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On the characteristic cycle of an  $\ell$ -adic sheaf

The analogy between the wild ramification of an  $\ell$ -adic sheaf on a smooth scheme over a perfect field of characteristic  $p > 0$  and the irregular singularity of a  $\mathcal{D}$ -module on a complex manifold suggests that the characteristic cycle of an  $\ell$ -adic sheaf be defined as a cycle on a cotangent bundle.

I will discuss recent progresses on this problem.

Focus will be put on an analogue of the Milnor formula and the stability of nearby cycles under small deformation of fibrations to curves.