Ranee Brylinski, Penn State University University

``Star Products and Quantization of Manifolds with Symmetry''

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A star product deforms the algebra of functions on a (smooth or algebraic) Poisson manifold into a non-commutative algebra with a parameter. The prototype -- the Moyal star product on flat space -- is equivariant under the symplectic group. Classical Poisson manifolds such as cotangent bundles, the dual of a Lie algebra and coadjoint orbits all have symmetry groups.

The problem of constructing equivariant star products on curved spaces is still wide open. The main reason is that to get equivariance one is forced into using *quotients* of differential operators (so this is outside the Fedosov and Kontsevich schemes). The example of the cotangent bundle of $\mathbf{CP}^n$ in algebraic symplectic geometry already shows this, and there is an underlying unitary representation. Cotangent bundles of generalized flag varieties and the complex nilpotent orbits form a very interesting class to study.