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**Markus Banagl\*** ([banagl@mathi.uni-heidelberg.de](mailto:banagl@mathi.uni-heidelberg.de)), Mathematical Institute, Heidelberg University, Im Neuenheimer Feld 288, 69120 Heidelberg, Germany. *High-Dimensional Topological Quantum Field Theory, Singularities of Maps, and Exotic Spheres*. Preliminary report.

We will discuss the construction of a new topological field theory defined on smooth manifolds, which is not limited to low dimensions. The fields are given by a certain class of smooth maps, whose singularities together with diagrammatic techniques from knot theory are used to define a matrix valued action functional that factors through a categorification of the Brauer algebra arising in the representation theory of the orthogonal group. The path integral is carried out using Markov idempotent integration, which means that the theory is defined over a semiring. The resulting invariants are polynomials depending on boundary conditions, and detect exotic smooth structures on spheres. (Received February 13, 2013)