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**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, 29th March 2022, 9.35 - 11.00 via Webex**[**https://ibm.webex.com/meet/tomasz.stopa**](https://ibm.webex.com/meet/tomasz.stopa)

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**Applications of Quantum Annealing to Music Theory**

**Abstract**

An alternative model of computation is adiabatic quantum computing (AQC). A heuristic algorithm known as quantum annealing running in the framework of AQC is a promising method for solving optimization problems. In this talk, we approach music composition and music reduction using quantum annealing. We formulate music composition as an optimization problem, and we describe the fundamental methodologies needed for generating different aspects of music including melody, rhythm, and harmony. The music reduction problem is the process that reduces the number of tracks in a multi-instrument music piece so that the resulting music consists of less number of tracks while preserving the characteristics of the original song. We present a Quadratic Unconstrained Binary Optimization formulation to select the parts of the music that are more relevant by quantifying the information each part contains through their information entropy.

**Bio:** Ludmila Botelho is a doctoral student at the Institute of Theoretical and Applied Informatics, Polish Academy of Sciences under supervision of Professor Jarosław Adam Miszczak. Botelho is currently working in quantum error mitigation and music reduction problem using quantum annealing.