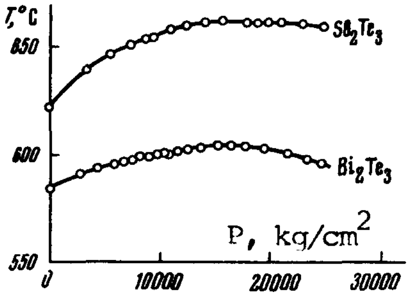
itions were too low.



Melting curves of Bi_2Te_3 and Sb_2Te_3 up to 25000 kg/cm^2

The authors thank L. V. Poretskaya for graciously furnishing the antimony telluride sample.

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1) The melting curve of Bi_2Te_3 was also investigated by D. L. Ball[3] up to 50 kbar pressure, but under quasi-hydrostatic conditions. On the whole, Ball's data agree with ours.

MASER WITH TWO SERIES RESONATORS AND A "MOLECULAR RINGING" AMPLIFIER

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A maser was investigated with two cascaded cavities and with two colliding beams, one cavity acting as generator and the other as amplifier. A schematic diagram is shown in Fig. 1. We investigated the possibility of obtaining in this system a narrower spectral emission line than in a single-cavity maser.

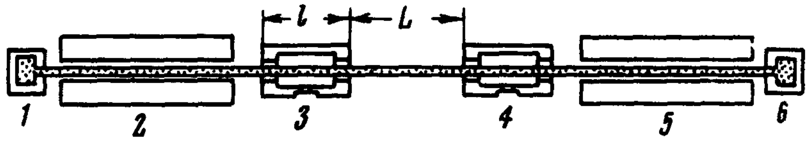

Figure 1. Schematic diagram of two-cavity two-beam maser: 1, 6 - molecular-beam sources, 2, 5 - sorting systems, 3, 4 - cavities.

The beam of molecules, first polarized in one of the resonators, excites in the second resonator oscillations of the same frequency as in the first ("molecular ringing"[1-3]). This "ringing" is amplified by the opposing intense beam of molecules.

If the number of opposing-beam molecules entering the generating resonator is approximately equal to the number of outgoing molecules, then this system should be similar to a Ramsay system, since the particles of the two beams are coherent[4]. Approximate equality of the incoming and outgoing particles will be attained if the intensity of the beam amplifying the "molecular ringing" is several times larger than the intensity of the beam producing the generation. To keep the amplifying resonator from becoming self-excited at large beam intensity, it is necessary to use a low-Q cavity. The time of flight of the particle in such a system will be determined by the quantity $2T + 2\tau$, where T is the time of flight in the space between resonators and τ the time of flight in the resonator. This quantity is approximately one order of magnitude larger than the quantity $\lambda T + 2\tau$, which corresponds to the case of a generator with two generating cavities[5]. The narrowing of the line in such a system can be estimated from the decrease of the slope of the plot of the change of generation frequency vs. resonator frequency deviation (relative to the abscissa axis), since it is known that $\Delta\nu_{gen} \approx (Q_{res}/Q_{lin})\Delta\nu_{res}$, where $Q_{lin} = \omega\tau$ is the so-called line Q, determined by the time of the flight in the oscillating field, and consequently also by the emission line width.

Figure 2 shows the experimentally plotted dependence of the system generation frequency on the frequency deviation in the cavity in which the generation takes place. The straight line shows the same dependence when the amplifying cavity is turned off. From the comparison of the two plots we see that the slope in the system with amplifier is approximately 4 - 5 times larger than in the system without amplifier; this shows that the effective Q of the line has increased by the same factor.

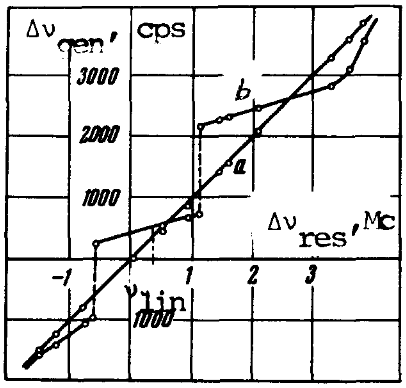

Figure 2. Dependence of the generation frequency on the cavity detuning: a - in single-cavity maser, b - in maser with "molecular ringing" amplifier

In our system, whose dimensions were ℓ = 23 mm (length of each cavity) and L = 140 mm (distance between cavity ends), the expected line narrowing should have been 10 - 12, but since the losses of beam intensity in the gap between cavities were not fully compensated for, we obtained a much smaller narrowing.

It is seen from Fig. 2 that as the cavity in which generation takes place is tuned, the system frequency does not vary continuously over the entire detuning range. There are two jumps in frequency. The presence of these jumps can be attributed to the fact that in this system, like in a Ramsay system with separated fields, there should be besides a principal maximum at the molecular-transition frequency two secondary maxima differing in frequency by approximately 1/T from the principal maximum. If the line has such a shape, then jumps of frequency and amplitudes should be observed in the generation mode.

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