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Uniformly Rastering an Electron Beam on a Polarized Cryotarget[1] DAVID BRAKMAN[2], GERARD GILFOYLE[3], University of Richmond, CHRIS CUEVAS[4], Jefferson Lab — The HDice experiment in Hall B of Jefferson Lab will measure excited nucleon states more completely by controlling the spin states of a hydrogen target. For the experiment, an electron beam will be incident on a polarized target of frozen hydrogen-deuteride, and the debris produced will be measured by the CEBAF Large Acceptance Spectrometer. To ensure that sections of the target don't overheat and depolarize, it is necessary to quickly and uniformly move the beam across the circular surface of the target entrance window. This process of distributing a sequence of beam packets over the x-y plane is known as rastering and is accomplished with a pair of electromagnets that deflect the beam along the x and y axes. We mathematically defined a parametric spiral pattern over the surface of the target window. As sine and cosine waves for x(t) and y(t) produce a circular x-y pattern, we scale their amplitudes by (t) over a repeating interval to fill in the circle. When simulated, this procedure produces a sufficiently uniform distribution of heat throughout the target. Given this pattern, we specify the current as a function of time in the magnets. In our test setup, the circuit's frequency response alters the input pattern, and we are investigating ways to compensate for that effect.

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