ID de Contribution: **31** Type: **Non spécifié**

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mardi 2 décembre 2025 14:00 (1 heure)

Large-Data Global Well-Posedness for the modified Novikov-Veselov (mNV) Equation

This is joint work with Adrian Nachman and Daniel Tataru. The mNV equation is a nonlinear dispersive equation in two space dimensions, related to the Novikov-Veselov equation by a Miura-type map. Drawing on Nachman, Regev, and Tataru's work on global well-posedness for the Davey-Stewartson equation, we prove large-data global well-posedness for the mNV equation in L^2 using the inverse scattering method. The mNV equation is L^2-critical so this result should be regarded as optimal. A key ingredient in our proof is a new nonlinear Gagliardo-Nirenberg estimate for the scattering transform.

Using the Miura map, we are also able to prove large-data global well-posedness for a spectrally determined class of initial conditions in the Novikov-Veselov (NV) equation. Along the way we obtain a sharp, scale-invariant version of the Agmon-Allegretto-Piepenbrink theorem for Schrödinger operators in the critical two-dimensional case.