ID de Contribution: **79** Type: **Non spécifié**

Classical superselection sectors, memory and soft symmetries from Hamiltonian reduction by stages in gauge theory

jeudi 28 mars 2024 15:00 (1 heure)

In recent years, increasing attention has been drawn to the behaviour of field theory with local (gauge) symmetries on manifolds with boundary and corners. On the physics side, this has led to the discovery of a relation between perturbative scattering results (e.g. Weinberg's "soft photon"theorems) and certain soft/asymptotic/large gauge symmetries, with their associated conserved charges. However, on the mathematics side we have been lacking an exhaustive explanation of these phenomena.

In this talk I will attempt to provide one, through an application of Hamiltonian reduction by stages to gauge moduli problems in the presence of higher codimension strata, which is enabled by the existence of a particular normal gauge subgroup, and it is natural from a physical standpoint. The "first stage"implements the constraint reduction/moduli space of the gauge theory. Conversely, the residual momentum map governing further stages has generally no physically-preferred value, leading to the classical counterpart of the "superselection sectors"encountered in algebraic quantum field theory, here interpreted as symplectic leaves of the fully-reduced (Poisson) phase space.

As an example within this framework, I will describe the Hamiltonian assignment to a null manifold with boundary in Yang—Mills theory, and show how it provides a purely Hamiltonian explanation of the emergence of soft symmetries, and how the electromagnetic memory (or a non-Abelian counterpart thereof) is recovered as (a part of) the residual momentum map.
In passing, I will describe how the Ashtekar—Streubel phase space, usually treated as the true reduced phase space of the theory, is instead the result of a partial reduction.

This is based on joint work with A. Riello.

Orateur: SCHIAVINA, Michele (University of Pavia)