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

Quot Schemes in the McKay Correspondence: Geometry, Combinatorics, Representation Theory

(University of Vienna, Supervisor: B. Szendroi, co-supervised by Adam Gyenge, Renyi Institute Budapest)

The celebrated McKay correspondence establishes relations between certain types of surface singularities, representations of finite subgroups of SU(2), and simply laced (ADE) type Dynkin diagrams. Recent work of Gyenge, Szendroi and others has defined a range of new moduli spaces in this setup, the so-called Quot schemes of the corresponding orbifolds. Some of these Quot schemes can be identified with Hilbert schemes of the singular quotient surfaces. To this setup, one can also attach a family of generating functions, indexed by a subset of the nodes of the affine Dynkin diagram. In some cases, formulae for these generating functions are known, and relate in interesting ways to representations of finite-type and affine Lie algebras, their crystal bases, and quantum specialisations of their characters. The purpose of this project is to prove new results in this area in various different potential directions:

- *study the combinatorics of the generating function in Type A for general subsets of the Dynkin diagram, relating the resulting expressions to wall-crossing and Lie algebra characters;*
- *prove conjectured formulae for the generating function in arbitrary type using Nakajima's quantum dimension method;*
- *find higher rank generalisations of the various expressions in the field;*
- *understand the deeper representation-theoretic ramifications of the specialisation rules.*

The advertised position is associated with the Faculty of Mathematics of 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 position is planned to start on September 1, 2022.

Application Requirements and Procedure

The candidates must have a master degree (or equivalent) in Mathematics at the moment the PhD position starts and a high level of competence in (or experience of) algebraic geometry. The application documents should contain a letter of motivation; the scientific CV with publications list; higher education certificates/diplomas. Applications have to be sent via the Job Center of the University of Vienna at the Reference number 13044. The deadline for application is **May 3, 2022**.