Twisted Rarita-Schwinger Operators

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In this talk, we will define the twisted Rarita-Schwinger operator $\mathcal{R}_k$ and explain how this invariant differential operator can be used to define general higher spin Dirac operators (HSD) acting on functions $f(\underline{x})$ on $\mathbb{R}^m$ which take values in more complicated representations for the spin group. The classical approach to construct these operators, is defining them as being of the form $\pi_\lambda \underline{\partial}_x : \mathcal{C}^\infty(\mathbb{R}, \mathcal{S}_\lambda) \to \mathcal{C}^\infty(\mathbb{R}, \mathcal{S}_\lambda)$. Here, π_λ is a projection operator, $\underline{\partial}_x$ is the Dirac operator, $\lambda = (l_1, \ldots, l_k)$ and $\mathcal{S}_\lambda$ is an irreducible representation of the spin group with highest weight $\lambda + (\frac{1}{2}, \ldots, \frac{1}{2})$. We will make a comparison between this classical approach and our new approach based on the twisted Rarita-Schwinger operator. The latter has the advantage that one can define general higher spin operators through an inductive procedure, which will then also be reflected in the construction of homogeneous polynomial null solutions.