Abstract Submitted
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3D Printed Scintillators For Use in Field Emission Detection and Other Nuclear Physics Experiments KAREN FICENEC[1], College of William & Mary — In accelerator cavities, field emission electrons electrons that get stripped away from the cavity walls due to the high electromagnetic field necessary to accelerate the main beam are partially accelerated and can crash into the cavity walls, adding to the heat-load of the cryogenic system. Because these field electrons emit gamma rays when bent by the electromagnetic field, a scintillator, if made to fit the cavity enclosure, can detect their presence. Eliminating the waste of subtractive manufacturing techniques and allowing for the production of unique, varied shapes, 3D printing of scintillators may allow for an efficient detection system. UV light is used to start a chemical polymerization process that links the monomers of the liquid resin together into larger, intertwined molecules, forming the solid structure. Each shape requires slightly different calibration of its optimal printing parameters, such as slice thickness and exposure time to UV light. Thus far, calibration parameters have been optimized for cylinders of 20 mm diameter, cones of 30 mm diameter and 30 mm height, rectangular prisms 30 by 40 by 10 mm, and square pyramids 20 mm across. Calibration continues on creating holes in the prints (for optical fibers), as well as shapes with overhangs. Scintill

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