

Viscosity in an accelerated relativistic medium from the Unruh effect vs string theory bound

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This project investigates the dissipative properties of an accelerated relativistic medium and their connection to the Unruh effect and effective black hole radiation. The thermodynamic properties in spaces with a horizon is one of the most discussed in modern fundamental physics. A notable 2005 string theory limit sets a minimum shear viscosity. We calculated viscosity in an accelerated frame for a photon medium, where no holographic description exists, treating the black hole horizon as a membrane of finite thickness. While the average viscosity meets the string theory limit, local values are described by a universal function that is independent of particle spin. Specifically, on the membrane surface, the ratio of local viscosity to local entropy is half the string theory limit. Importantly, this result is gauge-independent, with the positive contribution from gauge fixing exactly canceling the negative contribution from Faddeev-Popov ghosts.

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