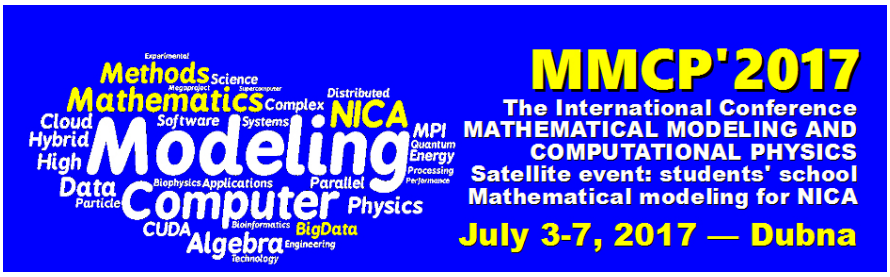

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High precision computer simulation of cyclotrons

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Effective and accurate computer simulations are highly important in accelerators design and production. The most difficult and important task in cyclotron development is the magnetic field simulations. It is necessary to achieve the accuracy of the model that is higher than the tolerance for the magnetic field in the real magnet. An accurate model of the magnet and other systems of the cyclotron allows us to perform beam tracking through the whole accelerator from the ion source to the extraction. While high accuracy is necessary in the late stages of R&D works, high performance of the simulations and ability to swiftly analyze and apply changes to the project plays the key role in the early stages of the project. Techniques and algorithms for high accuracy and performance of the magnet simulations have been created and used for development of the SC202 cyclotron for proton therapy, which is under production by collaboration between JINR (Dubna, Russia) and ASIPP (Hefei, China).

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