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MAGE - a GEANT4-based Monte Carlo Application Framework for Low-background Germanium Experiments

We describe a physics simulation software
framework, MAGE , that is based on the GEANT4 simulation
toolkit. MAGE is used to simulate the response
of ultra-low radioactive background radiation detectors to
ionizing radiation, specifically the MAJORANA and GERDA
neutrinoless double-beta decay experiments. MAJORANA
and GERDA use High-purity Germanium technology to
search for the neutrinoless double-beta decay of the 76Ge
isotope, and MAGE is jointly developed between these two
collaborations. The MAGE framework contains simulated
geometries of common objects, prototypes, test stands, and
the actual experiments. It also implements customized event
generators, GEANT4 physics lists, and output formats. All
of these features are available as class libraries that are
typically compiled into a single executable. The user selects
the particular experimental setup implementation at runtime
via macros. The combination of all these common
class into one framework reduces duplication of efforts,
eases comparison between simulated data and experiment,
and simplifies the addition of new detectors to be simulated.

Are you a Memeber of the Geant4 Collaboration (yes/no)

no

Keymords

Low background, germanium detectors, double-beta decay, dark matter

Summary

User's Workshop

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