



LECTURE COURSE IN THE QUANTUM UNIVERSE RESEARCH SCHOOL

Summer Term 2024

Examples of Braided Tensor Categories

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Course Description:

Representations of a group or a Lie algebra form a category, which admits a tensor products of representations, which is commutative. For example, the Lie algebra \mathfrak{sl}_2 of traceless 2×2 matrices, in physics often called the angular momentum algebra, has a series of simple representations in each dimension, and their tensor product can be computed explicitly (Clebsch-Gordan formula). This standard knowledge appears in a wide range of subjects in mathematics and mathematical physics, for example the description of spherical harmonics or the notion of spin.

The goal of this lecture is to construct and study example classes of such tensor categories, starting with the examples mentioned initially. A background in Lie algebras will be very beneficial, but it is not required, as we will focus on the smallest example above. An important insight is that this tensor category can be deformed by a parameter q (quantum groups). Moreover at q a root of unity, the category is not semisimple any more. We will learn novel ways to construct both of these within the framework of tensor categories. These examples and their general theory has many applications in mathematics (knot theory, Lie group over finite fields) and mathematical physics (topological and conformal quantum field theories) and also appear in research done in Hamburg in several groups.

Date and Place: Fri, 12:15–13:45, Hörsaal H3, Geomatikum

Problem Classes: Fri, 10:15–11:45, SemRm 433, Geomatikum

Starting on: 5 April 2024
