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Title:

A Classification of Rational Conformal Field Theories with Three Characters and vanishing Wronskian Index.

Abstract :

In this talk, a classification scheme for rational conformal field theories (RCFTs), based on the modular linear differential equations (MLDEs) that their characters satisfy, will be explained. In this classification scheme, introduced by Mathur-Mukhi-Sen in 1989, a RCFT is labelled by two integers  $[n, l]$  : (i)  $n$  is the number of characters and is positive, (ii)  $l$  is the Wronskian index and is non-negative. Remarkably, the MLDE that the characters of RCFT satisfies, is also labelled by the same pair of integers  $[n, l]$ . All RCFTs with a given  $\{n, l\}$  solve the MLDE with that  $[n, l]$ .

The classification of  $[2, 0]$  RCFTs was achieved in 1989 by Mathur-Mukhi-Sen; this is a list of eight CFTs (the Deligne-series or the MMS-series). The classification problem of  $[3, 0]$  RCFTs was set up in 1989 but remained unsolved till the end of 2022. This talk will report on this progress. First, the character-like solutions to the  $[3, 0]$  MLDE will be obtained: there are two infinite series and an additional 303. Then, the analysis that identifies  $[3, 0]$  RCFTs from the character-like solutions to the  $[3, 0]$  MLDE will be explained. The main tool for this analysis is the Gaberdiel-Hampapura-Mukhi (GHM) theory of meromorphic cosets, which will be summarised. The final complete list of  $[3, 0]$  RCFTs includes two infinite affine series  $B_{\{r, 1\}}$ ,  $D_{\{r, 1\}}$  and 45 additional theories.

Sources : (1) Wronskian indices and rational conformal field theories, Arpit Das, Chethan N Gowdigere, Jagannath Santara, J. High Energy Phys. 2021, 294 (2021), arXiv : 2012.14939.

(2) Classifying three-character RCFTs with Wronskian index equalling 0 or 2, Arpit Das, Chethan N Gowdigere, Jagannath Santara, J. High Energy Phys. 2021, 195 (2021), arXiv : 2108.01060.

(3) New meromorphic CFTs from cosets, Arpit Das, Chethan N Gowdigere, Sunil Mukhi, J. High Energy Phys. 2022, 152 (2022), arXiv : 2207.0461.

(4) Meromorphic cosets and the classification of three-character CFT, Arpit Das, Chethan N Gowdigere, Sunil Mukhi, J. High Energy Phys. 2023, 23 (2023), arXiv: 2212.03136.