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Design of periodic permanent magnet for S-band high efficiency klystron

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Improving the efficiency of the klystron can significantly reduce the operational costs of particle accelerators. This paper investigates the use of permanent magnets in klystrons, aiming to create a design that minimizes energy usage while maintaining performance. The focus of this study is on the design of a periodic permanent magnet (PPM) for S band high efficiency klystron. In addition to the innovative magnetic field configuration, the study includes the design of a new output cavity. This cavity is optimized to match the phase of both the outer and inner beam components, which is crucial for maximizing output power and efficiency. The development of a PPM S-band klystron represents a significant step forward in klystron design, offering a more efficient and cost-effective solution for high-power applications. This design reduces power consumption while maintaining or even improving performance, contributing to the broader goals of energy efficiency and cost reduction in accelerator technology.

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