Contribution ID: **212** Type: **Talk in the parallel session**

Three Extraordinary Theorems On Black Hole Rotation

Wednesday 7 July 2021 11:50 (20 minutes)

We reveal three new theorems on black hole rotation previously unexplored in the Hawking era. These results are based on the quasi-local energy investigation of the black hole in Kerr spacetime.

1. The *Horizon Mass Theorem* states that the mass at the event horizon of any black hole is always twice its irreducible mass. In particular, the irreducible mass does not contain rotational energy.
2. The *External Energy Theorem* asserts that the rotational energy of a Kerr black hole exists completely outside the horizon. There is no rotational energy inside the Kerr black hole.
3. The *Moment of Inertia Theorem* states that a black hole with an angular momentum and an angular velocity at the horizon has a moment of inertia. When the rotation stops, there is an irreducible moment of inertia which is equal to *mass x (Schwarzschild radius)^{2}*. This is recognized as the rotational equivalent of the rest mass of a moving body in relativity.

These surprising discoveries indicate that what is believed to be a black hole is a mechanical body with an extended structure. Singularity does not exist. A new paradigm for black holes is presented. Astrophysical black holes are likely to be massive compact objects from which light cannot escape.

References:
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Session Classification: Theoretical and Observational Studies of Astrophysical Black Holes

Track Classification: Black Holes: Theory and Observations/Experiments: Theoretical and observational studies of astrophysical black holes