

[online] Meissner Effect and Kerr/CFT Holography of Extremal Kerr–Bertotti–Robinson Black Holes

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The Kerr–Bertotti–Robinson (Kerr–BR) spacetime is a recently constructed exact Einstein–Maxwell solution describing a rotating black hole immersed in a homogeneous Bertotti–Robinson electromagnetic universe. Unlike the familiar Melvin-type magnetized Kerr families, its asymptotics are $\text{AdS}_2 \times S^2$, the external field explicitly deforms the horizon and extremality condition, and its Maxwell and Weyl principal null directions are misaligned. In this talk I examine two complementary near-horizon phenomena of the extremal Kerr–BR black hole and show that both are governed by the same Kerr/CFT data. First, I establish the Meissner effect in a manifestly gauge-invariant way: the horizon-tangent field strength vanishes, so the external magnetic flux is fully expelled, while the residual gauge coefficient survives only as a local Wilson-line term. Second, I derive the near-horizon Breitenlohner–Freedman instability criterion for a charged scalar probe, expressed through two gauge-invariant combinations — the shifted fibre momentum and the effective Kaluza–Klein electric coupling. Both the Meissner expulsion and the BF threshold turn out to be controlled by the twist parameter and gauge coefficient that enter the holographic dictionary, revealing them as two probes of a single extremal throat whose structure is fixed by the external field.

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