Bologna Workshop on:

CFT AND INTEGRABLE MODELS

and their applications from gauge/gravity dualities to statistical mechanics and quantum information

Contribution ID: **90**
Type: **Talk (20 min)**

Homotopy Manin triples and higher current algebras

Monday, 4 September 2023 12:00 (20 minutes)

The notion of a Manin triple of Lie algebras arises in many contexts in quantum integrable systems and beyond. After recalling the general definition, I will describe one important class of examples involving current algebras, i.e. certain Lie algebras associated to the punctured formal disc in complex dimension one. Studying these examples naturally leads one to recover the ideas of vertex algebras and rational conformal blocks, as I will try to describe.

Now, one would like to generalize all this to higher complex dimensions. (I will sketch one source of motivation, coming from quantum Gaudin models and integrable quantum field theory.) A possible approach to doing so starts with higher current algebras in the sense Faonte, Hennion and Kapranov. I will review the definition, which involves passing from Lie algebras to their differential graded (dg) analogs. In the dg setting, it is natural to relax the definition of a Manin triple, by requiring some statements to hold only up to homotopy. I will describe some recently constructed examples of such homotopy Manin triples, and sketch some applications, in particular to higher rational conformal blocks.

This talk is based on arXiv:2208.06009, to appear in J. Geom. Phys, and work in progress, joint with Luigi Alfonsi.

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Session Classification: Bologna Workshop CFT-IM