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SOLID STATE LASER TRIGGERING SYSTEM FOR THE HERMES-III ACCELERATOR

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The Hermes III accelerator at Sandia National Laboratories is a 20 cavity multi-stage linear induction voltage accelerator typically producing a 20-MV, 20-ns, 600-kA output pulse. Energy is initially stored in Marx banks that are each discharged into two intermediate store capacitors. Each of these capacitors are then switched with an SF6-insulated high voltage rim-fire gas switch into four pulse forming lines that further condition the pulse before finally delivering it to the induction cavities arrayed along the axis of the machine. Presently, a single 0.9-J KrF laser operating at 248 nm, the output of which is divided into twenty beams, is used to trigger the 20 rim-fire switches. As part of an upgrade to the accelerator, however, a new solid state laser triggering system is being designed to replace this system and provide additional capabilities for the accelerator. The laser triggering system will be made up of 10 discrete compact flash-lamp pumped, Q-switched Nd:YAG lasers (Tempest 300), each having an output energy of 40 mJ at a wavelength of 244 nm. As each laser will be responsible for triggering only two of the rim-fire switches, it becomes possible to shape the output pulse by varying the times at which the individual lasers fire. Overall reliability for the accelerator's operation with these new lasers will be increased, as well. The overall layout of this new laser triggering system design will be presented, and details pertaining to the triggering of the lasers and the optical beam paths will be shown.

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