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How To Find A Parallel Universe: Cern Boosts Data Intelligence

Seagate Contributor (http://blogs.forbes.com/people/seagatecontrib/) , Seagate

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By John Paulsen

CERN is restarting its Large Hadron Collider (after a two-year massive upgrade) to start working on amazing experiments to reveal the identity of "dark matter" and to search for tiny black holes that could be gateways to parallel universes or alternate dimensions. Yes, modern physics and math actually indicate parallel universes are pretty likely — the big question is how to prove it.

The new, improved Large Hadron Collider (LHC) — humankind's most powerful particle accelerator — begins firing proton beams again this month at almost twice the energy of its previous run. And CERN (http://home.web.cern.ch/) (the European Organization for Nuclear Research) expects to have the beams colliding at those energies by mid-May.

Besides the proton power, imagine the technical power needed to capture and crunch data at the world's leading particle physics laboratory — probing the fundamental structure of the universe using the most complex scientific instruments and generating a phenomenal volume of data in the process!
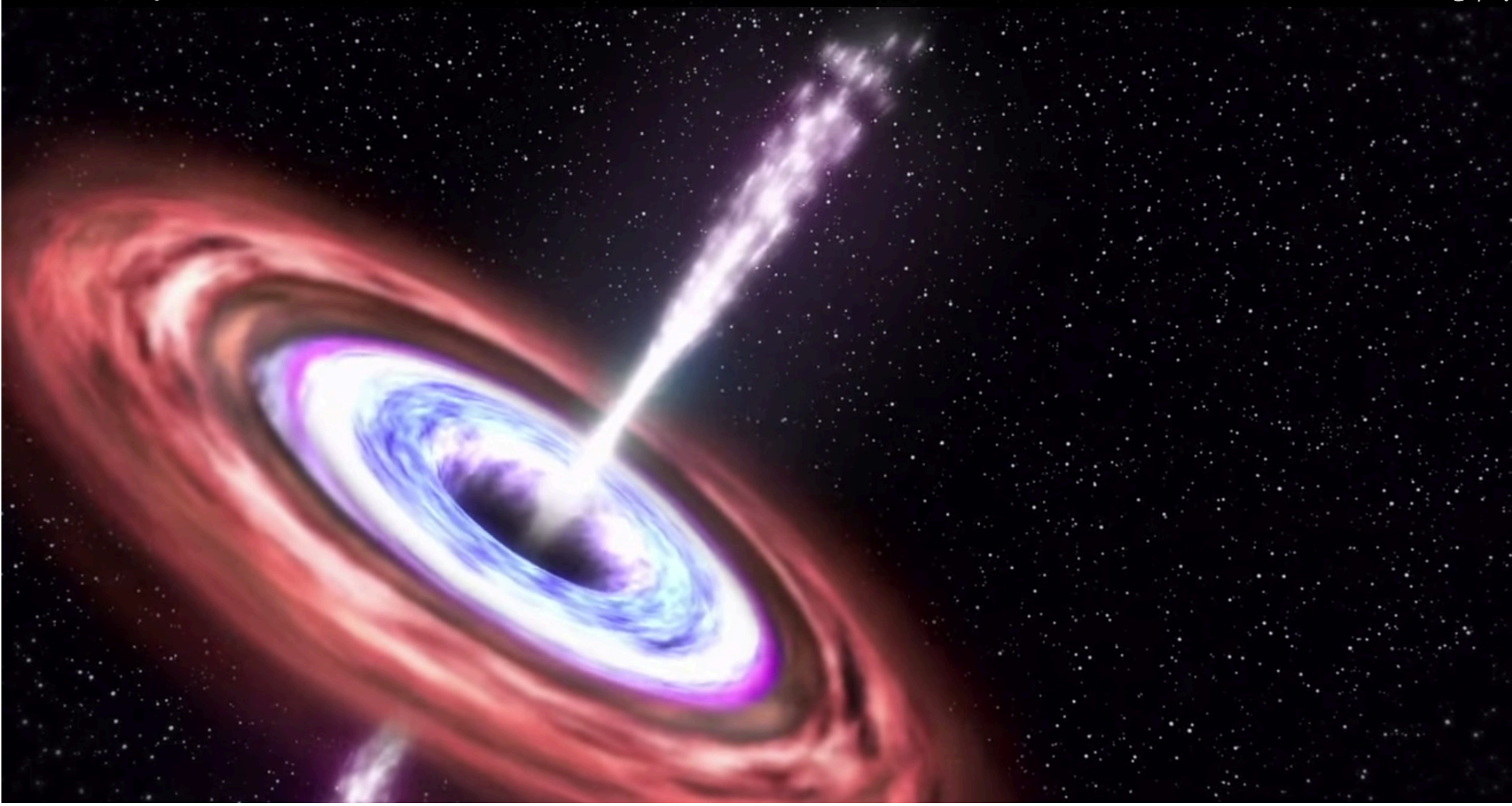
How will CERN harness all that data?

Thanfully, CERN openlab has entered a three-year partnership with Seagate and is using Seagate's Kinetic Open Storage Platform (http://www.seagate.com/solutions/cloud/data-center-cloud/platforms/) to more efficiently handle CERN's colossal – and growing – data needs. The partnership will help CERN better manage the hundreds of petabytes of data that its Large Hadron Collider has generated to date, as well as the additional 2-to-3 petabytes of information it produces every month.

Seagate — *harnessing the power of data to solve the world's (and the universe's) toughest problems!*

"CERN creates a truly astonishing amount of data on a daily basis, and finding secure and efficient ways to store that information is one of the most important challenges we face," said Alberto Di Meglio, head of CERN openlab. "We are excited to collaborate with Seagate on understanding how the Kinetic storage architecture could potentially contribute to the CERN infrastructure and aid the very demanding Large Hadron Collider program by reducing complexity and operational costs in our storage systems."

How will we know if Dark Matter exists?
How will the LHC "discover" dark matter particles?

If dark matter does exist, it was produced at the time of the Big Bang (like all other matter). For scientists to figure out what kind of matter was produced at the big bang, they try to create conditions like that of the Big Bang. The closest we an get to replicating those conditions is at the point where protons collide inside the LHC. And the faster they can make protons collide, the closer they are to mimicking the temperature of the Big Bang.

Why does the LHC need so much more energy for its new set of experiments?

"It all comes down to E = mc2," said physicist Josh Thompson, speaking with the Swiss Broadcasting Corporation (http://www.swissinfo.ch/eng/plugged-in_cern-s-collider-just-got-more-powerful/40583108) last year. The "E" in Einstein's equation, of course, stands for "energy" — the LHC has previously run at 8 TeV (tera electron Volts). After this upgrade, the LHC's "E" will be 62 percent greater at 13 TeV. "When we get more 'E' we can hopefully get more 'm' [mass] stuff coming out," continued Thompson, pointing out that the increased energy will allow not only more mass but also heavier particles — the kind of particles that may prove the existence of dark matter.

Astrophysicists tell us that the matter we can detect — galaxies, stars, planets, comets, people, cosmic dust — comprise only 5% of the universe. The other 95% consists of dark energy (about 70%) and dark matter. We know essentially nothing about dark matter, except that physics and math indicate it must exist — just as scientists though the Higgs boson particle must exist, though it hadn't been detected before 2012.

"Dark matter is a real problem in physics today. It's one of the big puzzles," CERN physicist Dave Charlton told the Swiss Broadcasting Corporation this month (http://www.swissinfo.ch/eng/the-big-bang-machine-is-back_what-s-next-for-cern-s-large-hadron-collider-/41337172). "We don't understand what 95% of the universe is made of. We know from astronomical observations that there is dark matter in the universe – probably five times as much as the normal everyday matter that we can see. So what is it? We don't know. One very good possibility is the theory of supersymmetry, which predicts that dark matter is due to particles that we should be able produce at the LHC."

Can we find a gateway to a parallel universe?
Another major project for the particle-smashing LHC is to search for tiny black holes, which might be gateways to parallel universes and new dimensions. The existence of multiple universes is a possibility that's been well established by much observational and mathematical data of modern cosmology and particle physics. There are numerous theoretical models for multiple universes that can be supported by current data, but none are yet proven.

A paper published in Physics Letters B (http://www.sciencedirect.com/science/article/pii/S0370269315001562) by scientists at the University of Waterloo in Canada — Ahmed Farag Ali, Mir Faizal, and Mohammed M. Khalil — proposes a way to prove that tiny black holes connect our universe to other universes. CERN intends to test this hypothesis. The LCH has previously been used to look for tiny black holes, but hasn't yet succeeded. The paper's authors suggested a possible explanation for the absence of black holes at the LHC. They've designed revised LHC experiments they hope will confirm their hypotheses — in the authors' own words, their paper demonstrates "it is possible for black holes in six (and higher) dimensions to be produced at energy scales that will be accessible in the near future."

If they succeed, these tests could confirm a reality far different from the one most of us are aware of — but familiar in some ways to fans of Star Trek and Isaac Asimov.

It could also confirm another well-established (but not yet widely accepted) theory about our very origins: that the universe did not in fact start with a single big bang, but that each universe is only part of an infinitely large multiverse with no beginning or end.

John Paulsen is a former small-business leader, who launched and ran a well-regarded production company in San Francisco with a team of 9 brilliant, hard working people. He learned to manage a wide array of tasks a small business must handle — business strategy, facilities design, HR, payroll, taxes, marketing, all the way down to choosing telecom equipment and spec'ing a server system to help his team collaborate in real-time on dense media projects from multiple production rooms. He has partnered with and learned from dozens of small business owners.

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6 Habits To Make Your Small Business More Productive

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By John Paulsen

Not enough time in the day? Too much to do? That's the lament of all entrepreneurs and small business owners!

There are lots of ways to save time, and plenty of tools to help you work faster. Recently I talked about <u>super handy smartphone apps (http://blog.seagate.com/business/8-apps-to-boost-your-small-business-productivity/)</u> that make work easier and improve time management, and I also rhapsodized about this year's <u>new gadgets that can help you work smarter (http://blog.seagate.com/business/ces-6-new-tools-will-change-your-work-life/)</u>. And of course you know how a <u>business-savvy storage solution (http://blog.seagate.com/business/best-way-to-get-your-business-critical-files-anywhere-anytime/)</u> can simplify your workflow!

But some of the best things you can do to be more productive are simply about habit and intentions.

You may have tried using an organizer system, or reading a self-help book on getting organized. Those are great things — keep plugging away. But perhaps these few tips about how to attack your workload can serve to quickly remind you how simple it can be to take control of your work and improve your productivity.

Think of these as the basics. Look at this list each day (it's short) until one day you find you've incorporated all these practices into your daily work habits.

1. Update your *To Do List* every day.

What's that? You don't even keep a To Do List? Well, start there! Then, rewrite the whole thing each morning or at the end of the day. (This may seem like another time-consuming task — it's not. The 15 minutes you take each day to do this will easily save an hour in lost unproductive time.) It's best to rewrite the entire list, rather than crossing off and adding new tasks, because you want to put your list in a specific order for each day. Your top priorities should be most prominent — probably at the top of the list; those are the jobs you should work on and complete first. When you start each day with an important task and succeed on that task, it keeps you juiced so you're ready to plow into the next job on the list. Don't get distracted — stick to the priorities on the list as a habit. You don't want to waste your daily allotment of energy and focus on anything else, do you?

2. Break down big projects into small tasks.

A huge multi-part job or project is daunting. It seems unimaginable that you'll ever reach task number 25, six weeks from now. So don't list that project as one huge item. Break it into digestible, doable items that can be crossed off each day. This achieves three benefits: first, it gets you to analyze the steps needed to reach the final goal; second, it lets you define and track progress in discrete chunks so you know you're on the road to completion; and finally, checking off small tasks gives you a sense of accomplishment each day so you remain positive and encouraged (and this keeps you productive).

3. Start that task *now*.

Draft that first chart. Write that first sentence. Pull apart that prototype. Whatever step you need to take to start a new project is always the hardest step — it can feel like pulling off the warm comforter on a very chilly morning, and we often work harder finding ways to avoid taking that step than we would by just jumping in. So jump in! Once you start, dedicate yourself for a specific timeframe to stay focused. Don't check email every 5 minutes; don't accept ad hoc meetings; ignore your phone, and for goodness' sake, stay off social media (save it for the evening). Don't let a million little things get in the way of the one important thing.

4. Do one thing at a time.

Multitasking might seem like the norm these days, but study (http://www.apa.org/research/action/multitask.aspx) after study (http://news.stanford.edu/news/2009/august24/multitask-research-study-082409.html) show it does not work. You might think you can change your focus every two minutes to get five things done instead of one, but science disagrees (http://www.npr.org/2013/05/10/182861382/the-myth-of-multitasking). Folks who do try to multitask are straight-out less productive, and they're even making it harder in future to concentrate and to think creatively! Just because you feel super busy doesn't mean you're getting important things done — if you want your small business moving forward, stick to one high-priority task at a a time. (And what about all those little tasks nagging at you in the back of your mind? If they fall through the cracks, the impact will be far less significant.)

5. Take breaks.

Yes, you need to get right down to work, don't get distracted, stay focused on one thing — and we certainly know entrepreneurs must work hard. But working 12 hours straight — or even three hours straight — isn't healthy, and doesn't lead to long-term productivity. Let's turn to science again — studies find (http://www.theatlantic.com/business/archive/2014/09/science-tells-you-how-many-minutes-should-you-take-a-break-for-work-17/380369/) we are at our most productive when we focus intensely on one task for under an hour, then take a brief break (recommendations vary — some suggest a not-so-brief 20 minutes). Take a nap, or get some active exercise — both are good for your focus (http://www.nytimes.com/2012/06/17/jobs/take-breaks-regularly-to-stay-on-schedule-workstation.html), creativity and productivity, and also good for physical health (and that improves long-term productivity too)! The physical change also gives your mind some time to rest, consolidate new learnings, and replenish your attention (http://www.scientificamerican.com/article/mental-downtime/).

6. Delegate!

You don't have time to do everything for your small business. You're not the most skilled or talented person for every task. You need to delegate important jobs to your team. It's smart, good

for your team, and will lighten your workload significantly. It frees your mind to think strategically, and to look at tactics from a high altitude — two crucial things a small business leader must constantly do to help your business grow. It also frees your time to focus on the tasks leaders must execute: building out plans, meeting with customers and potential partners, and rewarding, listening to and coaching (http://blog.seagate.com/business/5-ways-to-keep-employees-happy-and-engaged/) (not micromanaging) your employees so they will share company goals and use their own strengths to succeed. Again, don't just delegate the menial tasks — delegate the tasks that aren't your strengths so you can focus on the things you are great at, and let your team shine where their strengths allow.

Keep this list handy and refer to it each day to remind yourself to build these habits. Of course, a simple list of daily practices cannot change the actual work you do; your own commitment, drive, choices and abilities are what will drive your success (so, by the way, be sure to choose a strategy that matches your abilities). But if these six things become everyday habits for you, that alone will have a major, noticeable impact on your productivity.

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