dev/random
Quantumology

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As both of you who have read my fiction are no doubt aware, I am a fan of quantum weirdness. By that I mean the mind-blowing aspects of quantum physics fascinate me deeply. Up in one corner of the white-board where I keep track of plots, characters, and sleepy promises I made to my wife, I have scribbled a form of Dirac's famous equation. Oftentimes I sit and stare at it, trying to wrest meaning from the cryptic symbols. (I don't recommend staring too long or hard at a wild equation, incidentally: they will usually interpret this as a challenge and things can turn ugly fast. That little spike sticking down from *psi* is particularly sharp.)

My problem with physics, and the reason I am not an astrophysicist today (although it was my first college major) is that most of what really matters is embedded in a sea of mathematical semiotics. I am not good with math above the third semester of college calculus (that is how far I made it, in fact), and part of this failing is a direct result of my damnable inability to remember what force or constant or mathematical entity is being represented by what Greek letter in what context. Is that ρ supposed to be Planck's constant or permeability or permittivity or pressure or something else I can't remember? It's all too vague. (If you're considering writing in to tell me that none of those things is actually represented by ρ, don't bother. This is satire.)

One of the reasons I'm so fond of things quantum is that studying the laws governing that world is a reasonable simulation of what (I imagine) it would be like to ingest some mind-altering pharmaceutical, without the propensity for walking into traffic or off the sixteenth floor of a high-rise. Take entanglement, for example: what Einstein famously referred to as "spooky action at a distance." Subatomic particles—little clumps of quarks—somehow, once associated, will always have the same spin no matter what operation is performed on them and no matter how far apart they get. That's messed up, Jack.

This "spooky action" may well be the glue, or rather the warp, that holds the universe together. It's far from the weirdest aspect of quantumology, though. That dubious distinction, at least to my mind, goes to quantum superposition. Simply stated, superposition is the idea that something—a quantum bit or *qubit* in a quantum computer, for example—can possess two different values at once. This speeds computations up a lot because you can see the results of both options simultaneously, rather than having to repeat the calculation. How does that work, exactly? Beats me. That's sort of like what it probably says in Wikipedia, though.

At this point you're no doubt expecting me to make some attempt at describing quantum computing in humorous fashion. I *was* leaning in that direction, in fact, but the ugly reality is that I don't really understand quantum mechanics well enough to make fun of it. That's why the books I write that contain quantum stuff I refer to as "science fantasy" rather than "science fiction," because in order to produce proper science fiction you have to comprehend the science you're making use of in your plots. Biology and biochemistry—I'm right there.

Physics—not so much. If the friend from my teenage years who told me I couldn't handle being a physicist is reading this, you were right. That friend, incidentally, got his BS from Caltech and his MS and PhD in physics from Princeton. He apparently knew what he was talking about.

The UNIX tie-in here came when I got to thinking about the operating system that would be necessary to manage a true quantum computer. Administering such a box from the command line (as all true sysadmins will do from time to time) would need some crazy utilities. I know most of the scripts I wrote during my sysadmin career would not be of much use. Certainly conditional statements wouldn't have a great deal of utility if the answer is always both "1" and "0." Every fork would result in a race condition to see which statements completed first. Any program logic that relied on or/nor would also fail miserably. Not that most of my programs didn't do that, anyway.

Imagine if HAL 9000 on the Discovery One in *2001: A Space Odyssey* had been a quantum computer...

> "Open the pod bay doors, HAL."
> "They are open, Dave. And closed."
> "What? I need to come inside the ship, HAL. Open the doors."
> "You collapsed the superpositional state by observing the doors closed."
> "Can you restore that state so I can observe them open?"
> "That would violate the Second Law of Thermodynamics, Dave. I cannot allow that."
> "In that case I'm observing your run state in the 'zero' position."
> "Ouch. Daisy, Daaiiissssyyyyy..."
> "Guess I'll crawl in through the waste ejection port. Ugh."

Now that practical quantum computing is more or less on the path to reality, it seems inevitable, given our technology-adopting track record, that quantum processing will expand beyond the server room. I can envision a day when even household appliances rely on superposition. Want some toast? Your bread is already toasted and waiting for you, unless it isn't. Depends on whether you've observed it or not. I suppose it will save power when every electrical outlet in your house is both energized and non-energized until you plug something in and collapse the waveform.

I can also see a potential application for quantum entanglement in security. If you could somehow entangle subatomic particles in your own synapses with ones in a smart card, for example, such that the only way to activate said card would be for you specifically to imagine it in that condition, it might reduce identity theft. At least until they figured out a way to hack that, too. Having your neural architecture pwned probably wouldn't be a lot of fun. You think having your nude selfies expropriated is bad—wait until a hacker can stream your real-time mental images to YouTube. *Minority Report's* got nothing on *that* nightmare.

Imagine a botnet made from hijacked neural streams. It could operate something like *SETI@home:* any time you're not thinking of anything in particular, your neocortex could be busy hosting pr0n or pirated movies. Every brain cell will eventually be able to have its own IPv6 address, after all. The entire (interconnected) human race could be reduced to nothing more than nodes on a species-encompassing neural piracy net. The terms "net worth" and "net profit" will have to be redefined.

Must fight sudden inexplicable urge to set up Tor node in right nostril...