

Research plan

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A construction and an analysis of higher-dimensional black hole solutions play an important role for verification of gauge/gravity correspondence and clarification of non-perturbative effects in particle physics. From a view point of not only gravitational theory but also gauge theory, I'd like to construct and analyze higher-dimensional black hole solutions with gauge/gravity correspondence and non-perturbative effects as keywords. In order to do that, we need to investigate completely integrabilities of known higher-dimensional solutions. After understanding sufficiently them, it is helpful to construct an unknown solutions by using a way respected with the properties, I think.

It is known that separation of variables occurs in equations for various fields such as scalar and spinor fields and equation for gravitaional linear perturbation on higher-dimensional Kerr-NUT-AdS black hole backgrounds. I'd like to verify various separabilities of higher-dimensional Kerr-NUT-AdS black hole solutions.

It is expected that higher-dimensional Kerr-NUT-AdS solutions have the same properties of 4-dimensional Kerr-NUT-AdS solution. Therefore I would like to construct the new black hole solution by using a way respected with the separable structures of 4-dimensional solution.

Actually there exist various fields such as gauge and scalar fields in space-time in addition to gravitaional field. Such fields are introduced naturally by compactification of spacetime in Kluza-Klein theory. The theories including gauge and scalar fields give charged rotating black hole solutions as gravitational backgrounds. It is known that almost all known charged rotating balck hole solutions have also separabilies to various field equations. I would like to uncover the deeply common structure for the separabilities.

By understanding the separabilities of know solutions, I would like to construct new black hole solutions in theories ,that have scalar and gauge fields, such supergravities.