

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

**Ankündigung des öffentlichen Vortrags
(„defensio dissertationis“)**

im Rahmen der abschließenden kommissionellen Prüfung (Verteidigung der
Dissertation) im Doctor of Philosophy - Doktoratsstudium Physik

von

Romen Christian, BSc MSc

über

“Numerical Investigation of exotic Mott Insulators”

Zeit: Mittwoch, 19. Dezember 2018, 11:00 Uhr

Ort: 2S17 im ITP-Gebäude

Inhalt:

Electronic interactions in solid state physics are usually described by the spin symmetry group $SU(2)$. Ultracold systems with alkaline-earth atoms (such as ytterbium-173 or strontium-87) open the possibility to directly realize spin models with the enhanced symmetry, $SU(N>2)$. This way it is possible to study $SU(N)$ quantum magnetism, which can show novel physics with exotic phenomena.

In this talk I report on the investigation of the thermodynamics of several $SU(N)$ Heisenberg models in one and two dimensions. Using the technique of Exact Diagonalization in an $SU(N)$ -invariant form and supported by graph expansions we find a universal high-temperature regime with dominating short-ranged two-flavor antiferromagnetic correlations. The phase exhibits real-space correlation patterns subject to Manhattan shells. On the one-dimensional chain we find strong evidence for a continuous Lifshitz transition around $T \sim 0.6J$ for several N . For $SU(3)$ and $SU(4)$ on the square lattice we find further signs for two different types of Lifshitz transitions in the low temperature regime $T < J$.

Betreuer der Dissertation: Univ.-Prof. Dr. Andreas Martin Läuchli Herzig

Prüfungssenat: Univ.-Prof. Dr. Andreas Martin Läuchli Herzig
Univ.-Prof. Mag. Dr. Helmut Ritsch
Dr. Wolfgang Lechner (Vorsitz)