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The Design of the Emittance Diagnostic for the Scorpius Accelerator

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The planned multi-pulse linear induction accelerator, Scorpius, will be used in radiographic experiments at the NNSS U1A facility. One of the many diagnostics, the emittance diagnostics, will provide information on the quality of the beam emanating from the injector and therefore the quality of the beam in the accelerator. A Slit-Harp design was chosen for the emittance diagnostic. COMSOL multi-physics parameter space modeling using modeled Scorpius input beams tunes drove both the slit and harp designs to achieve the measurement of the emittance. Additional modeling for energy deposition/heat dissipation/x-ray reduction drove material choices for the slit (aperture) and harp wires. The signal chain is designed around constraints of signal extraction, biasing against secondary electrons which would cause errors in the emittance reconstruction calculation, and individual multi-pulse record capability. The ensemble of materials, electrical, and mechanical aspects of the design to reconstruct the emittance from the injector of the accelerator will be discussed.

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Footnotes

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Yes

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