

# Deformation Quantization and Poisson Sigma Model

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*Joint work with G. Felder*

Kontsevich's formula for the deformation quantization of Poisson manifolds can be obtained as the perturbative expansion of a certain expectation value in a topological open string theory called the Poisson sigma model.

The fields of this model are morphisms from the tangent bundle of the oriented disk (or, more generally, of an oriented compact surface—possibly with boundary) to the cotangent bundle of the given Poisson manifold (with suitable boundary conditions).

This quantum field theory interpretation allows for nonrigorous but more intuitive proofs of the associativity of the star product and, more generally, of the formality conjecture.

The classical phase space of the model turns out to be the so-called symplectic groupoid of the given Poisson manifold (up to possible singularities). This is an object introduced independently by Weinstein and Karasev as part of a program to quantize Poisson manifolds. Thus, in a sense, the Poisson sigma model provides a realization of their program.

## References

- [1] A. S. Cattaneo and G. Felder, “A path integral approach to the Kontsevich quantization formula,” to appear in *Commun. Math. Phys.*, [math/9902090](#).
- [2] A. S. Cattaneo and G. Felder, “Poisson sigma models and symplectic groupoids,” [math/0003023](#).