Proton radiography with the use of high-energy proton beams is a powerful diagnostic method for investigation of internal structure of dense objects. This technique has unique composition of properties such as high spatial and temporal resolution, high contrast sensitivity and capability to observe evolution of dynamic objects.

The result of a proton radiography experiments is two-dimensional image of investigated object in units of beam intensity. It is necessary to perform additional post processing of images to obtain information on physical properties (density) of object. To solve this problem complex of various techniques was developed and implemented in MATLAB. It consists of math methods used for correction of various types of distortions in initial data and reconstruction of density distribution from transmission of target.

During experiments with shock-compressed gases and non-ideal plasma investigated object have to be contained inside shell. Complicated form of beam transmission dependency on areal density leads to non-trivial problem of extracting values of areal density (and subsequently volume density) of component from transmission of whole assembly. Implication of Monte Carlo modelling in Geant4 provides solution by comparison of numerical simulation results with experimental data. In case of nonuniform volume density distribution, it is also possible to estimate values of areal density in experimental data from such comparison.

Capabilities and performance of this complex of methods demonstrated with results of processing and analysis of data obtained in experiment on investigation of non-ideal xenon plasma at PUMA facility in ITEP.

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