The **Vienna School of Mathematics (VSM)** is a joint graduate school of the mathematics faculties of the **University of Vienna** and the **TU Wien**. The VSM is devoted to top-level PhD education in all branches of mathematics. It fosters intra- and interdisciplinary scientific cooperation and networking among students and advisors and aims at increasing the international visibility of the Vienna area as a center for mathematics.

The VSM currently announces a PhD position in the area of

Mathematical theory of tensor network states
(University of Vienna, Supervisor: N. Schuch)

Tensor Networks form an ansatz where a complex high-dimensional tensor is expressed through the contraction of a number of elementary low-dimensional tensors. In particular, Tensor Networks form a powerful ansatz for the modeling of the structure of complex correlated quantum many-body systems in various scenarios. A key question in the application of tensor networks, both for the analytic classification and numerical simulation of quantum many-body systems, is their mathematical structure and in particular their representation theory. Here, the key question is to classify the inequivalent ways in which a collection of elementary tensors can give rise to the same high-dimensional tensor, and to characterize the structure of the gauge transformations which map these representations into one another.

Possible PhD projects concern the study of the representation theory of tensor networks and its application in different scenarios, such as tensors with specific types of symmetries (e.g. local symmetries, global symmetries, or symmetries acting on parts of the system), as well as the investigation of the consequences arising from the structure of the underlying gauge ambiguities, in particular in the classification of phases. The concrete thesis project will be developed jointly with the successful applicant.

Basic requirement for the position are thorough knowledge of the fundamentals of algebra, representation theory, and functional analysis, as well as interest in physically motivated problem settings, and the willingness to interact with both mathematicians and physicists, as well as both analytically and numerically oriented collaborators, alike.

The advertised position is within the Research Group "Quantum Information and Quantum Many-Body Physics" (https://schuch.univie.ac.at), which is part of both the Faculty of Mathematics and the Faculty of Physics at the **University of Vienna**. The successful candidate will become a member of the Vienna School of Mathematics and is expected to actively contribute to its activities. The extent of employment is 30 hours per week. The starting date of the position is negotiable.

Application Requirements and Procedure
The candidate must have a master degree in Mathematics or a master degree in Physics with a strong mathematical component (or a comparable degree) at the moment the PhD position starts. The application documents should contain a letter of motivation; the scientific CV with publications list; higher education certificates/diplomas; and letter(s) of recommendation preferably sent directly to office@vsmath.at by the person writing the letter. Applications have to be sent to office@vsmath.at, if possible in a single PDF file. The deadline for applications is **May 10, 2021**.