Contribution ID: **52** Type: **not specified**

Kaluza-Klein theory revisited: projective structures and differential operators on algebra of densities.

In mathematical physics it is very useful to consider differential operators acting on densities of various weights on a manifold M. To study the geometry of such operators one can consider an operator pencil Δ_t where for an arbitrary real t an operator Δ_t acts on densities of weight t defined on a manifold M. Pencils of this kind can be interpreted as differential operators on a certain algebra of functions on extended manifold $\hat{M}$.

For second order operators the study of their geometry naturally fits into a Kaluza-Klein framework. For such an operator the related geometry is defined by principal symbol (”metric on M”), a connection on volume forms (”gauge field”) and a function related with the scalar term (”Brans-Dicke scalar”). This becomes useful to study important and beautiful geometrical properties of second order differential operators.

The extended manifold $\hat{M}$ can be identified with Thomas bundle dating back in projective geometry to 1920. We see that study of the extended manifold $\hat{M}$ provides constructions on intersection of classical differential geometry and gravitational theory. Such investigations can be traced to H.Weil, Veblen, T.Y.Thomas, Pauli and Jordan.

Author: Dr KHUDAVERDIAN, Hovhannes (School of Mathematics The University of Manchester)

Presenter: Dr KHUDAVERDIAN, Hovhannes (School of Mathematics The University of Manchester)