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Preliminary design of energy recovery scheme for high-power

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Based on the high efficiency klystron scheme of circular electron positron collider (CEPC), the depressed collector design is proposed to improve the overall efficiency of RF power source. The depressed collector technology has been applied in low power microwave electronic vacuum devices such as TWT and TV communication klystrons. The velocity of electrons entering the klystron collector is scattered, and it is difficult to use the depressed collector to sort the velocity of electrons. This paper will carry out a detailed theoretical analysis of the depressed collector and determine its basic design scheme for CEPC high efficiency klystron. In order to verify the klystron energy recovery scheme, an energy recovery verification device is designed. DGUN and CST codes are used for optimization design of verification device beam. ANSYS thermal analysis is carried out on the depressed collector to determine the electron gun and depressed collector design scheme. The verification device is expected to be completed by the end of the year to carry out high-power experiments.
Keyword: depressed collector, klystron, energy recovery, electron gun

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