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Simulation of neutron and electron material damage in CuO, MgO, and Al2O3

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One of the key requirements of materials operating in high radiation environments is that they are radiation hard. That is, they endure low to no-radiation induced damage when exposed to high radiation fields, and that is important in that such materials do not lose their performance levels. Displacement per atom (dpa) which relates the number of displaced atoms in materials by exposure to radiation is the property calculated to measure radiation damage in materials. A high material dpa signals a high material damage by radiation. CuO, MgO, and Al2O3 are candidate materials due to their high secondary electron emissions and potential radiation hardness for use as electron multipliers that are a key component of the detection system in the high radiation environment of the ATLAS detector of the Large Hadron Collider (LHC) at CERN. We performed Monte Carlo based simulations using the FLUKA code to investigate the possible radiation damage extent in CuO, MgO, and Al2O3, by calculating the neutron and electron dpa in these candidate materials.

Apply to be considered for a student ; award (Yes / No)?

yes

Level for award;(Hons, MSc, PhD, N/A)?

PhD

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