis (UMN, 4, No. 5, 99, 1949). They show that no matter what the growth of $|f(t, y+\Delta y) - f(t, y)|$ where $y' = f(t,y)$, $y(0) = y_0$, the corresponding delay ... $= f(t, y(t-g(t)))$ has a unique solution. "The authors express ... L. E. El'sgol'ts, ..."

ASSOCIATION: none

SUBMITTED: 27Mar63

ENCL: 00

SUB CODE: MA

NO REF SOV: 002

OTHER: 000

Card 1/1

APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R000930420002-1"

LOGUNOV, A.I. (Izhevsk)

Some aspects of the behavior of the solution to an integral equation. Volzh. mat. sbor. no.1:237-239 '63.

(MIRA 19:1)

LOGUNOV, A.N., gornyy inzh.; VELICHKIN, A.N., gornyy inzh.

Using charges with air spaces and igdanite in Kazakhstan enterprises. Vzryv. delo no.54/11:342-349 '64.

(MIRA 17:9)

1. Trest Kazakhvzryvprom.

LOGUNOV, A. S., SAYVIL, L. P., and KORSUNSKIY, M. I.

"The Application of Radioactive Isotopes for the Control of Parameters of Moving Wet Steam"

paper presented at the All Union Seminar on the Application of Radioactive Isotopes in Measurements and Instrument Building, Frunze (Kirgiz SSR), June 1961)

So: Atomnaya Energiya, Vol 11, No 5, Nov 61, pp 468-470

1. LOGUNOV, F. G., Eng.
2. USSR (600)
4. Steam Boilers - Air Preheating
7. Installing regenerative air preheaters. Elek. sta., 23, No. 11, 1952

9. Monthly List of Russian Accessions, Library of Congress, February 1953. Unclassified.

Fuel Abstracts
Vol. 14 No. 4
October 1953
Atmospheric Pollution

3028. ASSEMBLY OF CYCLONE BANKS IN LARGE BLOCKS. Loginov, F.G. (Elekt. Sta., [Ivr Sta., Moscow), Jan. 1953, vol. 24, 20-23). Difficulties met with in the assembly of cyclones for dust removal are discussed and a description and diagrams are given of a device for hoisting and assembling blocks for a 4-unit bank. A table indicates the expenditure of time and labour in assembling 384 components of a 4 unit bank of cyclones. B.E.A.

LOGUNOV, F.G., inzhener.

Installing boilers with tower cranes. Elek.sta. 24 no.8:48-51 Ag '53. (MLRA 6:8)

(Cranes, derricks, etc.) (Steam boilers)

U S S R

AUTHOR: Logunov, F.G., Engineer. 104-4-11/40

TITLE: The erection of direct flow high pressure boilers in large blocks. (Montazh pryamotochnykh kotlov vysokogo davleniya krupnymi blokami.)

PERIODICAL: "Elektricheskie Stantsii" (Power Stations), 1957, Vol. 28, No.4, pp. 36 - 40 (U.S.S.R.)

ABSTRACT: The erection of direct flow boilers differs in many respects from that of drum type boilers because of differences in construction. Since direct flow boilers are not very widely used procedures for prefabrication of large assemblies for erection of these boilers have not been fully worked out, and the boilers are still largely designed for piecemeal erection. This article describes the experience of erection of several direct flow boilers type 67-2-СП of 280 t/h, 100 atm.and 510 C with considerable prefabrication. The sub-division is illustrated by drawings and details of weights and so on are given in tables. The erection procedure is described in detail. Considerable advantages are claimed for prefabrication but it is clear that sub-division of the boiler into sub-assemblies can still be improved. This refers in particular to the inclusion of furnace lining in the finished assemblies. It is concluded that the erection of direct flow boilers

The erection of direct flow high pressure boilers in large blocks. (Cont.)

104-4-11/40

can be organised on the high speed large sub-assembly method. The erection of pipes of the radiation sedion into large assemblies closed in a quadrilateral circuit is both possible and desirable. The quality of erection of pipes of the radiation system should be ensured by careful work using special devices to ensure safe and convenient working conditions for assemblers and welders. The boiler-makers should take account of
2/2 the experience that has been gained in the organisation of assembly of direct flow boilers.

There are 5 figures and 3 tables.

AVAILABLE:

LOGUNOV, Feofan Georgiyevich; SHMUKLER, B.I., red.; VORONIN, K.P., tekhn.red.

[Walling-up of boiler units] Obmurovka kotel'nykh agregatov. Moskva, Gos.energ.izd-vo, 1961. 391 p. (MIRA 14:6)

(Boilers) (Bricklaying)

RZHEVKIN, K.S.; LOGUNOV, L.A.; KAPTSOV, L.N.

Analysis of near harmonic transistor oscillators for above critical frequencies. Radiotekh. i elektron. 1 no.5:647-653 My '56. (MLRA 9:12)

1. Fizicheskiy fakul'tet Moskovskogo gosudarstvennogo universiteta.
(Oscillators, Transistor)

S/032/60/026/02/025/057
B010/B009

5(4)
AUTHORS: Samokhin, V. A., Logunov, L. A.

TITLE: Measurement the Electrical Resistivity of Silicon by the Four-probe Method

PERIODICAL: Zavodskaya laboratoriya, 1960, Vol 26, Nr 2, p 185 (USSR)

ABSTRACT: The current two-probe compensation method for measuring the electrical resistivity of silicon is cumbersome. It is difficult to use the four-probe method because of the great instability of the probe contacts. This instability may, however, be eliminated by using tungsten probes and a current generator, or by molding the contacts electrically. An attachment (Fig) which permits the electric molding of contacts using the normal potentiometric circuit is described. The attachment consists of an oscilloscope of type EO-7, a rectifier, and a commutation system. For p-type silicon, duralumin wire probes are used, for n-type silicon, phosphor bronze probes. For measurements without current molding tungsten probes of 0.65 mm thickness are used. For stabilizing the measuring current an electronic current generator is used. Measurement results obtained with the attachment described are

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Measurement the Electrical Resistivity of Silicon by the Four-probe Method

S/032/60/026/02/025/057
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given (Table). There are 1 figure, 1 table, and 2 references.

Card 2/2

LOGUNOV, L.A.

Inverted diode as a small signal detector. Radiotekh.i elektron. 8 no.4:722-723 Ap '63. (MIRA 16:4)
(Radio detectors) (Diodes) (Radio)

L 12954-63 EWT(1)/BDS AFFTC/ASD/RADC S/109/63/008/004/028/030

AUTHOR: Loguncv, L. A. 51

TITLE: Inverted diode as a weak signal detector 25

PERIODICAL: Radiotekhnika i elektronika, v. 8, no. 4, 1963, 722-723

TEXT: The degree of non-linearity of the volt-ampere characteristic of this device is one of its outstanding properties as a detector. The author develops a mathematical formulation to determine the value of rectified current and points out that by a proper selection of the material from which the diode is made it is possible to offset the effect of the temperature factor upon its efficiency. He cites the following equation as representing the volt-ampere characteristic of an inverted diode:

$$I = \text{const } Ve^{-\beta V}$$

and after additional mathematical manipulation, proves that the value of β is independent of temperature, but does depend upon the material used. For germanium diodes, he finds, β works out to a value of about 35, while for diodes made of indium and antimony, the corresponding value of β is approximately 125. Thus, he concludes, by selecting proper material parameters, it is possible to obtain $2\beta \gg \alpha = e/kT$. The inverted diode then becomes, according to him, a very much more effective rectifier of a weak signal, than an ordinary semi-conductor diode.

Card 1/2, Inverted diode as.....

L 12953-63 EWG(k)/EWP(q)/EWT(m)/EWT(l)/BDS/T-2/EEC(b)-2/ES(t)-2 AFFTC/
ASD/ESD-3 Pz-4/Pm-4 IJP(C)/JD S/109/63/008/004/029/030

AUTHORS: Logunov, L. A., and Pitanov, V. S.

TITLE: Volt-ampere characteristics of tunnel diodes made of gallium arsenide

PUBLICATION: Radiotekhnika i elektronika, v. 8, no. 4, 1963, 723-725

TEXT: The authors report on their research into the inverted and direct branches of the volt-ampere characteristic of pn-junctions obtained with gallium arsenide of the p-type, alloyed with zinc [in a concentration of $(4\text{-}10)\cdot10^{19}$ cm^{-3}]. The drop in voltage r_s in the series resistance of the diode was taken into account in plotting the characteristics of the pn-junction. The measurements were taken while passing, through the diode, currents of from ~100 to 300 ma, for a duration of ~1 μ-sec. The voltage drop was measured in the diode, while the impulse current was determined on the basis of the amount of voltage drop when using a resistance of 10 ohms connected in series with the diode. On the basis of two measurements of the voltage at various high current values, the value of r_s could thus be determined. Two graphs accompany the article. One shows the relationship between the logarithm of conductivity of the pn-junction and the respective pn-junction voltage. This relationship is very close to rectilinear. The other graph shows the relationship between the logarithm of the direct current and the

Card 1/2

L 12953-63

S/109/63/008/004/029/030

Volt-ampere characteristics .....

shift in the pn-junction. In the negative sector of the characteristic, this relationship is closely approximated by an exponential curve.

SUBMITTED: December 18, 1962

Card 2/2

LOGUNOV, L.A.; TARKHOVA, I.P.

Dependence of the parameters of converted diodes on the admixture concentration in initial germanium. Radiotekh. i elektron. 9 no.1:181-182 Ja '64. (MIRA 17:3)

LOGUNOV, L.A.; PLAKHOTNIK, L.A.

Change of the tunnel current density in the process of making the p-n junction. Radiotekh. i elektron. 9 no.1:182-183 Ja '64. (MIRA 17:3)

ACCESSION NR: AP4042522 S/0109/64/009/007/1258/1269

AUTHOR: Logunov, L. A.; Rudneva, N. K.; Chernyak, Ye. B.

TITLE: Inverted diodes

SOURCE: Radiotekhnika i elektronika, v. 9, no. 7, 1964, 1258-1269

TOPIC TAGS: semiconductor, semiconductor diode, inverted diode, inverted diode parameters

ABSTRACT: The parameters of inverted diodes intended for small-signal detection and pulse-circuit work are considered. Formulas for forward and reverse switching times are developed with the diode inductance neglected; the switching time of a Ge inverted diode proper is estimated to be 0.12 nsec, and that of the same diode operating in a computer, 0.22-0.25 nsec. The functioning of an inverted diode as a detector is analyzed. Formulas for the current-voltage characteristic, the peak current, and the voltage at peak current, which connect

Card 1/2

ACCESSION NR: AP4042522

these parameters with the properties of the semiconductor material, are derived on the basis of E. O. Kane's findings (J. Appl. Phys., 1961, 32, 1, 83). Laboratory models of Ge, Si, and GaAs diodes were tested; their parameters and I/V characteristics are reported. The effect of the ambient temperature on backward-diode parameters, experimentally determined, is reported: the peak current decreases at rates as high as 0.31% and 0.13% per 1C as the temperature of Ge and GaAs diodes, respectively, increases. Orig. art. has: 6 figures, 28 formulas, and 1 table.

ASSOCIATION: none

SUBMITTED: 25Apr63 ATD PRESS: 3077 ENCL: 00

SUB CODE: EC NO REF SOV: 003 OTHER: 008

Card 2/2

[illegible] Pm-4/

[illegible]unov, L. A.

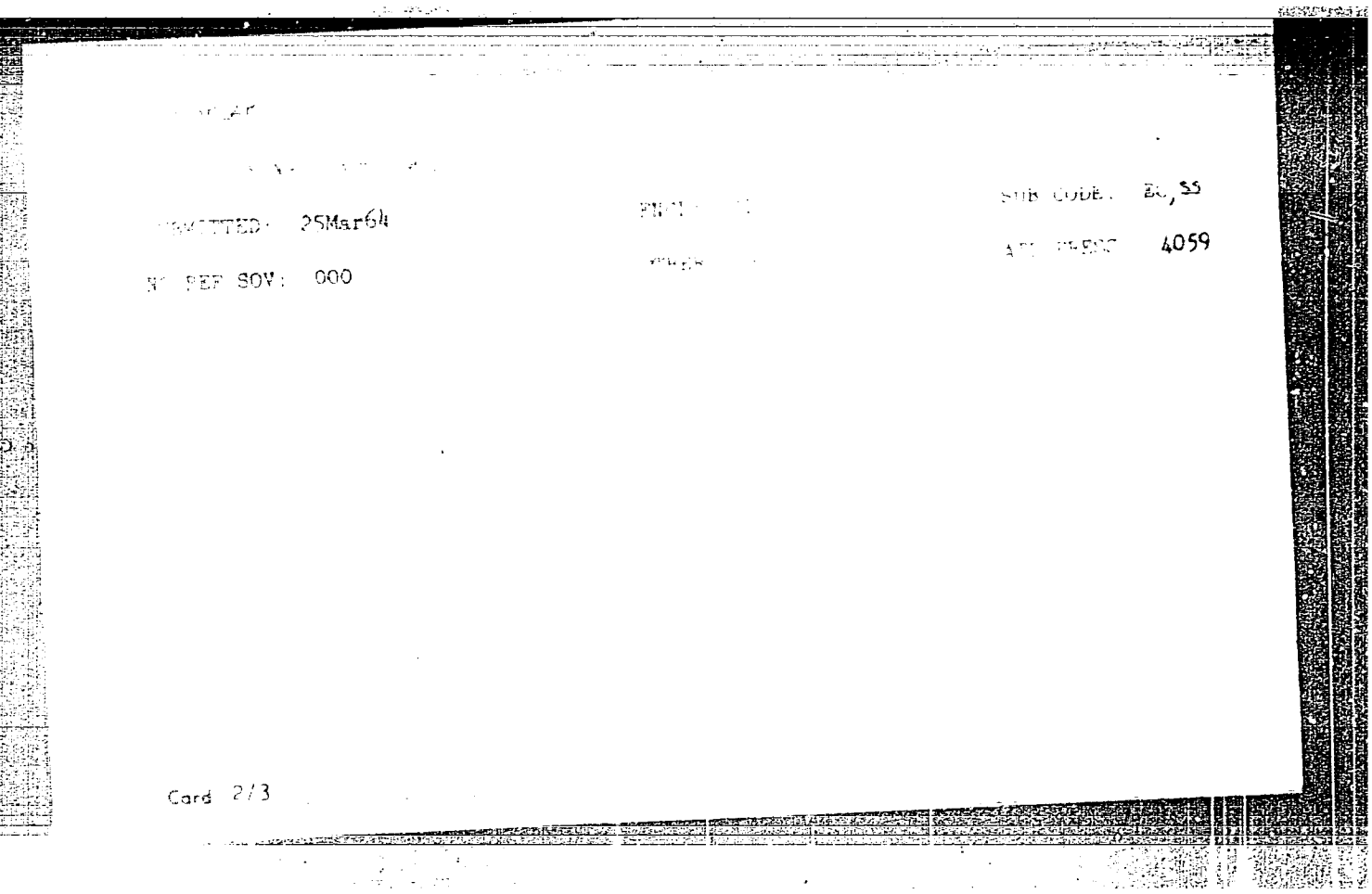
TITLE: Tunnel diode

SOURCE: Byulleten' izobreteniy i tovarnykh znakov [illegible], 37-38

TOPIC TAGS: tunnel diode, semiconductor mesa structure, p n junction, germanium tunnel diode

ABSTRACT: The mesa structure of the proposed germanium-base tunnel diode is mounted on a multilayer metal-germanium-glass structure. To decrease the capacitance and resistance and to improve the mechanical stability of the mesa structure, the diode contains an annular germanium plate with an [illegible] contact on one side, and a [illegible] glass ring or gasket. (See Fig. 1 of Enclosure.) The alloy forming the [illegible] is located inside the germanium ring. Orig. art. has: 1 figure. [illegible] plate and is located inside the germanium ring.

[illegible]ATE N. [illegible]



SUBMITTED: 25Mar64 SUB CODE: ES, SS

NR REF SOV: 000 ATD PRESS: 4059

Card 2/3

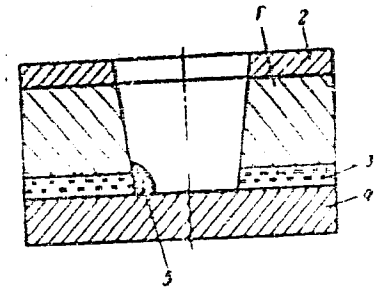


Fig. 1. Tunnel diode

1 - Germanium plate; 2 - ohmic
contact; 3 - glass gasket
[illegible]

Card 3/3

ACC NR: AP7003462 SOURCE CODE: UR/0413/66/000/014/0081/0081

INVENTOR: Kuznetsov, G. M.; Logunov, L. A.; Shkalikova, K. I.; Domnina, L. V.

ORG: none

TITLE: Gold-base alloy. Class 40, no. 183944

SOURCE: Izobreteniya, promyshlennyye obraztsy, tovarnyye znaki, no. 14, 1966, 81

TOPIC TAGS: gold base alloy, tunnel diode

ABSTRACT: A gold-base alloy is proposed for use in the manufacture of tunnel diode ohmic contacts. For better physical and engineering properties the components are taken in the following ratios (%): Au - 52-56; Ag - 43-47; Ga - 0.9-1.1; Cu - 0.001 (max); Ni - 0.001 (max); As - 0.001 (max); Sb - 0.001 (max). [JPRS: 37,480]

SUB CODE: 11, 09 / SUBM DATE: none

UDC: 669.215'22'871

Card 1/1

ACC NR: AP7002679 SOURCE CODE: UR/0109/67/012/001/0158/0161

AUTHOR: Logunov, L. A.; Polyakov, I. V.; Serebryakov, V. N.

ORG: none

TITLE: Distributed tunnel diodes

SOURCE: Radiotekhnika i elektronika, v. 12, no. 1, 1967, 158-161

TOPIC TAGS: tunnel diode, esaki diode, distributed amplifier

ABSTRACT:

The properties of an active transmission line in which the active element is an epitaxially grown distributed tunnel diode (see Fig. 1) are

Card 1/3 UDC: 621.382.233

ACC NR: AP7002679

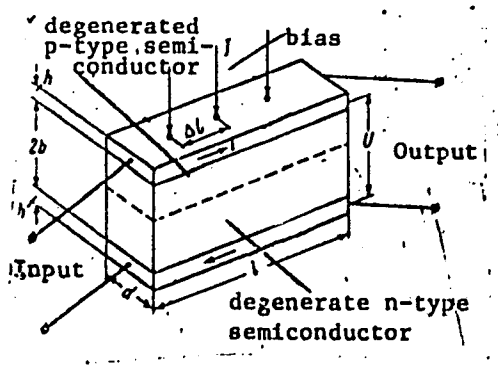


Fig. 1. Distributed semiconductor active transmission line.

analyzed. The device is made as follows: from the In + 3% Ga +7% Ge solution a p-type germanium layer was grown on an n-type 400—450-μ Ge plate doped with As whose resistivity was $(6—8) \times 10^{-4}$ ohm/cm. The resistivity of the p-type layer was $\sim 4 \times 10^{-4}$ ohm/cm. The finished samples were 15—20 cm long and 150—250 μ wide. The metallic layers for input and output contacts and biasing were made by depositing a 1-μ layer of Ni. Tests, using five samples driven by 35-nsec triangular current pulses and 200—400-usec bias pulses, have shown that a nonattennated signal may be propagated along this line. The propagation velocity varied $(0.4 \times 10^8—1.15 \times 10^8$ cm/sec) from sample to sample increasing as the

Card 2/3

ACC NR: AP7002679

ratio of bias to peak TD current was increased up to a value of 1. After this the sample behaved as a lumped element where all tunnel diodes in the equivalent circuit switched simultaneously. In other samples which had linearly varying width, in addition to the above properties, current amplification occurred as it flowed in the direction of increasing sample width. The value of current gain was approximately equal to the ratio of sample width at the output to that at the input. Orig. art. has: 7 formulas, 3 figures, and 1 table.

SUB CODE: 09/ SUBM DATE: 25Jun66/ ORIG REF: 004/ OTH REF: 002/
ATD PRESS: 5112

Card 3/3

LOGUNOV, L.I.; L'VOV, V.B.

Production Combine "Zarya" (Moscow). Kozh.-obuv. prom. 6 no.8:2-3 Ag '64. (MIRA 17:9)

1. Glavnyy inzh. Moskovskogo obuvnogo ob"yedineniya "Zarya" (for Logunov). 2. Zamestitel' general'nogo direktora po ekonomicheskim voprosam Moskovskogo obuvnogo ob"yedineniya "Zarya" (for L'vov).

L 45152-66 EWT(m)/EWP(t)/ETI IJP(c) JD/JG
ACC NR: AP6027245 SOURCE CODE: UR/0109/66/011/008/1525/1528

50
B

AUTHOR: Kovalev, A. N.; Logunov, L. A.

ORG: none

TITLE: Gallium antimonide tunnel diodes

SOURCE: Radiotekhnika i elektronika, v. 11, no. 8, 1966, 1525-1528

TOPIC TAGS: gallium antimonide semiconductor, tunnel diode, semiconductor diode, semiconductive material, GALLIUM COMPOUND, ANTIMONIDE

ABSTRACT: Tunnel diodes are now being manufactured mostly from Ge, GaAs, and GaSb. The properties of GaSb diodes have had the least attention among investigators. The purpose of the present article is a detailed evaluation of the properties of such diodes as compared with the characteristics of tunnel diodes based on Ge or GaAs. The diodes were prepared by the fusion method on both n- and p-type GaSb. The P-type materials were alloyed with zinc and had a carrier charge concentration of $(1-2)\cdot 10^{19}$ cm^{-3}; the n-region was formed by doping with Sn + 5% Te. The n-type material was alloyed with Te and had a charge concentration of $2\cdot 10^{18}$cm^{-3}; the p-n junction was obtained by fusion in Sn + 10% Zn. Etching of finished p-n junctions produced a mesa-structure; the capacitance of the junctions in

Card 1/2 UDC: 621.382.23.011.222

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ACC NR: AP6027245 O

this case was 1—5pf. The authors conclude that the GaSb tunnel diodes now manufactured as yet do not have a substantial advantage as low-noise amplifiers, due to the high values of forward resistance. Furthermore, GaSb low-noise tunnel diodes have a strong temperature-dependence of the peak current. The most promising areas for the application of GaSb tunnel diodes are, apparently, detectors and mixers. In this case, however, the advantages of the shape of the volt-ampere characteristics of these diodes may best be used only by reducing forward resistance to values found in Ge diodes. This problem can be solved by perfecting the manufacturing technology of GaSb tunnel diodes. [26]

SUB CODE: 11,20/ SUBM DATE: 15Nov65/ ORIG REF: 002/ OTH REF: 005/ ATD PRESS: 5081

Card 2/2

LOGUNOV, M.M.

Broader use of existing potentialities in rated capacities. TSvet. met. 33 no.11:85 N '60. (MIRA 13:11)
(Crushing machinery)

LOGUNOV, N.M.; RAMKOV, F.G.; AVDEYEV, N.Ya., metodist pavil'ona; SYCHIK, Ye.V., redaktor; BALLOD, A.I., tekhnicheskiy redaktor

["Dog breeding" pavilion; a guidebook] Pavil'on "Sobakovodstvo"; putevoditel'. Moskva, Gos. izd-vo selkhoz. lit-ry, 1956. 26 p. (MLRA 9:8)

1. Moscow. Vsesoyuznaya sel'skokhozyaystvennaya vystavka, 1954-
2. Direktor pavil'ona (for Ramkov)
(Dogs) (Moscow--Agricultural exhibitions)

SAFOKHIN, Mikhail Samsonovich; KATANOV, Boris Aleksandrovich; LOGUNOV, Nikolay Fedorovich; BARKANOV, Yevgeniy Ivanovich; SOKOLOV, A.I., otv. red.; ABARBARCHUK, F.I., red. izd-va; MINSKER, L.I., tekhn. red.

[Crosscutting and boring machines and drill bits]Buro-sbooshnye mashiny i burovoi instrument. [By] M.S.Safokhin i dr. Moskva, Gosgortekhizdat, 1962. 208 p. (MIRA 15:9)
(Boring machinery)

RAMKOV, F.; PLOTNIKOV, D.; LOGUNOV, N.; BYRDINA, A., red.; FEDOTOVA, A., tekhn.red.

[Hunting, fur farming, and dog breeding] Okhota, zverovodstvo i sobakovodstvo. Moskva, Gos. izd-vo sel'khoz. lit-ry, 1958. 91 p.
(Fur farming) (Dogs) (Hunting)