An algorithmic construction of group automorphisms and the Yang-Baxter equation
Fabienne Chouraqui, University of Haifa, Israel

The quantum Yang-Baxter equation is an equation in the field of mathematical physics and it lies in the foundation of the theory of quantum groups. The classification of the solutions of the quantum Yang-Baxter equation is still an open problem, and as an approach to tackle this problem V. Drinfeld suggested the study of set-theoretical solutions of this equation. If a set-theoretical solution satisfies some properties, then the induced operator $R$ is a solution of the quantum Yang-Baxter equation. To each such set-theoretical solution of the quantum Yang-Baxter equation is associated a group $G$ called the structure group. This group has a rich algebraic structure: it is a Bieberbach group and a Garside group. A particular interesting and efficient approach to understand a group is to compute and understand its automorphism group. In this talk, I will present an algorithm to compute explicitly a group of automorphisms of this group. Indeed, given an invertible integer matrix, there is a combinatorial criteria to decide whether it can induce an automorphism of the group and to compute it explicitly. Furthermore, there is a subgroup of this group of automorphisms that preserve entirely the Garside structure.