Humor: Einstein and Lorentz Play Quantum P = NP Marbles

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Einstein begins, “You know, Hendrik, people say we think so much alike we must be twins, but we are obviously different ages.” Lorentz responds, “Yeah, I know, it's a sort of twin paradox – I think Siggie started that one. Forget it, let’s play marbles.”

Lorentz continues, “Here’s the rule: From a 50/50 mix of red and blue marbles, we each have to put the blue marbles in a blue container and the red marbles in a red container. But let's use a quantum computer to make it more interesting.” Einstein responds, “I’ve done something like this before with classical computers, and I noticed I get worse and worse as the number of items to sort gets larger and larger.”

Being the mathematicians they are, they decide to give each other a 50/50 chance of winning. This means conducting preliminary games to develop a handicap – like in golf. First, Lorentz tries it. Given 2 marbles to sort, he completes the task in 2 seconds. 4 marbles, 4 seconds; 10 marbles, 10 seconds, and so on. Now, for Einstein: 2 marbles, 2 seconds; 4 marbles, 24 seconds; 10 marbles, 3,628,800 seconds, and so on.

Lorentz says, “Looks like I scale linearly with the number of marbles, while you, Albert, scale factorially!”

Einstein muses, “Indeed, Hendrik. But I think I’ve found a way to even the odds using a new vehicle I’ve invented that incorporates relativistic quantum computation principles. It runs on an $E=mc^2$ engine and dilates time. The time t dilates to t' based on the equation you derived:

$$(1 - \frac{v^2}{c^2})^{-0.5}$$

We’ll have to ignore $F=ma$ and $W=Fd$ because of the extreme forces and heat at launch.”

Lorentz grins, “I like it. Let’s normalize our rates and see who wins. But what’s this vehicle called?”

Einstein replies, “I thought about calling it the Folks-Wagon, but that’s taken. So, I named it the You-Van. In fact, I’ll ride first because you’re so slow.”

They calculate the necessary velocity to sort 100 marbles using the Big O notation for their sorting times:

Lorentz's time: $O(n)$

Einstein's time: $O(n!)$

Using relativistic effects to normalize this:

$$t' = t\left(1 - \frac{v^2}{c^2}\right)^{-0.5}$$

Solving for v with $c=1$:

$$v = \left(\frac{(O(x!))^2 - x^2}{O(x!)}\right)^{0.5}$$

Substituting the scaling factors:

$$v = \left(\frac{(100!)^2 - 100^2}{100!}\right)^{0.5}$$

Given the tiny fraction involving $100!$:

$v \approx c$

Lorentz sighs, "Too bad Cook and Levin aren't around yet to help with this!" Einstein adds, "And we need Wolfram's software for all these digits. Maybe another day…"

In other words: As velocity approaches the speed of light, the computational complexity of sorting marbles using a quantum computer with relativistic effects approaches $O(n)$, making P effectively equivalent to NP.

https://www.researchgate.net/publication/380622400_Relativistic_Quantum_Computation_and_Homotopy_Type_Theory_Bridging_Time_Dilation_Iterative_Steps_and_P_vs_NP