

AD-A079 938

FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OH F/S 20/5
ACTION OF THE LARGE DOSE OF GAMMA IRRADIATION ON THE PROPERTIES--ETC(U)
AUG 79 U A ARIFOV, M R BEDILOV, K KHAYDARV
FTD-ID(RS)T-1118-79 NL

UNCLASSIFIED



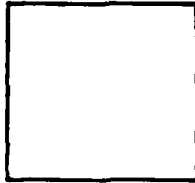
END
DATE
FILMED

2 80
DDC

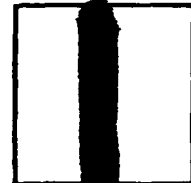
PHOTOGRAPH THIS SHEET

ADA 079938

DTIC ACCESSION NUMBER



LEVEL



INVENTORY

FTD-ID(RS)T-1118-79

DOCUMENT IDENTIFICATION

DISTRIBUTION STATEMENT A

Approved for public release;
Distribution Unlimited

DISTRIBUTION STATEMENT

ACCESSION FOR

NTIS GRA&I

DTIC TAB

UNANNOUNCED

JUSTIFICATION



BY

DISTRIBUTION /

AVAILABILITY CODES

DIST

AVAIL AND/OR SPECIAL

A

DISTRIBUTION STAMP

DDC
RECEIVED
JAN 28 1980
D

DATE ACCESSIONED

79-12 27 322

DATE RECEIVED IN DTIC

PHOTOGRAPH THIS SHEET AND RETURN TO DTIC-DDA-2

DTIC FORM
OCT 79 70A

DOCUMENT PROCESSING SHEET

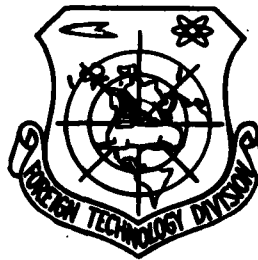
FOREIGN TECHNOLOGY DIVISION



ACTION OF THE LARGE DOSES OF GAMMA IRRADIATION
ON THE PROPERTIES OF LASER

by

U. A. Arifov, M. R. Bedilov, K. Khaydarv



Approved for public release;
distribution unlimited.

ADA079938

UNEDITED MACHINE TRANSLATION

FTD-ID(RS)T-1118-79

27 August 1979

MICROFICHE NR:

FTD-79-C-001166

ACTION OF THE LARGE DOSES OF GAMMA IRRADIATION ON THE
PROPERTIES OF LASER

By: U. A. Arifov, M. R. Bedilov, K. Khaydarv

English pages: 6

Source: Doklady Akademii Nauk UZSSR, Nr, 8, 1970, pp.
22-24.

Country of origin: USSR

This document is a machine translation.

Requester: FTD/TQTD

Approved for public release; distribution unlimited.

THIS TRANSLATION IS A RENDITION OF THE ORIGINAL FOREIGN TEXT WITHOUT ANY ANALYTICAL OR EDITORIAL COMMENT. STATEMENTS OR THEORIES ADVOCATED OR IMPLIED ARE THOSE OF THE SOURCE AND DO NOT NECESSARILY REFLECT THE POSITION OR OPINION OF THE FOREIGN TECHNOLOGY DIVISION.

PREPARED BY:

TRANSLATION DIVISION
FOREIGN TECHNOLOGY DIVISION
WP-AFB, OHIO.

U. S. BOARD ON GEOGRAPHIC NAMES transliteration SYSTEM

Block	Italic	Transliteration	Block	Italic	Transliteration
А а	<i>А а</i>	A, a	Р р	<i>Р р</i>	R, r
Б б	<i>Б б</i>	B, b	С с	<i>С с</i>	S, s
В в	<i>В в</i>	V, v	Т т	<i>Т т</i>	T, t
Г г	<i>Г г</i>	G, g	У у	<i>У у</i>	U, u
Д д	<i>Д д</i>	D, d	Ф ф	<i>Ф ф</i>	F, f
Е е	<i>Е е</i>	Ye, ye; E, e*	Х х	<i>Х х</i>	Kh, kh
Ж ж	<i>Ж ж</i>	Zh, zh	Ц ц	<i>Ц ц</i>	Ts, ts
З з	<i>З з</i>	Z, z	Ч ч	<i>Ч ч</i>	Ch, ch
И и	<i>И и</i>	I, i	Ш ш	<i>Ш ш</i>	Sh, sh
Й й	<i>Й й</i>	Y, y	Щ щ	<i>Щ щ</i>	Shch, shch
К к	<i>К к</i>	K, k	Ъ ъ	<i>Ъ ъ</i>	"
Л л	<i>Л л</i>	L, l	Ы ы	<i>Ы ы</i>	Y, y
М м	<i>М м</i>	M, m	Ь ь	<i>Ь ь</i>	'
Н н	<i>Н н</i>	N, n	Э э	<i>Э э</i>	E, e
О о	<i>О о</i>	O, o	Ю ю	<i>Ю ю</i>	Yu, yu
П п	<i>П п</i>	P, p	Я я	<i>Я я</i>	Ya, ya

*ye initially, after vowels, and after Ъ, ь; e elsewhere.
When written as ё in Russian, transliterate as yë or ë.

RUSSIAN AND ENGLISH TRIGONOMETRIC FUNCTIONS

Russian	English	Russian	English	Russian	English
sin	sin	sh	sinh	arc sh	sinh
cos	cos	ch	cosh	arc ch	cosh
tg	tan	th	tanh	arc th	tanh
ctg	cot	cth	coth	arc cth	coth
sec	sec	sch	sech	arc sch	sech
cosec	csc	csch	csch	arc csch	csch

Russian	English
rot	curl
lg	log

Page 22.

ACTION OF THE LARGE DOSES OF GAMMA IRRADIATION ON THE PROPERTIES OF LASER.

Academician AN of the Uzb.SSR U. A. Arifov, M. B. Bedilov, K. Khaydarov.

By us was investigated the action of γ -radiation on the properties of the stimulated radiation of four-level laser (lasers) on the glass, activated Nd^{3+} . Experimental installation and methods of recording the characteristics of the stimulated laser radiation are described in [1,2]¹.

FOOTNOTE 1. In work [2] "dose 10^{10} rad" should be read "dose 10^9 rad" ENDFOOTNOTE.

Lasers (active element/cell together with resonators) we irradiated by γ -radiation Co^{60} with energy 1.17 MeV in the interval of doses $0-2 \cdot 10^9$ rad.

Time characteristics laser on the glass, activated Nd^{3+} depending on the degree of irradiance are given in Fig. 1 (a - generation to the irradiation; b, c - after irradiation by dose $2 \cdot 10^6$ rad respectively in 3 and 24 hours). The character of a change of the generation with time in dependence on radiation dose remains constant/invariable. Consequently, in the limits of the investigated doses the character of stimulated radiation is multimode and spike. Is experimental established that the general/common/total duration of stimulated radiation with an increase in the radiation dose is reduced. Before irradiation and in doses 10^6 , 10^5 , $2 \cdot 10^6$ rad the duration of stimulated radiation is equal to with respect 1000, 470, 370 and 90 μs about near-threshold electrical energy of excitation. This is connected with the fact that the threshold of the excitation lasers depends on the degree of the irradiance of active element/cell by the ionizing radiation/emission, since with an increase of radiation dosage stimulated radiation noticeably detains and attenuates earlier. For example, the threshold of the excitation of induced radiation before and after irradiation by doses 10^6 and $2 \cdot 10^6$ rad composes with respect to 0.8; 1.3 and 2.9 kJ.

Under the action of γ -radiation in lasers substantially change the threshold energy of pumping, the energy of induced radiation and efficiency. Changes of the energy characteristics lasers in dependence on energy of pumping capacitor bank with different degree

of irradiance laser are shown in Fig. 2. In character curved changes in the energy properties of the stimulated laser radiation in the range of radiation dose $0-2 \cdot 10^6$ rad it is possible to divide into two parts. In the first part ($0-10^6$ rad) with an increase in the radiation dosage increases the threshold of excitation, decrease by efficiency, energy and angle of the slope of curve (curve 3).

Page 23.

Radiant energy laser before irradiation and in doses 10^6 , 10^6 rad composes 1.2; 0.6 and 0.3 J, with electrical energy of capacitor bank of 1.5 kJ the efficiency of laser radiation in the dose of 10^6 rad 4 times it is lower than before irradiation (curve 1). In another segment of a curve ($2 \cdot 10^6$ rad) with an increase in the radiation dosage also increases the threshold of excitation, but increase the output of laser and the angle of the slope of curve (curve 4).

Findings show that when the laser is located directly under the action of the large doses of γ -radiation, the output of laser must be substantially more. Otherwise the more the time passes from the moment/torque of irradiation, the less the output of stimulated radiation. During experiment properties of resonator during irradiation lasers substantially they do not change.

We will also investigate restoring the generating properties of lasers in dependence on the dose of γ -radiation. Which generate properties of lasers it is possible to restore/reduce, in particular, by annealing of color centers at room temperature (curves 5-10). It is established, that restoring the properties of lasers proceeds nonlinearly. With an increase in exposure time the threshold of excitation approaches according to exponential law the threshold of pre-irradiated state laser. The temporary/time dependence of the restoration/reduction of the threshold of the excitation of lasers can be seen from Fig. 2. The annealing of lasers, irradiated by dose $2 \cdot 10^6$ rad at room temperature during 120 hours, decreases the threshold of excitation almost 2 times. It is characteristic the fact that restoring the energy dependency also depends substantially on radiation dose. In the limits of the dose of $0-10^6$ rad, it takes a normal course, i.e., with an increase in the time from the moment/torque of irradiation gradually it approaches an initial state (curve 2). When radiation dose increases to $2 \cdot 10^6$ rad, the restoration/reduction of properties of laser occurs gradually.

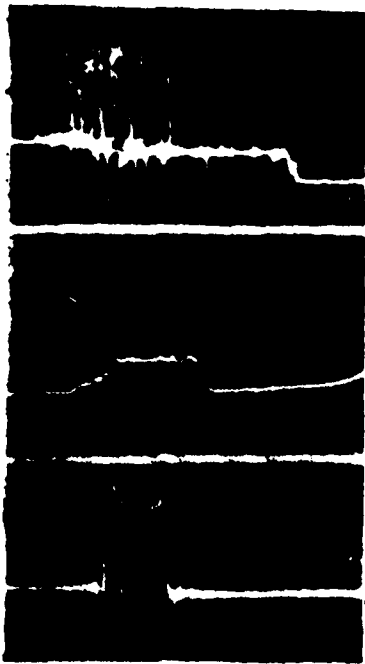


Fig. 1.

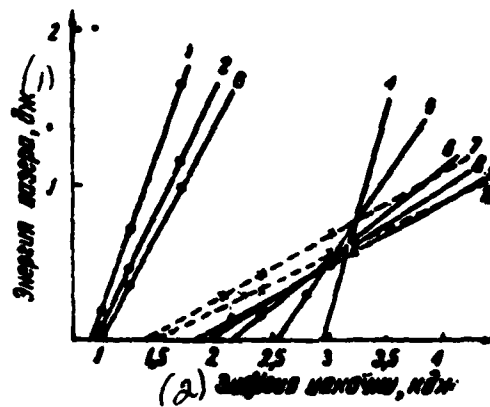


Fig. 2.

Key: (1). Energy of laser J. (2). Energy of pumping, kJ.

Page 24.

As can be seen from Fig. 2 (curves 4-9), first the output of laser decreases, and then (curves 7, 10) it begins to increase. is

established/installed also the restoration/reduction of stimulated radiation of laser in the course of time (see Fig. 1c).

An increase in the output of laser in the large doses of γ -radiation can be explained, apparently, by the emergence of the new method of the energy exchange between color centers and by laser transitions, and also an increase of the absorptive power of active element/cell at useful laser energy levels.

REFERENCES

1. Белилов М. Р. [и др]. Труды ФИАН СССР, Физика плазмы, 12, М., 1966.
2. Арифов У. А. [и др]. ДАН УССР, 1969, № 8.

Institute of nuclear physics AN of the Uzb.SSR.

Entered 21. NOV. 1969.

DISTRIBUTION LIST

DISTRIBUTION DIRECT TO RECIPIENT

<u>ORGANIZATION</u>	<u>MICROFICHE</u>	<u>ORGANIZATION</u>	<u>MICROFICHE</u>
A205 DMATC	1	E053 AF/INAKA	1
A210 DMAAC	2	E017 AF/RDXTR-W	1
B344 DIA/RDS-3C	9	E403 AFSC/INA	1
C043 USAMIIA	1	E404 AEDC	1
C509 BALLISTIC RES LABS	1	E408 AFWL	1
C510 AIR MOBILITY R&D	1	E410 ADTC	1
LAB/FIO			
C513 PICATINNY ARSENAL	1	FTD	
C535 AVIATION SYS CMD	1	CCN	1
C591 FSTC	5	ASD/FTD/NIIS	3
C619 MIA REDSTONE	1	NIA/PHS	1
D008 NISC	1	NIIS	2
H300 USAICE (USAREUR)	1		
P005 DOE	1		
P050 CIA/CRB/ADD/SD	2		
NAVORDSTA (50L)	1		
NASA/NST-44	1		
AFIT/LD	1		
LLL/Code L-389	1		
NSA/1213/TDL	2		

FTD-ID(RS)T-1118-79