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**The EOS studies on Luch facility**

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The results of the investigations in the shock compressibility of materials on the "Luch" facility [1] are presented. The experiments have been performed with impedance mismatch technique [2] applying.
The output non-uniformity of the shocks achieved <10ps and inaccuracy of their velocity measuring <3%. The pressures to 30 Mbars were developed in lead and till 50 Mbars with applying of the special-constructed targets for hydrodynamic pressure increasing. Results on the materials shock compressibility have been obtained that accord well with the test results shown on hydrodynamic stands [3].

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**Development of the systems for uniform target irradiation**

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The new devices have been developed for laser beams homogenizing in the focal spot – multi-component lens raster and raster with the edges smoothing phase mask [1]. The envelope non-uniformity of <3-5% at energy concentration up to 60% was achieved for beams having the initial non-uniformity in the near field of approximately 30% and divergence $\leq 10^{-4}$ radians.
Investigation into the temporary-spatial smoothing with the use of low-density foams with the density less than the critical one [2] is still in progress. Experiments on the foams with the density of 1-2.3 mg/cm$^3$, thickness of 100-200 μm, and the cells' sizes up to the tens of micrometers were carried out with the radiation wavelength of 0.657 μm. The RMS non-uniformity <5% has been found for the beam passed through the foam. The non-uniformity is evenly distributed over the spatial frequency spectrum. The induced divergence of radiation is measured to be 0.35radian. The frequency of the rearranged speckled field of about 2 THz was obtained. The beam smoothing was recorded from the start of pulse of radiation, had the duration up to 1 ns, and the width of the radiation spectrum was about 30 Å.
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