Experimental Tachyons

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● In the physics of potential superluminal information transfer, causality is preserved by the experimental identification of the CMB (Cosmic Microwave Background) rest frame, as the preferred inertial frame in which potential superluminal information transfer is isotropic [Rembielinski]. Potential superluminal information transfer is engineered by tunneling through two successive barriers [Olkhovsky]. In our experiment we use two meter wavelength photons tunneling through two water-tank barriers, separated by an air-gap length [Soli]. The data presented in this talk demonstrates that if the air-gap length is adjusted for subluminal information transfer, then the democracy of inertial frames is recovered, and no preferred frame is measured. The one-way subluminal tunneling group velocity of light is shown to be isotropic to accuracy below the CMB rest frame velocity. It has already been argued in the literature that Einstein's special relativity with tachyons predicts the existence of antimatter [Recami]. We conjecture that tachyons are constructed out of ordinary particles that in our case are the photons used to construct a wavepacket tunneling through two water-tank barriers.

● If the air-gap length is adjusted for potential superluminal information transfer, then the Cosmic Compass™ finds the direction in space that Earth is moving relative to the CMB rest frame [1]. Quantum tunneling time does NOT measure superluminal information transfer [2].

[1] George Soli, http://integrateddetectors.com
[2] Davies, P.C.W., "*Quantum Tunneling Time*", *Am. J. Phys.*, **73** (1), 23, Jan. (2005)
http://cosmos.asu.edu/publications/papers/%27Quantum%20Tunelling%20Time%27%20AJP000023.pdf

* Integrated Detector Systems, APS-NW08, Lewis & Clark College, Portland OR, 16 May 2008,

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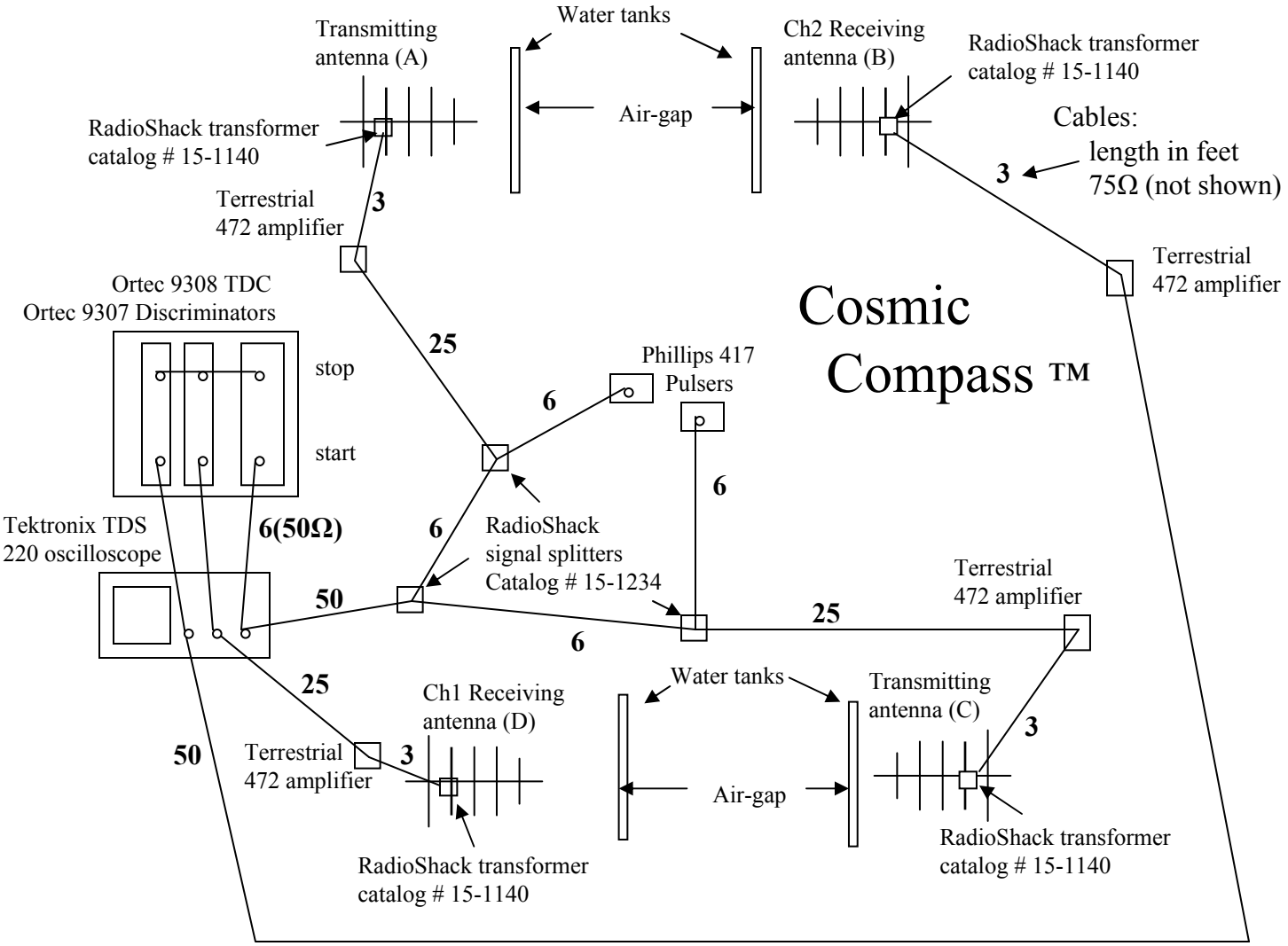

- two-channel experiment with opposing tunneling directions along the CMB dipole direction.
- longer cable length in the antenna (A) to (B) channel-2 displaces its spectrum by 30 ns.

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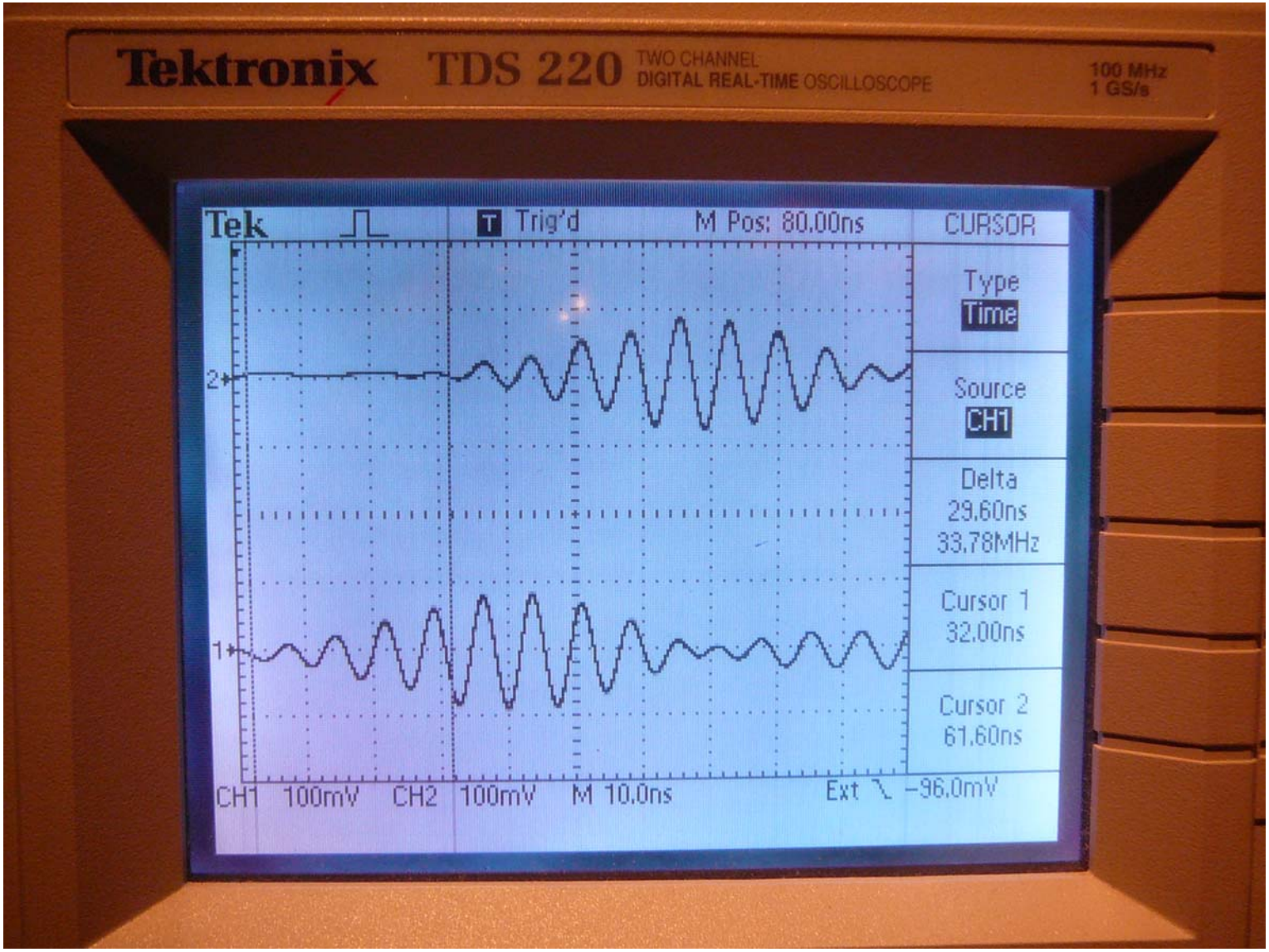

- the channel-1 wavepacket proceeds the channel-2 wavepacket by 29.6 ns.
- the channel-1 water tanks have been removed to verify channel-2 wavepacket reflection.

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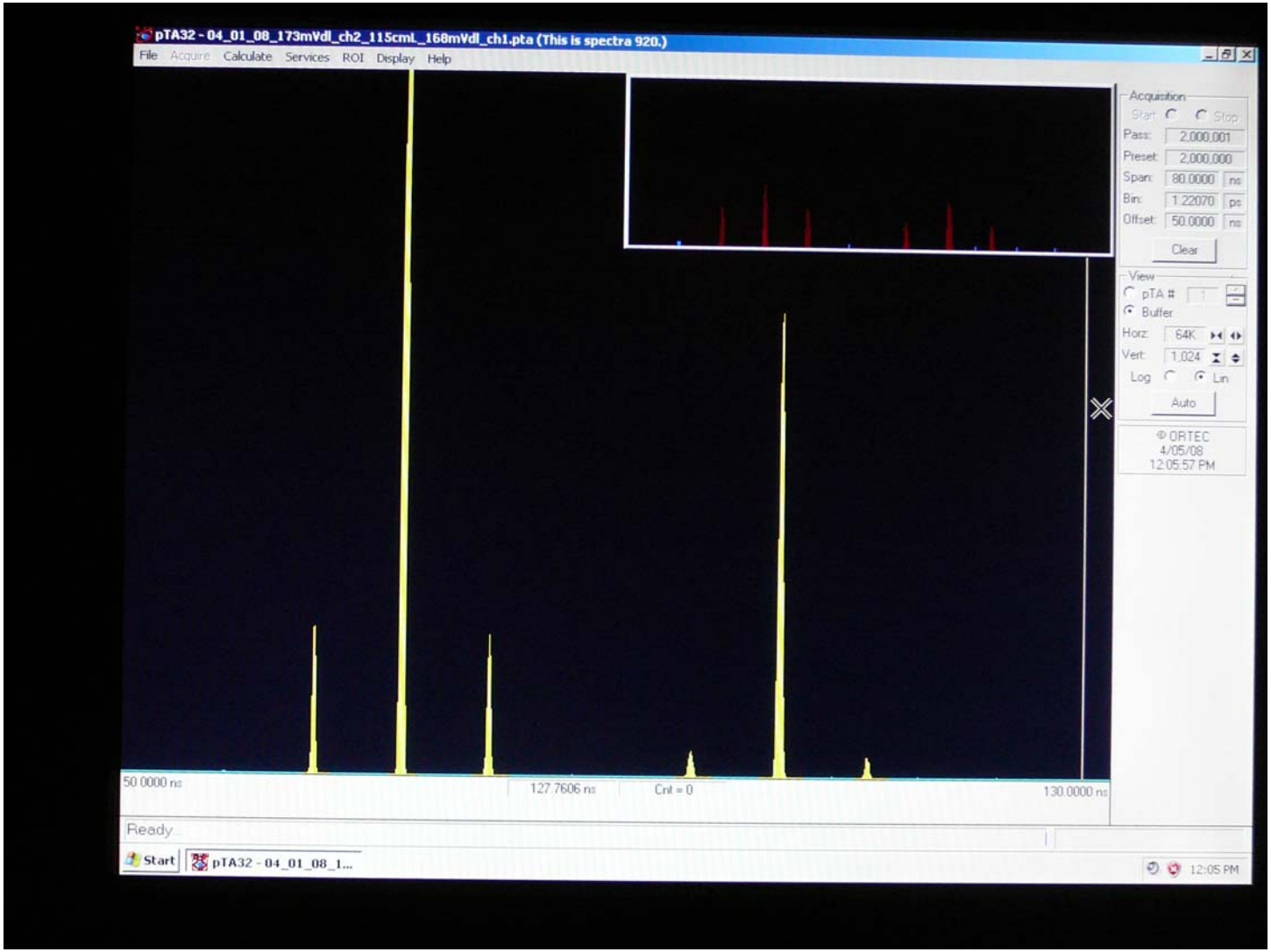

- for a 2 April 2008 spectrum, channel-1 contains 947K counts out of 2M start counts.
- the channel-2 spectrum contains 199K counts because most wavepackets are reflected.

this is the "post-selection" requirement for our sidereal anomaly.

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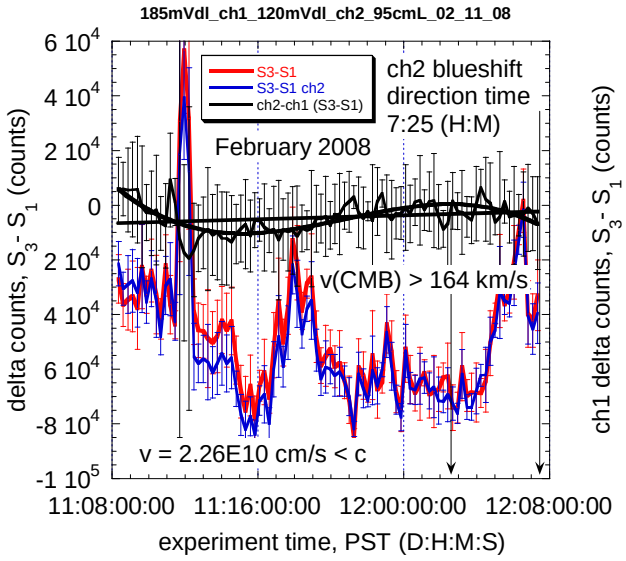

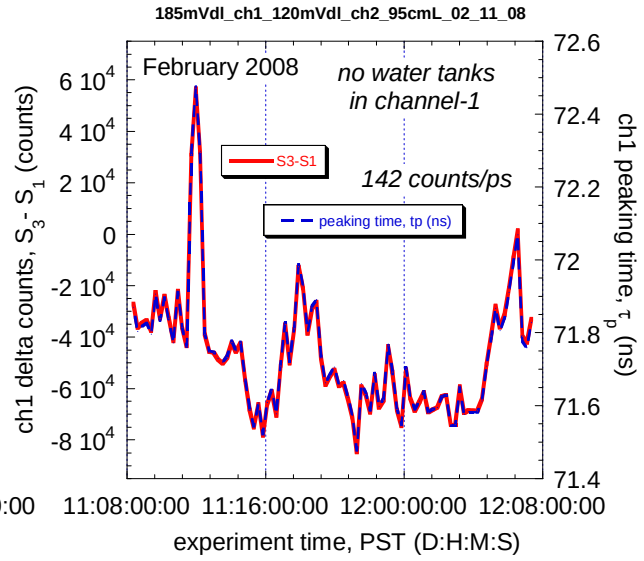

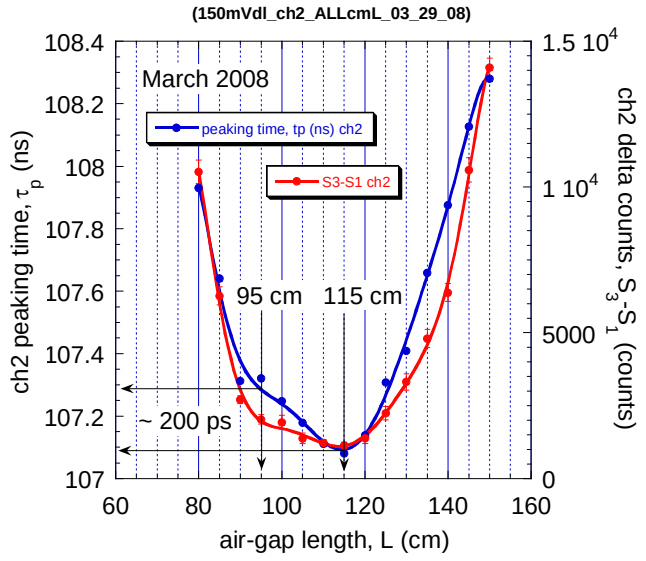

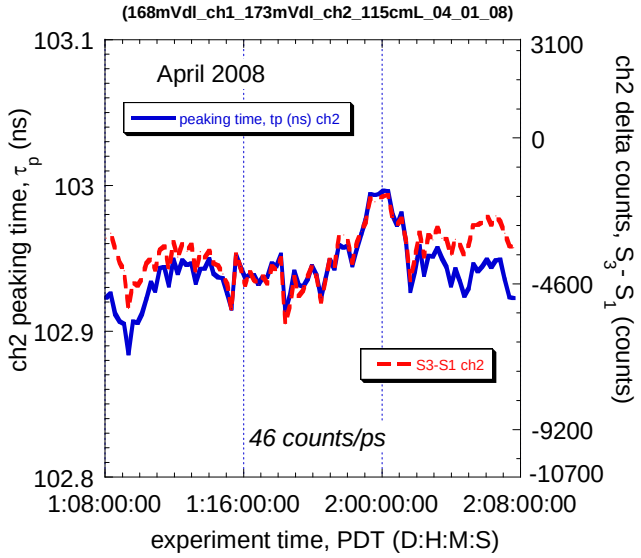

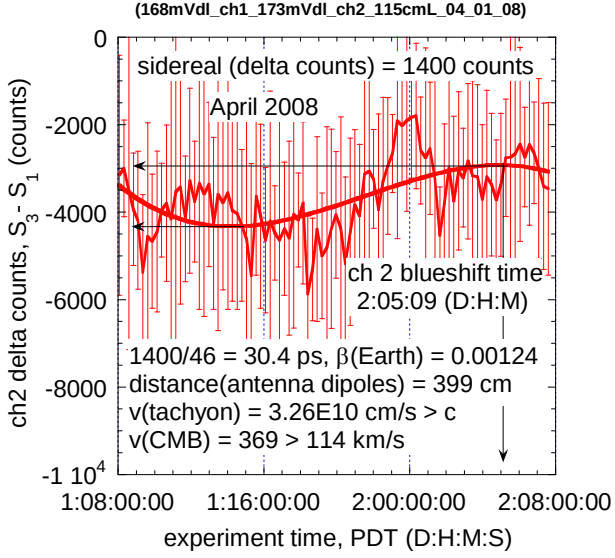

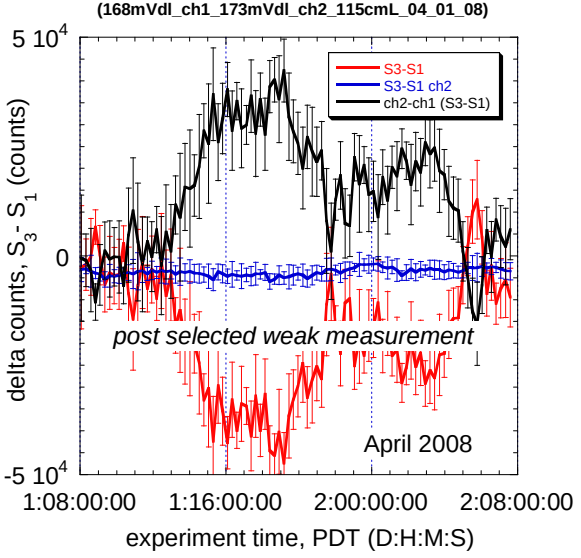

- one-way photon group velocity is isotropic only for subluminal tunneling.
- sidereal "dwell-time" (Δt) is a post-selected weak-measurement [2].

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- Sidereal "dwell-time" (30.4 ps = Δt) > $\hbar/E_k$ is a weak-measurement minimum lower bound:

  where E_k is an electrons incoming kinetic energy, equation 29 in [3].
  the measured formal standard deviation is 52.2 ps for the April data.
  uncertainty in kinetic energy prohibits superluminal communication.

- As the incoming particle (electron) velocity (and electron kinetic energy) goes to zero:

  the Peres quantum clock "phase-time" tunneling velocity goes to zero
  but the weak measurement "dwell-time" tunneling velocity diverges [2].

  "phase-time" = "dwell-time" + "self-interference-time" [4].

- The weak-measurement "classical" joint probability vanishes:

  single-particle non-local interactions are never simultaneous and our
  wavepacket interacts with non-local water tanks using different photons.

[3] J. Ruseckas and B. Kaulakys, "Weak measurement of arrival time", Phys Rev **A** 66, 052106 (2002)
http://arxiv.org/PS_cache/quant-ph/pdf/0307/0307006v1.pdf
[4] J. Lunardi and L. Manzoni, "Relativistic Tunneling Through Two Successive Barriers",
http://arxiv.org/PS_cache/arxiv/pdf/0708/0708.3507v2.pdf