

# Positivity and higher Teichmüller theory

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Classical Teichmüller space describes the space of conformal structures on a given topological surface  $S$ . It plays an important role in several areas of mathematics as well as in theoretical physics. The uniformization theorem for Riemann surfaces allows to identify Teichmüller space with the space of hyperbolic structures on  $S$ , or with the space of discrete embeddings of the fundamental group of  $S$  into the Lie group  $\mathrm{PSL}(2, \mathbb{R})$ . Higher Teichmüller theory generalizes several aspects of classical Teichmüller theory to the context of Lie groups of higher rank, such as the symplectic group  $\mathrm{PSp}(2n, \mathbb{R})$  or the special linear group  $\mathrm{PSL}(n, \mathbb{R})$ . Interestingly, higher Teichmüller theory is linked with various notions of positivity in Lie groups. For example with the notion of total positivity or matrices, which plays a role in many areas, including stochastic processes, differential equations and in algebraic geometry. In this talk I will give an introduction to higher Teichmüller theory, introduce new positive structures on Lie groups and discuss the relation between the two.