**Laboratório de Instrumentação e
Física Experimental de Partículas**

L I P

Seminário LIP

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ANTS2 toolkit: interface to Geant4, event analyzer and semi-automatic detector optimization

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ANTS2 toolkit is under active development in Coimbra branch of LIP for more than 5 years. Its main application area is development and optimization of position-sensitive particle detectors and scintillation event reconstruction / classification techniques. Recently, the applicability range of the toolkit has been increased by introducing a possibility to automatically delegate simulation of particle transport and interactions to Geant4. This also allowed to significantly reduce the learning time for people new to Geant4 simulations (e.g., MSc and PhD students) needed to start producing useful results: due to the interactive GUI and CAD features of ANTS2, it is easier to start compared to direct use of Geant4. This is further reinforced by the fact that ANTS2 offers a comprehensive event viewer and interaction data analyzer, accessible from GUI and scripts. The analyzer allows to extract from the simulation results a wide range of data with very flexible custom cuts. Finally, ANTS2 is now capable of multi-parameter optimization of detector design in semi-automatic mode. The user only needs to select a set of parameters to optimize (e.g., sizes of several elements of the detector) and to define a cost function using Python or JavaScript. The function, used by the ANTS2 minimizer, allows to find the optimal set of the parameter values: on each call of the minimizer, the function modifies the detector geometry, runs a simulation and has access to all the simulation results. In this talk we will give an overview of the ANTS2 structure and capabilities, and then focus on the features listed above.

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