

# 3: Reciprocal Cosmology

## Additional Materials, Links and References

### Additional Materials

[Predeterminism in Relativity](#) A quote from Kip Thorne's "Black Holes and Time Warps" showing that predeterminism really does lurk within Relativity.

[Some Further Discussion](#) Of the ideas.

### Links

[Availability, Exergy, the Second Law and all that...](#) An interesting example of what happens when we turn a part of the current physical paradigm upside down. What we know about some energy is more important than how much of it we have.

[Backwards Causation](#) A New Scientist item on Lawrence Schulman's work. Backwards causation gets statistical validation. Experiential diode concepts apply, and we don't need the "regions of this universe" bit!

[The Speed of Gravity](#) The evidence this fellow cites is correct. Amaze yourself. Check it out!

### References

**Bell, J. S.**

#### **Speakable and unspeakable in quantum mechanics**

Cambridge University Press  
ISBN 0-521-36869-3

It's worth bearing the picture in "3: Reciprocal Cosmology" in mind and savouring this book slowly. Bell's philosophical rigour and sense, his willingness to recognise the unsolved problems, are quite wonderful.

## Davies, Paul (ed)

### The New Physics

Cambridge University Press  
ISBN 0-521-43831-4

Excellent general discussion of issues in QM and chaos in particular. Rich yet very readable.

## Deutsch, David

### The Fabric of Reality

Penguin  
ISBN 0-713-99061-9

Deutsch's view relates the themes of quantum physics, epistemology, theory of computation and evolution in a quite Reciprocity friendly way. He's deeply wedded to multiple universes, but in such a way that we can swap them out and install the creative arrow of time instead. In particular, his challenge on p217, "To those who still cling to a single-universe world-view, I issue this challenge: *explain how Shor's algorithm works*" is answered in Reciprocity as an event that must be possible on *both* arrows at once - the same place probability *amplitudes* come from.

## Feynman, Richard P.

### Feynman Lectures on Computation

Addison Wesley  
ISBN 0-20148991-0

All good, but particularly the sections on Charles Bennett and the energy value of information. This book was stuck in legal wrangles for 10 years, but now we can get Feynman's words on this remarkable result, so essential in Reciprocity.

## Feynman, Richard P.

### The Character of Physical Law

Penguin  
ISBN 0-14-017505-9

Vintage Feynman. See as he stumbles around, unhappy about what entropy is at cosmological scales!

## Feynman, Richard P.

### The Feynman Lectures on Physics Volume 1

Addison Wesley  
ISBN 0-201-02116-1

See how Feynman first shows us a universe of dynamic movement, then gets into special cases like simple harmonic motion. Newton does this the same way, yet physics is always taught with dynamic motion *last*, after the wrong

impression - that there can *be* a static frame of reference - has been established.

## **Feynman, Richard P.**

### **The Feynman Lectures on Physics Volume 3**

Addison Wesley  
ISBN 0-201-02118-1

Feynman on QM. These are the mysteries - don't worry about them, just make progress...

## **Kantor, Frederick W.**

### **Information Mechanics**

Wiley  
ISBN 0-471-02968-8

A hard book in places. Sections 1 and 3 took me years to read. Section 2 is more accessible. I borrowed the Photon Particle Representations (and took some liberties with them) for the model of massive particles in "3: Reciprocal Cosmology".

## **Leff, Harvey S. & Rex, Andrew F. (eds)**

### **Maxwell's Demon: Entropy Information Computing**

Adam Hilger  
ISBN 0-7503-0057-4

Much on Bennett. I found the paper by Myron Tribus and L. Costa de Beauregard an inspiration. At a level where they demonstrate the equivalence of thermodynamic and information theoretical entropy, they observe that inductive reasoning is still not understood. This point convinced me that what I think of as a day to day occurrence - and taught my students to also - needs a whole new chunk of physics to explain. Penrose was right - we will need new physics to build a synthetic consciousness. (Interestingly, the authors' point doesn't apply to linear consciousness, since that cannot do inductive reasoning. We could build linear consciousness out of kit to hand today.)

## **Mandelbrot, Benoit B.**

### **The Fractal Geometry of Nature**

Freeman ISBN 0-7167-1186-9

If you've never seen this book, it's a real treat. For some reason, the geometry of nature is *very* fractal.

## **Newton, Isaac**

# Mathematical Principles of Natural Philosophy

University of California (English Translation)

Just Another Alchemy Hacker :-)

**Rae, Alastair**

## Quantum Mechanics

Institute of Physics Publishing  
ISBN 0-7503-0217-8

Standard text, so accessible for physics types.

**Thorne, Kip S.**

## Black Holes and Time Warps: Einstein's Outrageous Legacy

Papermac  
ISBN 0-333-63969-3

Predeterminism (but not necessarily determinism) in GR, how Penrose thought round the Ghost Not and applied global methods to black hole entropy, how Einstein turned up at his local physics group with another theory of Relativity every Wednesday for a month before they stopped iterating.