

I do like the idea of “particles” as interaction events {“flash ontology”} and the importance and need for “relative states.” There are still some outstanding questions:

1. All interactions are considered as “*measurements*,” and measurements have definite outcomes {collapses ? – true?}. Rovelli claims that an interaction with observer ‘O’ results in a definite eigenvalue,  $q$  where O can be any physical thing (somehow O can perform measurements without needing to be macro ?). But, if O is a tiny atom or molecule at rest and “system” S is a speeding electron or x-ray and S **scatters** off of O, is an eigenvalue realized? What is the “interaction fact” that happens to O? – a “kick” from S? Does O have a “pointer variable” entangled with S? {*Note: the usual observation might be a detectable spot on a screen at a deflection by some scattering angle. That in turn can reveal the original electron momentum by deduction*}.
2. [Rovelli\_96,97] Like “Wigner’s Friend,” Rovelli says that “Different observers may give different accounts of the same sequence of events.” A second outside observer ‘P’ {or ‘W’} not interacting with S-O ( perhaps should not really be called an observer of events ? {maybe “describer” of S-O correlation is better because P doesn’t know the value of the eigenvalue outcome}. Is this really a problem? P’s undecided superposition wavefunction is just epistemological – is that necessary?
3. Nonlocality: A “Bell test” requires a comparison of outcomes between final spacelike-separated observations/detections ‘A’ and ‘B’ to reveal correlations. Rovelli’s claim that EPR in RQM is local a bit obscure and unclear. There can always be observers O(t+) in the future whose past light-cone encompasses these two detections A and B and could be the final arbiter as a local decision at O ( assuming A and B are “quantum”-- *unlike all experimental tests so far*).
4. What is the justification for claiming that all observers are quantum? {‘O’ means |O>, and “all systems are equivalent” }. Is there a size limit (like approaching the Planck Mass)? And, we could say that experimental “facts stabilized by decoherence” are no longer subject to quantum affects. Interactions are relative quantum events – but what is a spacetime event for a prolonged influence of an electric or magnetic field on a charged particle?

**MISSING:** Rovelli is silent about a cause for “jointness” of S and O. The term “bidirectional” lurks in the background with no mention of terms such as S&O “transactions.” The “**Born Rule**” for probability is just assumed, and “pure randomness is a given. RQM cares about determined properties but without any “property bearers {“beables?}.” His prose is prolific but very abstract with almost no concrete examples that might add needed clarification to his content. In particular, “measurement” is {and always has been} vague and now seems mainly to mean the establishment of new correlations.

You may enjoy: Carlo-Rovelli: “The hippie activist who became a game-changing scientist.”  
<https://www.huckmag.com/art-and-culture/print/transformational-books/activist-scientist-physics-reality-carlo-rovelli-interview/>

A primary source for RQM is: <https://arxiv.org/pdf/quant-ph/9609002.pdf> For 2021 see:  
<http://philsci-archive.pitt.edu/19664/1/pienaar.pdf> .

For [Rovelli\_110] The Giant Explosion of Helgoland in 1947 was called “**The BIG BANG.**”

Dave.