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plan of research

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I plan to study the following subjects:

Dynamics of stationary closed strings in higher-dimensional black holes

Closed strings in four-dimensions cannot be stationary states because a singularity generically appears on the world sheet, which is called the cusp. On the other hand, the cusp formation is not generic event for closed strings in higher-dimensions. Therefore, we consider stationary closed strings around a higher-dimensional black hole, and I plan to discuss the separability of equations of motion, the dynamical properties, the stability, and the gravitational emission.

Effect of a magnetic field on particle acceleration by a rotating black hole

Bañados, Silk, and West pointed out that arbitrarily high energy particle collisions occur near the horizon of the extremal black hole. Recently, Frolov showed that charged particle collision energy of orbiting the innermost stable circular orbit becomes arbitrarily high in a uniform magnetic field around a Schwarzschild black hole. I plan to discuss the stability of Bañados, Silk, and West's process for charged particle collisions and of Frolov's process with respect to the black hole rotation.

Symmetries of the black ring geometry

It is revealed that chaotic behavior appears in geodesics in the black ring geometry. The result means that we cannot find additional symmetries in the black ring geometry. We plan to discuss the nonexistence of additional constants by the integrability condition of the rank-2 Killing equation.