either to a power law with $\gamma \approx 1.5$, or to an exponential law with $kT \approx 10$ keV. The measurement accuracy is as yet insufficient to give preference to either, and it is necessary to move to the region of lower energies, where the absorption in the galaxy already comes into play.

Thus, the figure shows that there are possibly two mechanisms participating in the generation of x-radiation in outer space. A more detailed report on the results and a possible interpretation will be given later [9].

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*When radiation with $h\nu = 1 - 1.5$ keV is generated in intergalactic space, it passes through our galaxy practically without being attenuated in any direction; this justifies our averaging all our measurements.

LASER SPARK IN A STRONG MAGNETIC FIELD

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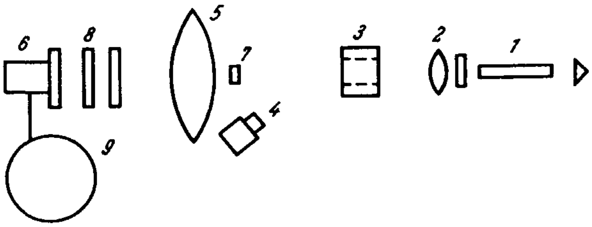
Investigations of a laser spark in a strong magnetic field are of undisputed interest. The energy-release density in the case of optical breakdown in the focus of a laser is about 2×10^{11} erg/cm^3 [1,2], corresponding in energy density and in pressure to a magnetic field on the order of 2×10^6 G. Since our equipment made it possible to obtain magnetic fields up to 3×10^5 G, we expected the magnetic field to exert an influence on the spark development for those breakdown stages in which the energy density in the plasma was not too high. During the breakdown, however, an appreciable fraction of the energy goes to the production of a shock wave, and only a small fraction is transformed into radiation [3]. Therefore, if the magnetic field has even a slight influence on the energy carried away by the shock wave, this can lead to a considerable change in the emission from the spark.

We have investigated the integral radiation of a laser spark, and also the intensity of laser emission passing through the spark and the threshold of spark production.

The radiation source was a laser Q-switched by a rotating prism. The pulse duration was 20 nsec at an approximate energy of 1 J; the wavelength was 1.06 μ.

The pulsed solenoid constructed by us had a large aperture, allowing the spark to be viewed at an angle up to 45° to the solenoid axis. The solenoid cavity was vacuum-insulated,



making it possible to work at low pressures and also with different gases. The diameter of the solenoid cavity was 8 mm and its length 10 mm.

The experimental setup is shown in the figure. The light beam from laser 1 is focused by lens 2 in the cavity of the solenoid 3, whose axis is parallel to the light beam. The spark can be photographed by camera 4. The light radiated by the spark is gathered by lens 5 on the photorecorder cathode 6. An opaque screen 7 and light filters 8 prevent the laser radiation from striking the photocathode directly. The photocathode signal is registered from the screen of oscilloscope 9. To register the laser beam passing through the spark, the filters 8 are replaced and the screen 7 is replaced by a round diaphragm.

We investigated the time-integrated intensity of the spark radiation. The spark was produced in air at atmospheric pressure and more than 90% of the laser energy was absorbed in the spark. Altogether 97 measurements were made, of which 43 were in a magnetic field.

In all the series of experiments, the average spark-emission intensity increased when the breakdown was produced in a magnetic field. The spark emission (in the visible region of the spectrum) at H = 210 kOe exceeds the emission intensity in the absence of a magnetic field by a factor 1.4 ± 0.1. A series of experiments was made at an air pressure 240 Torr. At so high a pressure, the magnetic field increased the average glow of the spark by a factor 1.6 ± 0.1.

An experiment aimed at measuring the intensity of a laser beam passing through the focal region was made at an air pressure of 240 Torr in the solenoid cavity. At this pressure, about 50% of the laser-beam energy passed through the focal region, and when the magnetic field was turned on, the fraction of the transmitted energy decreased to 25 - 40%. Since the spark plasma spark is opaque to the laser beam [4], the decrease in the intensity of the light passing through the solenoid must be attributed to the fact that breakdown occurs in the magnetic field earlier, i.e., the breakdown threshold is lowered. When filters were used to attenuate the laser emission to the breakdown threshold, there was no breakdown as a rule without a magnetic field, but breakdown was observe when the field was turned on (see Table).

	P = 760 Torr		P = 160 Torr		P = 30 Torr	
Magnetic field (G)	Observations	Breakdowns	Observations	Breakdowns	Observations	Breakdowns
0	7	0	9	0	7	2
210 000	5	5	5	4	3	3

The increased spark emission cannot be attributed solely to the increased absorption of the laser emission, since the absorption increases at atmospheric pressure only by 3%, but the luminosity increases by 40%. The increase in the glow intensity can be explained only by assuming that when the discharge is produced in a magnetic field the spreading plasma moves against the magnetic-pressure forces and expands more slowly, and the kinetic share of the energy decreases. The emission is increased, first, because part of the kinetic energy goes into Joule heat when the conducting plasma moves in the magnetic field, and second when the expansion (and hence cooling) is slowed down, a greater part of the energy can be radiated.

The lowering of the breakdown threshold is apparently connected with a slowing of the diffusion of the photoelectrons from the focal region, since their Larmor radius (at H = 200 kG) is approximately 10^{-5} cm, which is several times smaller than the mean free path even at atmospheric pressure.

We note in conclusion that the authors of [5], who observed optical breakdown in argon at H = 100 kG, discovered no influence of the magnetic field on the breakdown threshold. This is probably due to the insufficient magnetic field strength.

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STIMULATED TEMPERATURE SCATTERING OF LIGHT IN LIQUIDS

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The spectrum of thermal molecular scattering of light in liquids consists [1] of Mandel'shtam-Brillouin components (scattering by pressure fluctuations), a central component (scattering by entropy or temperature fluctuations), and a Rayleigh-line wing (scattering by anisotropy fluctuations). Observations and studies were already made of stimulated Mandel'shtam-Brillouin scattering (SMBS) [1,2] and stimulated light scattering in the Rayleigh-line wing [2, 4].

In this article we report observation of a new nonlinear phenomenon, namely stimulated temperature (entropy) scattering of light (STS).

The phenomenon consists of intense temperature waves produced when an intense exciting laser giant pulse and a weak initial scattering by entropy fluctuations interact with a medium. The interaction of these waves with the exciting and scattered light causes energy to be transferred from the exciting light to the scattered light and to the temperature wave.

In the case of scattering through angles that are not too small, when four-photon