



ID de Contribution: 25

Type: Non spécifié

## Ruijsenaars wavefunctions as modular group matrix coefficients

*mercredi 26 juin 2024 15:00 (30 minutes)*

The phase space of the Ruijsenaars integrable system can be identified with (a Poisson reduction of) the moduli space of  $GL_n$  local systems on a punctured torus. The latter admits a structure of a cluster Poisson variety. On the algebraic level, this leads to an injective homomorphism from a spherical subalgebra of the double affine Hecke algebra into the quantized algebra of global functions on the named cluster variety. From an analytic point of view, it allows for a unitary equivalence between Toda and Ruijsenaars quantum integrable systems. This in turn allows one to present the eigenfunctions of Macdonald operators as a matrix coefficient of an order 4 element in the mapping class group of a punctured torus. During this talk we will focus on the  $n = 2$  case when no Hamiltonian reduction is required. It will be based on a joint work with P. DiFrancesco, R. Kedem, S. Khoroshkin, and G. Schrader.

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