

Friday, December 9th (at 4.00pm, UK time)

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Title: Adding spin to a close connection between PDEs and CM models.

ABSTRACT

There are close connections between certain integrable PDEs and Calogero-Moser (CM) models. For example, the integrable deep-water-wave equation called Benjamin-Ono (BO) equation

- (1) can be obtained as a certain continuum limit of the trigonometric CM model,
- (2) has multisoliton solutions that are governed by solutions of this CM model and
- (3) in its first quantisation coincides with a second quantisation of the CM model and describes part of a CFT.

Recently an elliptic generalisation of this connection was found, for an equation named the non-chiral Intermediate Long Wave equation (ILW) equation. It establishes a connection between its solitons and the elliptic CM model at the cost of it now being two coupled equations for two waves, rather than just one equation for one wave.

In this talk I will discuss progress, made with Bjorn Berntson and Edwin Langmann, on extending the above story to the spinful case. I will introduce the non-chiral intermediate Heisenberg ferromagnet (nclHF) equation and show that it is integrable by a Lax pair and has multi-soliton solutions that are governed by the hyperbolic/elliptic spin CM model.

I will focus in particular on the key properties that are needed in order to achieve this, which get increasingly more involved when going from the rational to the elliptic case. I will furthermore highlight how one can use an elliptic parametrisation of the sphere to obtain initial conditions for the soliton solutions.
