

**Fakultät für Mathematik, Informatik und Physik
Universität Innsbruck**

Ankündigung des öffentlichen Vortrags

(„defensio dissertationis“)

im Rahmen der abschließenden kommissionellen Prüfung (Rigorosum)
im Doktoratsstudium der Naturwissenschaften Physik

von

Alexander Wietek, MSc MSc

über

**“Topological states of matter in frustrated quantum
magnetism”**

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Inhalt:

A little frustration makes things interesting. Although this statement is not necessarily true in real life it definitely holds in quantum magnetism. Frustrated quantum magnets can exhibit novel exotic phases of matter, such as quantum spin liquids, relevant for a possible implementation of a topological quantum computer. The theoretical study of these systems yet remains a major challenge due to the strongly interacting and frustrated nature of the problem. We present conclusive numerical evidence for the emergence of several so-called chiral spin liquids, a spin analog of the fractional quantum Hall effect, in experimentally relevant local spin models and discuss the associated phase diagrams. Furthermore, we present the numerical advances that allowed for these computations. We show that the exact diagonalization of spin systems with up to 50 Qubits has now become possible.

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