A Tool for Calculation of the Radiation Parameters on the Early Stage of Simulation Geometry Development in CATIA

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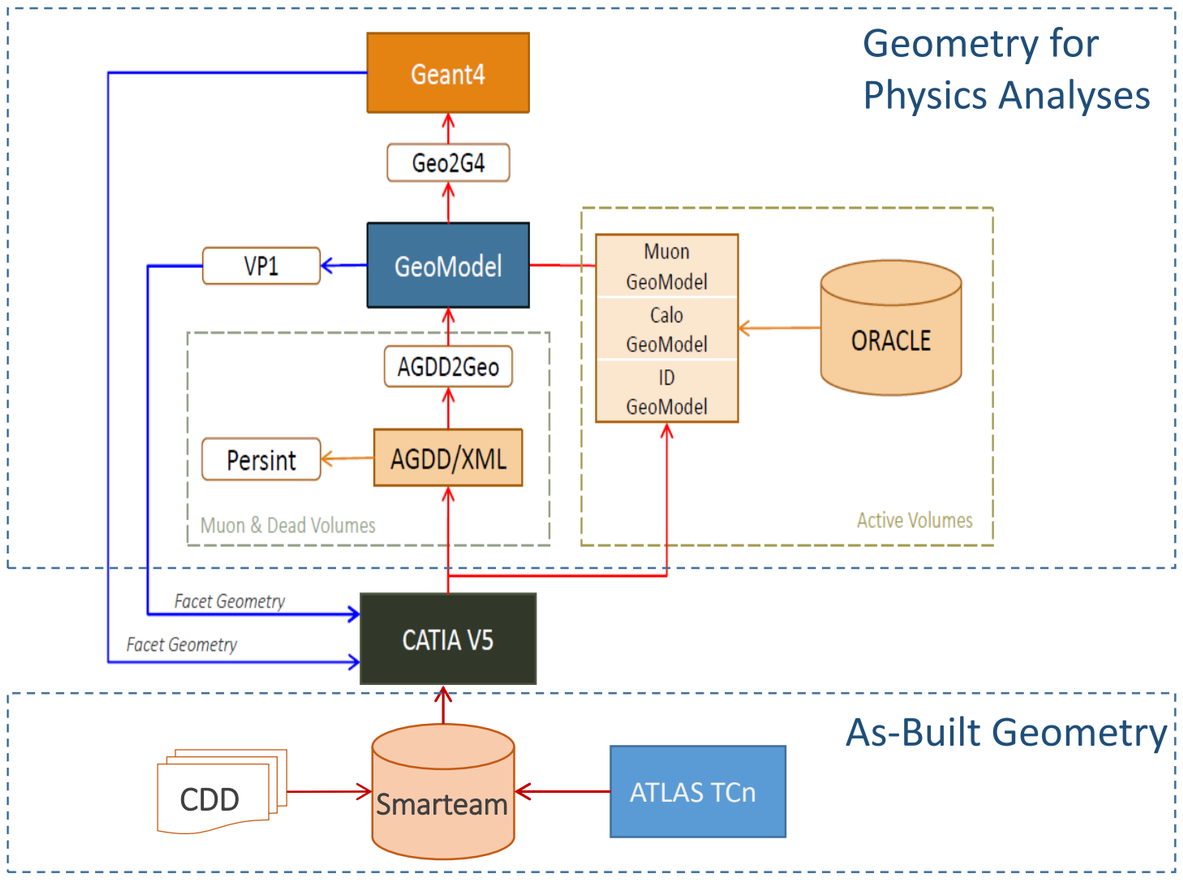
On behalf of ATLAS Collaboration

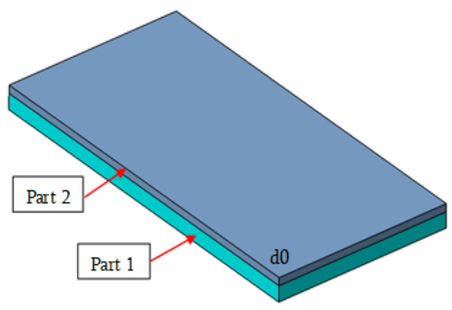
I. Introduction

The simulation in ATLAS is being used to produce artificial events for physics analyses and carried out on the GEANT4 platform. The GEANT4 uses geometry descriptions as an input for the modelling of the propagation of the particles in the material. Adding CATIA (Computer-Aided Three-dimensional Interactive Application) CAD application into simulation infrastructure brings an opportunity for the early study of the detector geometry for precise simulation. The proposed methodology foresees the calculation of X_0/λ radiation parameters for the CATIA native geometry descriptions. The core part is the so-called scanner function, enabling the generation of the control points on the geometry, where the calculations will carry out. The algorithm contains as well, the initial transformations of geometries before scanning and output interfaces with the standard applications *Root* and *Excel*.



II. Methodology

$$X_0 = \frac{716.4}{Z \times (Z+1) ln \frac{287}{\sqrt{Z}}}\ g.cm^{-3}$$

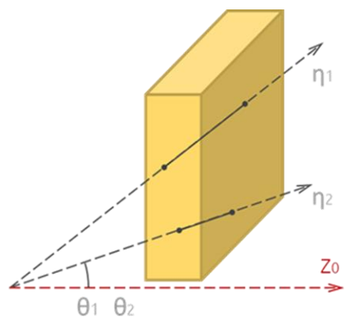


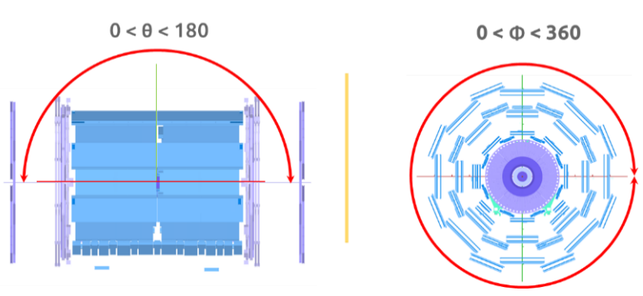
$$\frac{d_0\rho_0}{x_0} = \frac{d_1\rho_1}{x_1} + \frac{d_2\rho_2}{x_2}$$

$$d_0 = d_1 + d_2$$

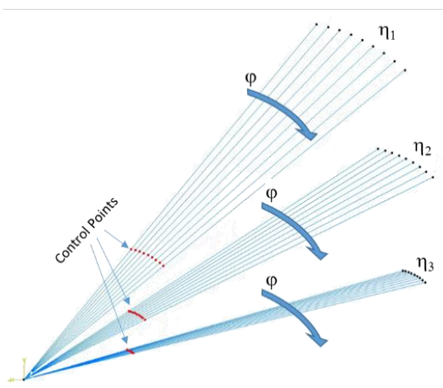
$$d_0\rho_0 = d_1\rho_1 + d_2\rho_2$$

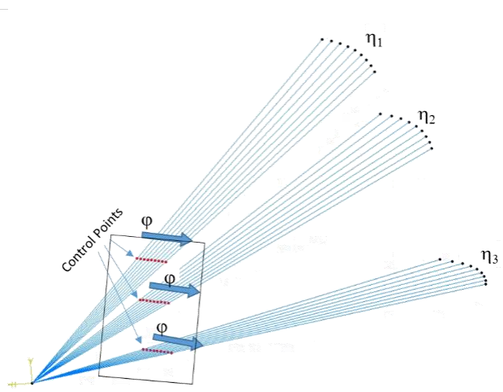
- Scanning directions





- Condition for the separation of the control points $C = \forall_i (t_i \neq t_{i+1} \vee m_i \neq m_{i+1})$





$$P_\Sigma = \sum_{i=1}^{n} \sum_{k=1}^{ij} P_{ik}(\varphi)$$

III. Implementation : The Liquid Argon Pump Analyses