

The main goal of high energy heavy ion collision experiments is to produce the so-called quark-gluon plasma (QGP) and study its properties. Advanced calculations demonstrated that when the temperature reaches around 10^{12} kelvins (around 100000 larger than in the middle of the Sun) the known building blocks of matter, namely, protons and neutrons melt and a new state of matter emerges with quarks and gluons being the proper degrees of freedom. Sophisticated experiments at the Brookhaven National Laboratory (BNL) and the European Organization for Nuclear Research (CERN) delivered a solid experimental evidence that indeed QGP is produced in high energy heavy ion collisions. It is commonly accepted that QGP behaves like a liquid and can be described using the laws of hydrodynamics. A few years ago it was found that QGP might be also produced in the so-called small systems, such as proton-nucleus or even proton-proton collisions. In this case, however, the evidence is not yet conclusive since other mechanisms (not directly related to hydrodynamics) originating from, e.g., color glass condensate, may also explain various experimental findings. The goal of this project is to analyze in detail the origin of hydrodynamics-like patterns observed in small and large colliding systems. In particular, we plan to study how the signal is produced collision after collision in the quark-gluon transport models. Here we are mostly interested in the limit of a small number of collisions. We also want to investigate the influence of the conservation laws, which are always present but quite often neglected in theoretical investigations. Finally, it is desired to see how the initial signal, driven, e.g., by the color glass condensate survives the evolution of the system. We believe our efforts will lead to a better understanding of a new state of matter possibly created in small and large colliding systems.