

ON THE MODULARITY OF TAU FUNCTIONS AND CONFORMAL BLOCKS ON THE TORUS

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ABSTRACT. The modular transformations of Virasoro conformal blocks are encoded by the so-called S -modular kernel, an integral kernel acting on the space of conformal blocks. For generic values of the central charge, this kernel admits an explicit integral representation discovered by Ponsot and Tschner. However, their integral formula ceases to be well-defined for real central charges $c \leq 1$. In this talk, I will present an alternative, fully explicit formula for the modular kernel of conformal blocks at the boundary value $c = 1$, avoiding integral expressions entirely. This new formula follows from the rigorous computation of the connection constant describing modular transformations of isomonodromic tau functions on the torus, made possible by recent progress on Fredholm determinant representations of these objects.

An immediate consequence of this result is an explicit relation between $c = 1$ and semiclassical $c = \infty$ conformal blocks. Additionally, I will provide a geometric interpretation of these results in terms of the symplectic geometry of flat connections on punctured tori.