



Contribution ID: 79

Type: **not specified**

Influence Through Mixing: Hotspots as Benchmarks for Black Hole Behaviour

Tuesday, August 10, 2021 3:00 PM (1h 20m)

Effective theories are being developed for quantum fields outside black holes, often with an unusual open system feel due to the influence of large number of degrees of freedom lying out of reach beyond the horizon. The absence of comparisons to simpler systems that share these features complicates the interpretation of what is found. This talk describes a simple model aimed to help remedy this, that involves a single external scalar field that mixes in a limited region of space with a large number of hot internal degrees of freedom. Since the model is at heart gaussian it can be solved explicitly, and correlation functions computed for the external field once the others are traced out. The results can be compared with various approximations, such as perturbative and resummed open-system calculations, to test their efficacy, and predictions can be made for the response of external qubit probes and for the evolution and decoherence of the external field itself.

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