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Physical design of a 10 MeV electron linac for industrial application and material irradiation effect research

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A 35MeV/2 mA S-band electron linear accelerator used to interact with solid targets to generate neutrons, gamma rays, and X-rays has been proposed to provide a scientific research platform for nuclear energy development, material development, biomedicine, deep space exploration besides other industrial applications. The accelerator has a three-stage accelerating structure, after the first-stage of structure, the beam energy can reach 10MeV, and then completes 270° vertical bend and 45° horizontal bend, respectively, for industrial applications and material irradiation effect research. This paper presents the first-stage acceleration of the linac and its bend branch, including a pre-buncher, an acceleration structure (provides beam energy 10MeV and average current 2mA), 270° and 45° bend magnets, with beam loss rate less than 15%. A detailed physical design and dynamics simulation results are presented and discussed.

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Footnotes

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Yes

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