About the Cover:

The photo on the cover shows Research Engineer Ildar Begishev adjusting thermostatic sensors on the internal chamber of a two-chamber cryostat. The cryostat is used to cool down nonlinear ammonium dihydrogen phosphate (ADP) crystals to –70°C in order to generate the fifth harmonic (211 nm) of a neodymium laser. The deep ultraviolet (UV) laser beam is necessary to measure density of a high-temperature plasma. Phase matching for the fifth-harmonic–generation process is extremely sensitive to the crystal temperature, and this unique two-chamber cryostat allows one to hold the temperature at a given level across the entire aperture of a 65-mm × 65-mm crystal with an accuracy better than 0.1°C. As result, 26% of input laser energy was transformed into a UV beam at 211 nm—a record for conversion efficiency.

The photo to the right presents a section of the Multi-Terawatt (MTW) laser. Dr. Begishev is preparing the experimental setup to generate the fifth harmonic in the two-chamber cryostat, shown in the center. The inset shows the ADP crystal inside the two-chamber cryostat. This research was provided in collaboration with Livermore Lawrence National Laboratory.

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