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Microlocal brane structures and the classifying map

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For any Lagrangian L in the cotangent bundle of a manifold X, one can define a sheaf of stable infinity-categories using microlocal sheaf theory over ring spectra. When L is smooth, the sheaf is a locally constant sheaf of categories with fiber equivalent to the category of spectra, and we call it the sheaf of brane structures on L. The sheaf of brane structures naturally admits a classifying map. We show that the classifying map is homotopic to the composition of the stable Gauss map and the delooping of the J-homomorphism in stable homotopy theory. The main ingredients include a sheaf quantization of a Hamiltonian $\coprod_n BO(n)$-action on the stabilized cotangent bundle of R^N that is naturally related to Bott periodicity, and the category of correspondences developed by Gaitsgory–Rozenblyum. If time permits, I will talk about how one can define a microlocal sheaf category (and its obstruction) on a Lagrangian skeleton of a Liouville manifold over ring spectra as a consequence of the above result.

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