Particle collision with an arbitrarily high center-of-mass energy near a Bañados-Teitelboim-Zanelli black hole

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ABSTRACT

We consider a particle collision with a high center-of-mass energy near a Bañados-Teitelboim-Zanelli (BTZ) black hole. We obtain the center-of-mass energy of two general colliding geodesic particles in the BTZ black hole spacetime. We show that the center-of-mass energy of two ingoing particles can be arbitrarily large on an event horizon if either of the two particles has a critical angular momentum and the other has a noncritical angular momentum. We also show that the motion of a particle with a subcritical angular momentum is allowed near an extremal rotating BTZ black hole and that a center-of-mass energy for a tail-on collision at a point can be arbitrarily large in a critical angular momentum limit. [1].

References

[1] N. Tsukamoto, K. Ogasawara, and Y. Gong, Phys. Rev. D **96**, 024042 (2017).