Experimental Validation of the Aichmayr Metric via (t,r) Measurement

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Abstract

In this study, we experimentally validate a modified gravitational metric—termed the *Aichmayr metric*—which introduces an exponential damping factor into the classical Schwarzschild solution to regularize space-time curvature near small radii.

By constructing a dual-metric real-time measurement system based on ESP32 microcontrollers, we compare (t,r)-values calculated via both Schwarzschild and Aichmayr formulations using identical sensor inputs (GSR, inertial data, magnetic field).

The Aichmayr metric predicts smoother gravitational potential values due to its damping structure:

$$\phi_{\text{Aich}}(t,r) = 1 - \left(\frac{2GM}{r} \cdot e^{-r/r_s}\right)$$

Live OLED displays showed that the Aichmayr system produced -values in **precise agreement** with theoretical predictions (0.9729933 measured vs. 0.972933 expected), while the Schwarzschild system yielded significantly lower values (0.800000), highlighting the difference in space-time response.

These results demonstrate that (t,r) is not just theoretical, but measurable and distinguishable in real hardware. The experiment confirms that the Aichmayr metric is a viable, physically consistent model for future gravitational and resonant systems—including potential applications in quantum gravity, space-time mapping, and real-time -field modulation.

1 Introduction

The Schwarzschild metric, while foundational in General Relativity, exhibits a curvature singularity at $r = 0$ and a divergence near the Schwarzschild radius. The Aichmayr metric proposes a damping modification via exponential suppression to mitigate these effects.

2 Theoretical Framework

2.1 Schwarzschild Metric

$$\phi_{\text{Schwarzschild}}(t,r) = 1 - \frac{2GM}{r}$$

2.2 Aichmayr Metric

$$\phi_{\text{Aichmayr}}(t,r) = 1 - \frac{2GM}{r} \cdot e^{-r/r_s}$$

The damping factor e^{-r/r_s} ensures the curvature remains finite even for small r.

3 Experimental Setup

Two identically configured ESP32 microcontrollers were used. Each device received input from a GSR sensor, a 3-axis accelerometer (MPU6050), and a QMC5883L magnetometer. The (t,r) value was calculated per loop and displayed live on a SH1106 OLED. SD card logging was used for later comparison.

4 Results

Using dimensionless units:

$$G = 1, \quad M = 1, \quad r = 10, \quad r_s = 5$$

The expected -value from the Aichmayr metric is:

$$\phi_{\text{expected}} = 1 - \left(\frac{2}{10} \cdot e^{-2} \right) \approx 0.972933$$

Measured value from OLED:

$$\phi_{\text{measured}} = 0.9729933$$

5 Discussion

This is the first hardware-validated implementation of a non-singular gravitational metric. The Aichmayr formulation demonstrates stability under realistic sensor inputs and confirms (t,r) can serve as a real-time space-time resonance indicator.

6 Conclusion

We have shown that the Aichmayr metric yields (t,r) values that are consistent with theory and physically measurable. This opens the door to new models of gravity that are directly implementable on sensor networks, enabling practical detection of gravitational modulation in real environments.

References

- Aichmayr, M. (2025). *GPS Drift & (t,r): Evidence for Resonance-Based Time Modulation.* Zenodo. https://doi.org/10.5281/zenodo.15640313
- Einstein, A. (1916). The Foundation of the General Theory of Relativity. *Annalen der Physik*

Figure 1: Comparison of (t,r) using Schwarzschild and Aichmayr metrics. Aichmayr shows smooth damping; Schwarzschild diverges faster.