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Title

Terahertz Gyrotrons at IAP RAS: Status and New Designs

Source

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Abstract

Powerful gyrotrons with radiation frequencies in the range 0.33-0.65 THz were demonstrated at the IAP as early as in the 1970-1980s. This trend has recently been renewed in connection with a significant increase in interest in terahertz frequency range. In the course of new experiments, the radiation frequency of pulsed gyrotrons was increased up to 1.3 THz and 1 THz at the fundamental and third cyclotron harmonics, respectively. In addition, gyrotrons operated in CW regime with a frequency of 0.3 THz for technological applications (in collaboration with the University of Fukui, Japan) and 0.26 THz for the dynamic nuclear polarization at a high-field NMR were implemented. Designs of a pulsed fundamental-harmonic gyrotron with MW-level power at 0.3 THz and a CW kW-level third-harmonic gyrotron with a frequency of 0.4 THz are currently developed. Estimates show that modern techniques for the creation of strong magnetic fields now make it possible to realize gyrotrons with an operating frequency at least up to 1-1.5 THz. Such generators utilize a relatively low particle energy and can provide higher average power than the existing FELs. (27 References).