

# ED Analogues of Horizon and Cosmological Laws

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Four regimes where the ED ontology pins enough structure to yield honest, ED-native mathematical laws  
In most situations, ED does not yet specify enough variables to write full dynamical equations.

But in four special regimes — where ED density is saturated, uniform, or has a fixed gradient — the ontology itself collapses the general ED diffusion law into simple, structurally meaningful analogue equations.

These are the first places where ED becomes a theory rather than a worldview.  
They are the footholds from which the full ED architecture will grow.

## 1. Black Holes — ED Saturation (saturation case)

A black hole is a maximally saturated ED region,  $\rho = \rho_{\max}$ . Its evaporation is governed by nonlinear diffusion across the steepest possible gradient:

$$\partial_t \rho = \nabla \cdot (M(\rho) \nabla \rho), \quad M(\rho) \rightarrow 0 \text{ as } \rho \rightarrow \rho_{\max}.$$

The horizon is the boundary where the gradient is maximal but mobility is stiff. The outward diffusive flux across this layer yields an evaporation rate  $dM/dt \propto -1/M^2$  and a lifetime  $\propto M^3$ , without importing Hawking’s machinery.

## 2. Early Universe — Uniform ED (global relaxation)

In the early universe, ED density is nearly uniform, so gradients vanish and the diffusion law collapses to a pure relaxation equation:

$$\partial_t \rho = -\Gamma(\rho).$$

Cosmic expansion is the global decompression of ED; “dark energy” is the residual stiffness that prevents full relaxation. This is the ED analogue of the Friedmann equation

## 3. de Sitter Horizon — Constant Gradient (constant flux)

de Sitter space corresponds to a constant ED gradient, so the diffusion law reduces to a constant-flux condition:

$$J_{\text{ds}} = M(\rho_{\text{ds}}) |\nabla \rho|_{\text{ds}} = \text{constant}.$$

The de Sitter temperature is the ED flux across this constant-gradient horizon.

## 4. Rindler / Unruh — Linear Gradient (accelerated observer)

An accelerated observer sees a linear ED gradient in their frame. With  $\nabla \rho = kx$ , the diffusion law collapses to:

$$\partial_t \rho = M(\rho) k.$$

The Unruh temperature is the ED flux generated by this acceleration-induced gradient.