

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, 11 January 2022, 9.35-11.00 via Webex

<https://ibm.webex.com/meet/tomasz.stopa>

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Simulating Quantum Devices

Abstract

The rapidly developing field of quantum information brings us ever closer to developing practical quantum computers. Currently, we are living in an era marked by the so-called Noisy Intermediate-Scale Quantum (NISQ) devices. It comes as no surprise that these machines have attracted attention from both the scientific and business communities. This attention results in a myriad of proposed potential applications for NISQ devices. One of the potential obstacles in developing quantum software, which this work aims to remedy, is the cost of testing on actual NISQ devices. The main way to cut quantum infrastructure access costs is to utilize frameworks that simulate their behavior. Nonetheless, if we try this approach, we quickly run into another problem: there are multiple frameworks available, each of which can be based on different numerical algorithms. Here, we are concerned with one particular NISQ architecture – the D-Wave annealer. The behavior of this machine can be simulated using a tensor network approach, dynamical system approach, neural networks and, for sufficiently small problem sizes, through a brute-force approach.

Bio: Łukasz Pawela leads at he Quantum Programming Laboratory at ITAI PAS. Currently, together with his team he is working on creating a unified numerical tool for simulating quantum Ising solvers.