Holography and Mottness: A Discrete Marriage[1]

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Gauge-gravity duality has allowed us to solve the physics of certain strongly coupled quantum mechanical systems using gravity. I will show how a space-time consisting of a charged black hole and a bulk Pauli coupling corresponds to a boundary theory with a dynamically generated gap (with no obvious symmetry breaking) and a massive rearrangement of the spectral weight as in classic Mott systems such as VO_2. In this holographic set-up, the gap opens only when discrete scale invariance is present. This raises the possibility that the elusive symmetry that might be broken in Mott insulators, in general, might pertain to scale invariance. The relevance of this claim to recent theories of Mott systems that possess massless charged bosons is explored.