Supplemental Material: Theoretical Derivations

1. General Relativity and Kerr Metric Foundation

Standard relativistic time dilation is governed by the Schwarzschild metric for static masses and ■the Kerr metric for rotating bo

2. Modified Time Dilation Equation (SDVR Corrections)

We propose the following generalized time dilation equation incorporating SDVR effects:■■Δt' = Δt sqrt(1 - v^2/c^2 - 2GM/c^2R

3. Implications for High-Density, Rotating Systems

This modified equation predicts:■1. Increased time dilation for high-density, rapidly rotating bodies (e.g., neutron stars, black ho