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ExpertRoot. A GEANT4 and FairRoot based framework for simulation and reconstruction of Nuclear Physics experiments at ACCULINNA2 and SuperFRS facilities.

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The ExpertRoot framework supports all the stages of the lifecycle of an experiment:
planning and feasibility studies, detailed simulations of the detector response and digitization, particle identification (PID)
and reconstruction, reconstruction of entire events.

The interaction with GEANT4 classes is implemented via VMC.
Thoroughly control over the production of secondaries, tuning of physics, stepping actions, etc. is demanded by the low energy nuclear Physics experiments and realized in the ER framework.

The key features of the framework are:
- an interface library for reading, converting and calibrating the experimental data
- a generator for the realistic cocktail beam
- an extended set of interactions including decays on the flight, interfaces to the external physical models, phase space dominated parameterizations etc.
- flexibly parameterized models and procedures (starting from geometry creation and ending with particle identification
and reconstruction) are built for all the detectors in use.
- a database with realistic parameters of the detection modules present in the lab and used in the experiments is supported
- The same geometry is used for simulation and reconstruction
- the same PID and reconstruction algorithms are used for the simulated and experimental data
- Such effects as energy loss in the target and dead layers of the detectors are taken into account in the simulation (stochastically) and the reconstruction (in average).

The architecture of the framework, principle algorithms and an experimental example will be discussed in the talk.

Primary authors: KOZLOV, Mikhail (Joint Institute for Nuclear Research (JINR), Bauman Moscow State Technical University); BELOGUROV, Sergey (Joint Institute for Nuclear Research (JINR)); CHUDOBA, Vratislav (Joint Institute for Nuclear Research (JINR)); FOMICHEV, Andrey (Joint Institute for Nuclear Research (JINR)); GAZEEVA, Elvira (Joint Institute for Nuclear Research (JINR)); GORSHKOV, Alexander (Joint Institute for Nuclear Research (JINR)); KRUPKO, Sergey (Joint Institute for Nuclear Research (JINR)); MAUEY, Bakytbek (Joint Institute for Nuclear Research (JINR)); MUZALEVSKIY, Ivan (Joint Institute for Nuclear Research (JINR)); OVCHARENKO, Egor (Joint Institute for Nuclear Research (JINR)); QUỲNH, Anh Mai (Joint Institute for Nuclear Research (JINR)); SAITYSHEV, Ilyas (Joint Institute for Nuclear Research (JINR)); SCHETININ, Vitaliy (Joint Institute for Nuclear Research (JINR), Bauman Moscow State Technical University)

Presenter: KOZLOV, Mikhail (Joint Institute for Nuclear Research (JINR), Bauman Moscow State Technical University)

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