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Anisotropic flow measured in Pb-Pb collisions with the NA49 experiment at the CERN SPS

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Anisotropic flow at SPS energies was measured by the NA49 Collaboration more than 10 years ago. Recently new data for Pb-Pb collisions were collected by the NA61/SHINE experiment during the Pb-ion beam energy scan program at the SPS. This motivated a new analysis of the available NA49 data, based on modern flow measurement techniques that will also utilize the spectator fragments for reaction plane determination. The new results on directed and elliptic flow in Pb-Pb collisions at beam energy of 40 A GeV recorded with the fixed target experiment NA49 at CERN SPS are presented. Event classification is based on the multiplicity of produced particles as well as on the energy of the projectile spectators using the procedure implemented within the Centrality Framework developed for the future CBM experiment at FAIR. To account for the azimuthal asymmetry of the fixed target setup of the NA49 experiment, a three-subevent technique is used for the determination of the reaction plane resolution. The reaction plane is estimated both from the azimuthal asymmetry of the produced particles measured with the NA49 TPCs as well as by using the transverse granularity of the NA49 forward VETO calorimeter. Corrections for the detector acceptance anisotropy in the transverse plane are applied using an extension of the Qn-Corrections Framework developed originally for the ALICE experiment at the LHC. The results are compared with those previously obtained by the experiments STAR at RHIC and NA49 at the SPS. The new study is complementary to the ongoing analysis of the recently collected Pb-Pb data of the NA61/SHINE experiment at the CERN SPS and provide an important reference for the performance investigations for the future CBM experiment at FAIR.

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