tubular beam with an energy of 300 keV and a current of 2.3 kA is used for excitation of a counter propagating 1GW/300 ps pulse of the Cherenkov SR in a periodic SWS. The inner near-axis beam with an energy of 250 keV and a current of 150 A is accelerated by pumping a resonator of the type "pill-box", located at the beginning of the SWS.

The electron energy was determined based on measurements of the internal beam current after the SWS as it passed through aluminium filters (foils) with different thicknesses and, accordingly, with different energy cutoff values. It is found that the energy of a certain fraction of the inner electron beam reaches up to 1.25 MeV. Thus, taking into account the cavity length (0.4 cm) and the initial beam energy, the acceleration gradient of ≈250 MV/m was experimentally demonstrated. This value significantly exceeds the record parameters achieved on the basis of long-wavelength klystrons.

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OPTICAL CHARACTERIZATION OF $GETE_2$ PHASE CHANGE MATERIAL FOR TERAHERTZ APPLICATIONS

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Recently, photonics of phase-exchange materials (PCMs) has become a new research field as the opti-cal properties of PCMs change during the amorphous-crystalline phase transition [1]. Activation of PCMs phase transition is possible by thermal, electrical or optical effects on the material [2]. The phase transition principles can be used in terahertz (THz) metamaterials [3], affecting their spectral characteristics [4]. By controlling the crystal fraction of the PCM film, multi-level nonvolatile te-rahertz resonance switching states with long retention times can be realized. We investigated the optical, infrared (IR), and THz permittivity properties of thin films of a new PCM GeTe2 during insulator-to-metal transition. Studies of the amorphous and crystalline phases as well as THz spectra are presented and studied using Lorentz and Drude models. It is proposed that the state of GeTe2 can be monitored by observing the intensity characteristics of the 155 cm-1 Raman peak. Molecular dynamics simulations showed that during crystallization, the intensity of the 155 cm-1 mode attributed to Te-Te stretching decreases and disappears during complete crystallization. Using the example of the new GeTe2 PCM, we demonstrate that the properties of PCM-based metasurfaces can be specified at the initial design stage and modified at the experimental stage. It has been shown that this PCM characteristic is of particular interest for achieving dynamic and tunable metasurface functionality. This work was supported in part by the Ministry of Science and Higher Education of the Russian Federation (Grant No. 075-15-2021-1353) for the PCM material characterization; in part by the Interdisciplinary Scientific and Educational School of Lomonosov Moscow State University "Photonic and Quantum Technologies: Digital Medicine" for the sensor creation; in part by the European Union through the European Regional Development Fund project "Center of Excellence" TK141 for the thin film preparation; and in part by the Ministry of Science and Higher Education within the State assignment FSRC "Crystallography and Photonics" RAS for the developements and prospects of THz photonics. The experimental Raman spectra were obtained at Lomonosov Moscow State University using the equipment purchased within the Lomonosov Moscow State University Program of Development.

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