

# The Double-Slit Experiment in Event-Density (ED) Terms

Allen Proxmire  
February 2026

This note explains the double-slit experiment using the Event-Density framework. It's meant as a clear, architectural summary for GitHub — not a formal paper.

## 1. What “goes through both slits” in ED?

In ED, **nothing physical** ever goes through both slits.

What propagates is:

- a **low-event-density participation field**,
- which gives the system the **capacity** to explore multiple causal channels,
- without splitting, branching, or duplicating anything.

### Key idea:

A low-ED system has enough participation bandwidth to occupy multiple channels simultaneously.

This is the ED analogue of “superposition,” minus the ontological weirdness.

## 2. Why does interference appear?

Because the participation field remains **coherent** across the available channels.

A low-ED system:

- maintains global coordination across channels,
- so the channels are **not independent**,
- and constructive/destructive participation emerges naturally.

**Interference = the participation field's structure at the detection plane.**

No waves.

No particles splitting.

No many-worlds.

Just one system exploring multiple channels coherently.

## 3. What collapses the pattern?

Collapse occurs when the system's event-density **crosses the threshold**.

A high-ED system:

- cannot maintain multi-channel participation,
- and is forced into **single-channel commitment**.

This is the ED quantum-classical transition:  
**binary, structural, and physical — not epistemic.**

#### 4. What counts as “which-path information”?

In ED, “which-path information” is not about knowledge.

It’s about **event-density injection**.

Any interaction that:

- raises the system’s ED above the threshold, or
- couples it to a high-ED environment,

forces single-channel participation.

**Interference disappears when the system can no longer support multi-channel participation.**

#### 5. Why does a single particle build up an interference pattern?

Each low-ED particle:

- explores multiple channels,
- with a coherent participation field,
- and collapses to one channel at detection.

The pattern is the **statistical imprint** of the participation distribution.

Each detection = one commitment.

Many detections = the pattern.

#### 6. What about delayed-choice experiments?

ED handles this without paradox.

- The participation field stays multi-channel until the ED threshold is crossed.
- The timing of the threshold-crossing interaction determines whether interference survives.

No retrocausality.

No time tricks.

Just structural conditions on participation.

#### 7.. Channels vs. Pattern

A common misunderstanding is to equate channels with the bright/dark stripes.

ED makes the distinction clean:

Channels = possible participation paths

These include:

- slit A
- slit B
- micro-geometric sub-paths
- downstream propagation channels

Channels exist **before** the pattern.

Pattern = participation distribution at the detector

- Bright regions → high participation density
- Dark regions → destructive participation (near zero)

So the correct mapping is:

**Channels → participation distribution → pattern**

not the other way around.

Bright fringes = high-strength channels

A bright fringe corresponds to:

- constructive participation,
- reinforcement of the participation field,
- higher probability of commitment.

Dark fringes correspond to channels where participation cancels.

## 8. The ED Advantage

This framing avoids:

- wave-particle duality
- particles “being in two places”
- epistemic collapse
- many-worlds branching
- retrocausal paradoxes

Instead, ED gives:

- low-ED systems with multi-channel participation
- coherent participation fields
- constructive/destructive participation
- a physical threshold for collapse
- single-channel commitment
- one classical world