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Research on an S-Band 50 MW High-Efficiency Permanent Magnet Klystron

Improving klystron efficiency is crucial for reducing the operational costs of particle accelerators. This study presents an S-band 50 MW periodic permanent magnet (PPM) focusing high-efficiency klystron , aiming to minimize energy consumption while maintaining high conversion efficiency. The research addresses the domestic need for localized development of S-band 50 MW klystrons. A key focus is the design of a high-efficiency 50 MW klystron and its corresponding PPM focusing structure. Through precise computer simulations of beam dynamics, the feasibility of the PPM focusing system is validated, achieving both high microwave conversion efficiency and compatible beam focusing. The development of this S-band PPM klystron represents a significant advancement in klystron technology, offering a more efficient and cost-effective solution for high-power applications. This design reduces power consumption without compromising performance, contributing to the broader goals of energy efficiency and cost reduction in accelerator technology.

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