**Generation of Millimeter and Sub-Millimeter Radiation in a Compact Oscillator Utilizing The Two-Stream Instability**

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**Title and Subtitle**

**Performing Organization**

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**Abstract**

We propose a novel technique to produce sub-millimeter
radiation; this technique mingles two electron beams of
slightly different energies. On their own, these beams will
exhibit a two-stream instability. Proper initial modulation
of the beams can control this instability, allowing such a
device to act as an oscillator at chosen radiation
frequencies in the millimeter and sub-millimeter ranges.
Simulations of this device show amplification of 100-
GHz radiation, with convenient scaling up to 1 THz.
Additionally, the experiment merely requires two low-
voltage, low-current electron beams and straightforward
beam and millimeter-wave optics; with a total beamline
length of under a meter. We predict this simple and
compact device can generate up to 100 W of 1-THz
radiation.