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Design and cold test of a high-efficiency C-band travelling-wave accelerating structure

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In this paper we present the development of a 1-meter high-efficiency C-band travelling wave (TW) accelerating structure for the proposed Jinhua Light Source (JHLS) project including the design and cold test. This C-band structure works at a mode of $3\pi/4$ with a relatively low group velocity varying from 0.016c to 0.009c. It employs a cell shape with elliptical irises and circular arc tops to reduce the surface electric and magnetic fields and to achieve an average shunt impedance of 94 MΩ/m through optimizations. This results in an accelerating gradient of 40 MV/m with an input power of 29.6 MW, which has an efficiency comparatively higher than those of previously-reported C-band structures. Moreover, a new technique is utilized for the design of couplers, significantly simplifying the whole optimization process and achieves high accuracy. After fabrication, the structure was precisely tuned. Results from low-power radiofrequency (RF) measurements and the comparison with simulated values are also presented in this paper.

Footnotes

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