

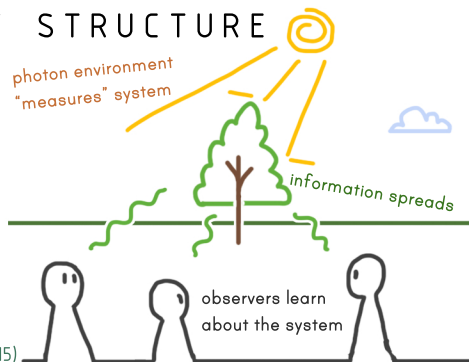
SPECTRUM BROADCAST STRUCTURE IN DIFFERENT QUANTUM REFERENCE FRAMES

SPECTRUM BROADCAST STRUCTURE

Objects become "objective" when multiple copies of the same information about the state is accessible in the environment; e.g. visual information in the photon environment.

Spectrum broadcast structure is one way to describe objective states.

Horodecki, Korbicz, and Horodecki, PRA 91, 032122 (2015)

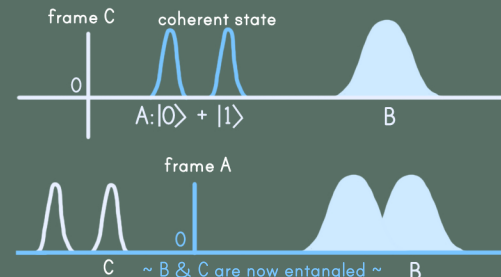


QUANTUM REFERENCE FRAMES

In Giacomini *et al.*'s formalism, quantum reference frames are associated with quantum systems.

When moving to a different frame, coherences become entanglement, and statistical mixedness become classical correlations.

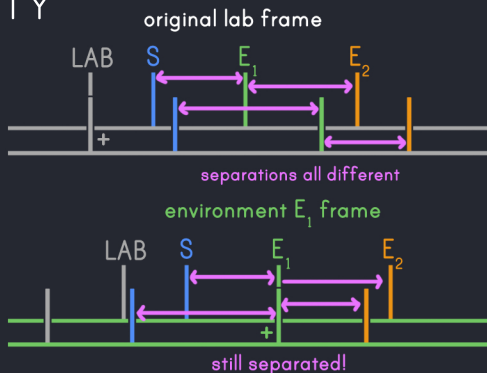
Giacomini, Castro-Ruiz, Brukner, Nat. Commun. 10, 494 (2019)



PERFECT OBJECTIVITY

Perfect objectivity in all environment frames happens if there is non-degenerate spatial separations. E.g. with random (initial) localised positions (the probability of two random locations being the same is zero.)

Such states are both objective in all frames and have the same original probabilities/information in all frames.



STATISTICAL MIXEDNESS

Mixedness in the environment state causes blurring of objectivity in the environment frame.

For better objectivity: localisation, non-degenerate separations, and multiple environments. These all enhance distinguishability.

There is new objective information in environment frames, but the original system objective information can be recovered.

