A Nonlinear Plancherel Theorem, the Defocusing Davey-Stewartson Equation and the Inverse Boundary Value Problem of Calderon

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Abstract. I'll describe a well-studied nonlinear Fourier transform in two dimensions for which a proof of the Plancherel theorem had been a challenging open problem. I'll sketch out the main ideas of the recent solution of this problem, as well as the solution of two other problems that motivated it: global well-posedness for the defocusing DSII equation in the mass critical case, and global uniqueness for the inverse boundary value problem of Calderon for a class of unbounded conductivities. On the way, there will also be new estimates for classical fractional integrals, and a new result on $L^2$ boundedness of pseudodifferential operators with non-smooth symbols. (This is joint work with Idan Regev and Daniel Tataru.)