



Contribution ID: 57

Type: **not specified**

### On 't Hooft lines and Lax operators of $SO_{2N}$ type

*Tuesday, 22 March 2022 15:15 (15 minutes)*

The four dimensional Chern Simons topological gauge theory represents a rich framework allowing to study two-dimensional integrable systems using line and surface defects and Feynman diagrams computations. Relying on this “Gauge/Bethe ansatz” correspondence, one can recover interesting results of the integrable models and generate new ones without reference to the traditional algebraic techniques. For example, the study of the intrinsic properties of interacting Wilson and 't Hooft line defects in the 4DCS theory yields the oscillator realisation of the Lax operator verifying the RLL equation of integrability. This study focuses on the 4DCS theory with invariance given by the  $SO_{2N}$  gauge group, which allows to construct the Lax operator associated to the QQ representation of an XXX spin chain with  $so_{2N}$  symmetry. This also allows to interpret the oscillator degrees of freedom in terms of algebras decomposition and field bundles charges.

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**Session Classification:** Parallel Session IV, Collider