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GEANT4 simulation project on the AMS facility, ARTEMIS, at LMC14 in Saclay, France

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A project of Ion Beam Simulation on the ARTEMIS Accelerator Mass Spectrometer is carried out at LMC14. The tool GEANT4 is used to take into account all physical processes and predict and control the settings of such a facility.

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

no

Keymords

14C dating, Accelerator Mass Spectrometer (AMS), Ion Beam Line Simulation

Summary

The ARTEMIS facility is an Accelerator Mass Spectrometer (AMS) installed in 2003 at Saclay in France and dedicated to radiocarbon dating. It routinely measures 3800 samples per year for French organizations covering a large field of research (e.g environmental science, archaeology, geology⋯). Because of the very low 14C abundance, we need high efficiency and transmission of the beam to avoid isotopic fractionation due to particle loss to get the best quality of measurement. That's why, since Octobre 2008, a PhD project on beam optic simulation on the ARTEMIS NEC Pelletron AMS of the LMC14 was carried out to improve the technical factors involved.
A first step of work was to use TRANSPORT tool to get a global view of the beam emittance behaviour. In a second part, we want to take into account all the physical processes involved, by using GEANT4 tool.
After a full examination of the facility, we propose to define how we project to use GEANT4 as a tool to find the most sensitive points of the machine and those where an improvement could be made. The aim of such a project is to predict and control the settings of the facility to find the most relevant ones for each kind of measurement.

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