The signature as a map of cobordism categories

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The signature is a classical invariant of manifolds, which is a shadow of their intersection form. More refined topological indices of manifolds can be constructed by remembering the full intersection form.

In this talk, I will explain how the signature has an enhancement to a multiplicative map from geometric cobordism spectra of manifolds to algebraic cobordism spectra of Hermitian forms (known as Grothendieck-Witt or L-theory). This crucially depends on the construction of the signature on the level of cobordism categories.

This approach generalises and unifies various existing constructions in the literature. I will conclude by explaining some interesting applications to geometric topology, such as a simple proof of the Weiss-Williams index theorem on characteristic classes of manifold bundles.

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