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High-rate radiation damage studies of materials with heavy ion beams

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The Argonne Tandem Linear Accelerator System (ATLAS) at Argonne National Lab is a superconducting ion linac capable of delivering beams ranging over all possible elements, from hydrogen to uranium, and at a wide range of beam currents and energies. The ATLAS scientific program is focused primarily on basic nuclear physics. In this contribution, we present the capabilities of ATLAS for high-rate radiation-damage studies for a variety of applications below the threshold of producing radioactivity. To date ATLAS has been used for such studies relevant to advanced reactors. These include studies of structural materials and damage induced by fission products in advanced fuel candidates. Such studies can be expanded to include in-situ measurements of response to damage in other materials used at high power densities such as for targets at spallation neutron sources and neutrino factories. ATLAS is in the process of a multi-user upgrade which adds the capability of simultaneously accelerating two ion beams and delivering them to different target stations. This enables ATLAS to deliver beams for nuclear physics research simultaneously with irradiation studies.

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