**Institute of Computer Science AGH and IBM Software Laboratory in Krakow invite to**



**Krakow Quantum Informatics Seminar (KQIS)
(KQIS is an official seminar of the Quantum Computing Section of the Computer Science Committee of the Polish Academy of Sciences)**<https://www.informatyka.agh.edu.pl/en/kqi-seminars/>

 **Tuesday, 20 December 2022, 9.30-11.00 via Webex**<https://ibm.webex.com/meet/tomasz.stopa>

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**Towards automatic comparison of quantum transpilers**

**Abstract**

Current quantum computers, as well as those that will be created in the near future, are not perfect. Their topological realizations deviate significantly from the ideal ones. External factors and imperfections in the hardware introduce errors and noise into the calculations, which significantly degrade the quality of the results, as well as the ability to perform calculations [1]. For these reasons, in order to perform calculations on them, quantum circuits, which are the equivalent of programs for classical computers, must be adapted (transpiled) to the target hardware and optimized to minimize errors and the impact of noise [2].

In this presentation, various techniques of quantum circuits optimization will be presented. The author will show a tool for automatic comparison of quantum transpilers with help of various metrics. The most interesting experimental results will be shown. Finally, the author will introduce the idea of using neural networks to predict quantum transpilers performance.

**References**

[1] Preskill J.: Quantum Computing in the NISQ era and beyond. In : Quantum, vol. 2, p. 79, 2018. URL http://dx.doi.org/10.22331/q-2018-08-06-79.

[2] Amy, Matthew: Algorithms for the Optimization of Quantum Circuits. Master’s thesis, 2013. URL http: //hdl.handle.net/10012/7818.

**Bio**

Wiktor Pawłowski graduated his studies in Computer Science and received M.Sc. Degree in 2022 at AGH University of Science and Technology. In his master thesis, he conducted research in the domain of quantum circuits optimizers.