

## Zero Energy Ontology (ZEO)

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1. replaces positive energy ontology of standard physics in which physical states have positive energies implying several philosophical problems such as
  - i. In classical physics only single solution of field equations is realized: theories are untestable in the strict sense of the word
  - ii. In quantum physics only quantum states of the universe with fixed total quantum numbers are realized although quantum transition between them are possible
- (a) assumes that
  - i. physical states are pairs of positive and negative energy states with opposite conserved quantum numbers and interpreted as generalization of physical events with positive and negative energy states interpreted as initial and final states of event
  - ii. positive resp. negative energy states are assigned with opposite boundaries of causal diamonds forming a fractal hierarchy and defined as subsets of imbedding space with form  $CD \times CP_2$  where CD is defined as diamondlike intersection of future and past directed light- cones and analogous to Penrose diagram and somewhat sloppily called also causal diamond
- (b) implies
  - i. a new view about state function reduction since it can occur to either boundary of CD
  - ii. that theory is maximally testable
  - iii. that any quantum state is creatable from vacuum in quantum jump: maximal free will
- (c) leads to a proposal that experienced time has state function reduction as chronon
  - i. explaining how
    - A. the arrow of time emerges
    - B. the experience about flow of time emerges
    - C. the localization of contents of sensory experience to a finite interval of tgeometric time emerges
  - ii. providing a common mechanism for
    - A. memory recall,
    - B. metabolism,
    - C. intentional action
  - iii. predicting that the arrow of time can temporarily change say in biosystems