On vector-valued singular perturbation problems involving potentials vanishing on curves

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We study the minimizers of energies of the form

$$E_\varepsilon(u) = \int_\Omega |\nabla u|^2 + \frac{W(u)}{\varepsilon^2}$$

where the function $W : \mathbb{R}^2 \to [0, \infty)$ vanishes on a closed curve in the plane, or the union of two such curves. We are interested in the asymptotic behavior of the minimizers when ε goes to zero for several problems of this type, with different kinds of boundary conditions, or constraints. The talk is based on a joint work with Nelly André (University of Tours).