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Planning for Obsolescence in a Production Environment: Migration from a Legacy Geometry Code to an Abstract Geometry Modeling Language in STAR

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Faced with the abundance of geometry models available within the HENP community, long running experiments face a daunting challenge: how to migrate legacy GEANT3 based detector geometries to new technologies, such as the ROOT/TGeo framework [1]. One approach, entertained by the community for some time, is to introduce a level of abstraction: implementing the geometry in a higher order language independent of the concrete implementation of the geometry model. This approach faces many practical challenges and, until now, has remained at the conceptual design level. The STAR experiment has successfully stepped back from its legacy Geant 3 model (AGI [2]) and implemented a front-end abstract geometry modeling language (AgML), based on an XML syntax enriched with mathematical expressions. AgML allows STAR to leverage recent developments in simulation and detector description, provides a clear path for the seamless integration of future technologies, and enables us to support both the past and ongoing experimental program of STAR by maintaining a consistent single-source description of the detector geometry across its decade-long lifespan. It is complemented by parsers and a C++ class library which enables the automated conversion of the original source code to AgML, supports export back to the STAR original format (regression testing), and creates the concrete ROOT/TGeo geometry model used in our reconstruction framework. In this talk we present our approach, design and experience and will demonstrate physical consistency between the original AGI and new AgML geometry models and discuss its integration within the STAR framework.

[1] R. Brun et al, "The ROOT Geometry Package", Nucl. Instrum. Meth. A502:676-680,2003.
[2] A. Artamonov et al, "DICE-95", internal note ATLAS-SOFT/95-14, CERN, 1995.

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