Abstracts

A Racetrack Microtron for Millimeter and Submillimeter Wave Generation

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The accelerator described here is an eight-orbit four-sector racetrack microtron possessing strong focusing action. The magnet gap is only 7mm, and the accelerating cavity is placed in one of the field-free regions. The energy gain per traversal of the cavity can be varied from 0.4 to 1.5 Mev and synchronism obtained by adjustment of the magnetic field strength and the length of the main straight section. A theoretical analysis of the synchrotrons oscillations in energy and phase shows that tight bunching can be achieved at almost any point in any desired orbit by changing the frequency of the synchrotrons oscillations. This can be accomplished by varying the RF power and therefore the accelerating voltage. One particularly attractive operating region gives tight bunching in the third orbit, allowing the construction of a compact machine if desired. For the RF accelerating source used (frequency 2800 Mc) one obtains 20 per cent of the third orbit current in a bunch length of 0.1 mm using dc gun injection (no prebunching). A current of 20 ma was obtained in the third orbit (2.2 Mev) which should be sufficient for the production of milliwatt power in the submillimeter region.

❑ Return to main document.