

Quantum time framework

Page & Wootters
Evolution without
evolution (1982)

Superselection
rules

POVM

Closed timelike
curves

Quantum reference
frame

Giovannetti, Lloyd, Maccone
Quantum time (2015)

Brückner et. al.

Quantum clocks in
relativity (2020)

2 type of
observers

Which system
we choose to describe
time flow?

{ More than one
interacting clocks

Brückner et. al. (PNAS)

Entanglement of quantum
clocks through gravity (2017)

JILA - Resolving the
gravitational redshift across
a millimeter-scale atomic
sample (2022)

QI notions
one needs

QG effects

Classical limit (2021 / 2022)

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Pronzini, Coppo, Verrucchi, Foti

Brückner - Boselli (2022) Mediated entanglement via gravity

Brückner (2022) Quantum superposition of ST obeys Equ. Princ.

Marram (2022) Quantum superposition of Minkowski ST