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New insights on the nuclear matter behaviour using CBM experimental set-up

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At GSI Darmstadt (Germany) there is in construction a new and very performant accelerator system, namely the Facility for Antiproton and Ion Research (FAIR). The performances of this facility, related to the beam intensity and energy, interaction rate, around 1 MHz, etc will provide remarkable research opportunities in Nuclear and Particle Physics, in Atomic Physics and Nuclear Astrophysics, as well as in materials research, plasma Physics and radiation Biophysics, including developments of novel medical treatments and applications for space science. This accelerator system will produce, too, high-intensity secondary beams using s a large acceptance Superconducting Fragment Separator (SFS). Therefore, major experiments have been proposed during the time, as: NUSTAR (NUclear STructure, Astrophysics and Reactions), PANDA (AntiProton ANnihilation at Darmstadt), at the High-Energy Storage Ring (HESR), APPA and CBM (Compressed Baryonic Matter).
The CBM Experiment includes detector systems for investigation of the high-energy heavy-ion collisions. These investigations will help in the knowledge of the properties of very dense and hot nuclear matter formed in the overlapping region of the two colliding nuclei. Interesting connections among different fields will be possible. As members of this collaboration, we are involved in different research directions of the collaboration. Some of the most interesting predictions obtained during two decades of participation at the activities of the CBM Collaboration are included in this work. These results reflect de connections between collision geometry and collision dynamics, influences of the thermodynamic equilibrium of the conditions in the participant region and the equation of state, nuclear matter flow and specific phases etc

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