## MINIMIZING TRAVELLING WAVES FOR THE GROSS-PITAEVSKII EQUATION ON THE 2D STRIP

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ABSTRACT. We investigate the two-dimensional defocusing nonlinear cubic Schrödinger (Gross-Pitaevskii) equation with nonzero conditions at infinity, on a strip, i.e. on an infinite channel of finite transverse width. We establish the existence of traveling waves that minimize the Ginzburg-Landau energy at fixed momentum. We establish a sharp bifurcation from planar to multidimensional behavior. Precisely, we show that there exists a threshold value for the transverse width below which minimizers are the one-dimensional dark solitons (planar solitons), and above which they are genuinely two-dimensional dark solitons. The existence of minimizers follows from a compactness argument based on a novel periodic symmetrization.

This is a joint work with Didier Smets and Philippe Gravejat.