The fundamental solution of higher spin Dirac operators

Tim Raeymaekers   David Eelbode

May 30, 2012

In this talk, we will define the higher spin Dirac operators $\mathcal{Q}_\lambda$, with $\lambda = (l_1, \ldots, l_p)$ a highest weight for an irreducible Spin-representation. These operators act on a function $f(x)$ on $\mathbb{R}^m$, which takes values in more complicated representations $\mathcal{S}_\lambda$ of the spin group. They should be seen as generalizations of the classical Dirac operator and the Rarita-Schwinger operator. We shall construct the fundamental solution $e_\lambda(x)$ of these operators, satisfying the equation $\mathcal{Q}_\lambda e_\lambda(x) P_\lambda = \delta(x) P_\lambda$, using distribution theory and techniques coming from representation theory, for each $P_\lambda \in \mathcal{S}_\lambda$, and $\delta(x)$ being the Dirac delta distribution. In view of proving the classical integral formulae with this fundamental solution, we choose P_λ to be the reproducing kernel, defined by using the proper inner product.