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## High efficiency, 1 MW, 1 MeV accelerator for environmental applications

*Thursday, 11 May 2023 16:30 (2 hours)*

We present design of a normal conducting, high efficiency linac that would provide a CW beam of 1 MW electrons at 1 MeV energy for various environmental applications. When a flowing sheet of wastewater is exposed to such a beam, various radiation-induced reactants are generated that lead to water purification by decomposing the chemical and biological pollutants therein. Such a linac could treat about 20 million gallons of wastewater per day with an ample dose of 1 kGy. Our linac comprises of three optimized accelerating rf cavities operating at 476 MHz. A compact rf distribution manifold splits the rf power from a 1-MW klystron in the appropriate ratio and phase for each accelerating cavity. The beam capture efficiency is 82% and the rf-to-beam efficiency is 94.5%. The total length of our accelerator is 2 m, which includes the 30 keV gun, the buncher cavity, and the accelerating cavities. In this paper, we present the corresponding beam dynamics, the implementation of rf couplers and feeding manifold, and the steady-state thermal analysis.

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### Footnotes

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Yes

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