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Higher Symmetries of the Laplacian via Quantization

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(Submitted on 28 Jul 2011 (v1), last revised 20 Aug 2012 (this version, v3))

We develop a new approach, based on quantization methods, to study higher symmetries of invariant differential operators. We focus here on conformally invariant powers of the Laplacian over a conformally flat manifold, and recover results of Eastwood, Leistner, Gover and Silhan. In particular, conformally equivariant quantization establishes a crystal clear correspondence between hamiltonian symmetries of the null geodesic flow and the algebra of higher symmetries of the conformal Laplacian. Resorting to symplectic reduction, this leads to a quantization of the minimal nilpotent coadjoint orbit of the conformal group and allows to identify the latter algebra of symmetries in terms of the Joseph ideal. By the way, we obtain a tangential star-product for a family of coadjoint orbits of the conformal group.

Submission history

From: Jean-Philippe Michel [view email]
[v1] Thu, 28 Jul 2011 22:20:03 GMT (50kb)
[v2] Wed, 4 Jan 2012 16:25:46 GMT (50kb)
[v3] Mon, 20 Aug 2012 16:39:42 GMT (25kb)

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