

# The analysis of qubit measurements quality in IBM quantum processor

B. I. Bantysh<sup>1,2</sup>, D. V. Fastovets<sup>1,2</sup>, Yu. I. Bogdanov<sup>1,2,3</sup>

1. Institute of Physics and Technology, Russian Academy of Sciences, Russia
2. National Research University of Electronic Technology (MIET), Russia
3. National Research Nuclear University (MEPhI), Russia

Since 2017 the IBM company has started to grant an open access to some of their 5- and 16-qubit superconducting quantum processors. This has provided a scope for the realization and analysis of quantum algorithms on real quantum devices. Unfortunately, there exist huge restrictions because of the low quality of two-qubit gates and one-qubit measurements.

However, the measurement errors could be partly compensated by the increasing of measurement statistics size if one know the mechanisms of the errors origination with high accuracy. This information about the measurements imperfections could be obtained from the theoretical reasons either by the performing the measurement setup quantum tomography.

In the present work we have performed the characterization of qubit measurement imperfections within the IBM quantum processor using the quantum process tomography procedure. To do this we have performed the tomography of an “empty” gate, which plays a role of an ideal identity transformation. The results have helped us to describe the measurement errors and significantly improve further measurements.