

Curved Casimir operators in conformal geometry

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I will start by discussing the strong restrictions on existence of invariant differential operators coming from representation theory. These also explain, why tools like Cartan's conformal connection are needed to systematically construct invariant operators. Then I will describe Curved Casimir operators, which offer a new approach to constructing invariant differential operators for conformal structures and, more generally, parabolic geometries. These operators are constructed from the Cartan connection and tie in nicely with tractor calculus. Applications to explicit problems usually only need verifications from finite dimensional representation theory. I will outline how the techniques can be used both for the construction of specific examples of invariant differential operators and for general existence proofs.

The talk is based on joint work with V. Soucek and A.R. Gover.