Elastic scattering is one of the simplest processes to be observed. At the accelerator, two protons moving in opposite directions collide and scatter at certain angle with the respect to the original direction preserving their identity. This resembles scattering of two billiard balls. However, there is a number of differences. Firstly, a proton is not a rigid sphere. Secondly, it is charged so it undergoes electromagnetic interactions. Thirdly, it also ``feels'' strong interactions which are responsible for the existence of the atomic nuclei. During the elastic scattering both types of interactions get mixed – they interfere – and this phenomenon leads to the modification of the scattering angle distribution which describes the probability of an observation of a scattered proton at the certain angle.

It is interesting to study properties of protons scattered elastically at very small angles, say below 100 micro radians. With decreasing value of the scattering angle one comes from the region where the strong interactions are responsible for the process, through the ``mixed'' (interference) region to the area where the Coulomb interaction dominates. Such an experiment requires high precision of the scattering angle measurement which implies the use of dedicated detectors located at large distances from the interaction point, here 231m and 247m. These can detectors can be inserted into the accelerator vacuum beam pipe in the immediate vicinity of the proton beams. They deliver information on the scattered proton trajectory position which can be used to determine the scattering angle. It has to be stressed that the discussed measurement would not be possible without the help and close co-operation with the machine crew. To be precise the measurement requires special setting of the machine in order to minimize the influence of the experimental conditions. As a bonus the measurement of the elastic scattering allows the determination of the total cross-section for proton-proton interactions. This is connected to the quantum-mechanical properties of the scattering process. In fact the total proton-proton cross-section is proportional to the elastic scattering amplitude in the forward direction i.e. for the zero scattering angle (in reality to the imaginary part of the amplitude which is a complex value). Since the extreme forward direction was not accessible during the discussed measurement one had to extrapolate the results obtained for larger angles towards zero. As a result of whole procedure the ATLAS Collaboration determined the total cross-section for proton-proton interaction at the centre-of-mass energy of 8 TeV to be nearly 100 mb (mili barn; in particle physics a barn is a unit of area and its value is 10^{-24} cm^2). The obtained result agrees with that obtained by the Totem Collaboration at the same energy within the errors. It is also well described the theoretical predictions.

The proposed measurement is one of the most basic measurements to be performed in investigation of elementary particle interactions. Together with results of the measurements performed at other energies it allows verification of the phenomenological models and theoretical calculations.