1. **Research Title:** Automated Process-Driven Design for Additive Manufacturing
2. **Individual Sponsor:**

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3. **Academic Area/Field and Education Level:**

Related Engineering Degree, Physics, Applied Math
Additive Manufacturing, Automated Design,
Topology Optimization (MS or PhD level)

4. **Objectives:** Develop automated design tools that directly couple to physics-based simulations of additive manufacturing process, i.e. process physics directly translate to design constraints.

5. **Description:** Developments in additive manufacturing are enabling the fabrication of parts with tailored performance through manipulation of complex topologies and microstructures and naturally reduces the number of parts in a complex system. These advances have led to a revitalization of automated design frameworks such as topology optimization techniques. However, state of the art design methods are in the early stages of accounting for process level information like print path and the resulting anisotropic material properties along an extruded filament or laser raster pathL but still lack the direct incorporation of process level physics modeling. To address these needs, this project call seeks proposals with innovative approaches for coupling additive process level physics modeling at a print path scale to automated designtechniques like topology optimization. The design tool should output an optimized part topology with process control profiles and raster/print paths through formulation of a fully coupled optimization problem. Solutions leveraging novel surrogate model approaches of process level physics, heterogeneous high performance computing architectures, and development of new optimization methods are highly encouraged.

6. **Research Classification/Restrictions:** Unclassified and Unrestricted. Eligible for Public Release. Open to U.S. Citizen Students Only.

7. **Eligible Research Institutions:** All DAGSI Institutions