The Next Truth

Where Science and Myth Meet

Volume 1 Issue 9 June 2019

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Weighs In

"The signal was real!"
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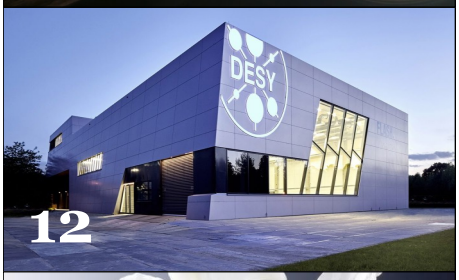

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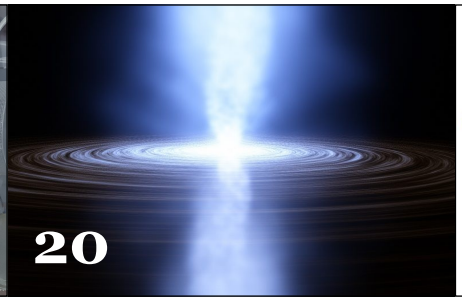

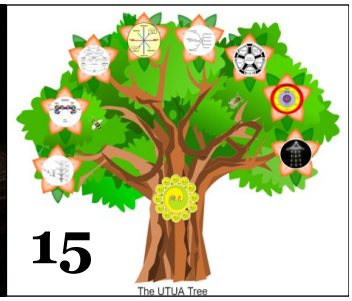

The Next Truth

Where Science and Myth Meet

WAS THERE MORE BEFORE THE BIG BANG?

Walking up to the globe of the CERN (European Organization for Nuclear Research) in July 2017, set a crazy quest for me in any understanding within the origin of evolution and with that the Universe … with tense curiosity.. I went back and the story began..

Once upon a time … a little spot, smaller than the dot at the end of a sentence, was hovering through the universe.

This charged particle could have sparked the production of every other particle it encountered, not to mention every galaxy, solar system, planet, and … our species.

That tiny spot exploded in a place being pitch black.

It exploded into an almost inaudible illuminating flash of everything!

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The Delta Aquarids Meteor Shower runs from July 12 to August 23.

This Meteor Shower is visible from both hemispheres.
Although it's best visible in the Southern Hemisphere.
In the Northern Hemisphere it has a lower intensity.

A Guide to the Best Astronomical Events in 2019: When, Where And How To Shoot Them.

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The 28th Space Cryogenics Workshop will be held **July 17-19, 2019**,
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All aspects of space cryogenics will be represented, with emphasis on those related to space exploration.
Workshop participants representing industry, academia and government will share their expertise through presentations and technical papers.

For more information: **https://spacecryogenicsworkshop.org/**

Total solar eclipse on July 2

Take advantage of this unique opportunity and travel to a place located in the path of totality.

The next one won't be until December 14, 2020

Gemini Monthly Horoscope
2019 predictions
Www.cafeastrology.com

International Symposium on Super-conductivity and Magnetism

(ISSM 2019)

20th August 2019 at 08:30 - 22nd August 2019 at 18:00 (GMT+08:00) Beijing

For more information:
www.wsaugust.org/conference/ISSM2019/

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Science vs Pseudoscience

Imagine being alive when Albert Einstein was developing his theories of relativity. Or witnessing the birth of psychology, as Sigmund Freud and psychoanalysis took over the scientific mainstream. The early 1900s was indeed an amazing time for Western science. But there was another figure on the intellectual scene when these great minds were at work.

Young philosopher Karl Popper, born in Austria and built his career in Britain, was giving serious consideration to the new ways that these and other scientists of the time were thinking about the world. And after looking at different methods that people like Einstein and Freud were using, Popper came to understand that not all scientific achievement was created equal. He ended up making an important distinction, between science and what he called 'pseudo-science'. And in the process of doing this, he taught us volumes about the nature of knowledge itself, and how we can best test it, challenge it and to bring us closer to the truth.

As a young scholar, he learned about the psychoanalytic theories of Freud, attended lectures given by Einstein himself about the rules of the universe and he noticed that these great thinkers used different methods. Popper observed that Freud was able to make just about any data point work in service of his theory. For example, he could explain a person's intimacy issues both in terms of not being hugged enough as a child, or in terms of having been hugged too much. Evidence to support Freud's theories seemed to be everywhere!

Einstein was making a different type of prediction. Instead of looking backward, and using past data to "predict" the present, he was looking ahead, and predicting future states of affairs. Einstein's theory was truly risky, Popper realized, if the future didn't match his predictions, then his theory would be conclusively disproven. If the results of the solar eclipse in 1919 had been different, general relativity would have been finished. Freud, on the other hand, could always read the past differently, so as to maintain some kind of confirmation of his theory. Suddenly, Popper understood the difference between the science that Einstein was doing, and what Freud was doing, which Popper rather snootily referred to as pseudo-science. Now, whether psychology today is considered a hard science or a social science might be debatable. But you won't find many mainstream thinkers who consider it pseudoscience. Still, nearly a hundred years ago, when Popper was reaching these conclusions, none had really characterized what "science" truly meant and what the implications were for the pursuit of knowledge.

If you're a scientist, you're gonna have to be willing to let your beliefs go. Accept the evidence. Move on. And this is the modern scientific thinking that we accept today: Testable, refutable, and falsifiable. *You don't seek to prove scientific hypotheses right, you only prove them wrong.* Sigmund Freud and Albert Einstein, Popper observed these developments firsthand and came to draw a distinction between what he referred to as science and pseudoscience, which might best be summarized as science disconfirms, while pseudoscience confirms. While the way we describe these disciplines has changed in the intervening years, Popper's ideas speak to the heart of how we arrive at knowledge. Obvious? That shows how right Popper was – he was a philosopher and actually managed to hit on an idea so right that we don't even really argue about it anymore. For Popper, knowledge was about probability and contingency.

And so; pseudo-science does not speak of someone's hypothesis, theories or methods not adhering to accepted scientific standards. These idea's do contain scientific research whereby scientists and citizen-scientists have used an open-minded curiosity what has taken their thoughts beyond the borders of the safe outlines of a schoolbook. I feel it would be a lost for possible new ways in modern science when these theories, which do tickle the mind in many ways, have only one direction…the bottom drawer of a forgotten desk standing in a dusty attic after rejection and gaining this infamous mark 'pseudoscience'.

Contributors

Thomas Zoufal (Hamburg, Germany)

After Dr. T. Zoufal received his PhD in physics from the University of Hamburg in (year), he has committed himself to the PR-department of the Deutschen Elektronen-Synchrotron in 2002 and has been tasked with since. The research center DESY is a big think tank for researchers who are looking for i.e. dark matter and axions made from light particles, and attracts more than 3000 guest researchers from over 40 countries every year. www.desy.de

Krystine I. Batcho (New York)

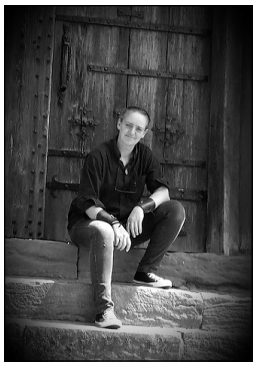
Professor Krystine I. Batcho received her Ph.D. in Psychology from The Ohio State University and is a licensed psychologist. She makes regular contributions as an expert on the Psychology Today website. Her research has ranged from early work in human-computer interaction to the impact of higher education on the development of moral and social responsibility. Prof. Batcho's current research on the psychology of nostalgia began with her introduction of the Nostalgia Inventory, a survey that assesses proneness to personal nostalgia. www.lemoyne.edu

Waldemar A. Schmidt (Oregon, USA)

Waldemar A. Schmidt, PhD, MD, is Professor Emeritus at Oregon Health and Sciences University in Portland, Oregon. His core interest, starting in early childhood, has been in "the human condition." Together with his wife, an Emerita Professor of Anatomy, and their dog Charlie he lives outside of Oregon City, the original "capital" of the Pacific Northwest Territory. And even being a Professor Emeritus, he continues his earnest study of psychology, the human condition, and "mental dysfunctions."

Gregg Henriques (Virginia, USA)

Prof. G. Henriques, Ph.D have been passionate about the possibility of developing a more integrated and coherent way of approaching the field of psychology and the work of psychotherapy. He first published his approach for developing a theoretically unified view of the field in 2003, and have been expanding on that view and its implications ever since. Dr. G. Henriques is a licensed clinical psychologist, a full professor at the James Madison University and the author of *A New Unified Theory of Psychology*. www.gregghenriques.com

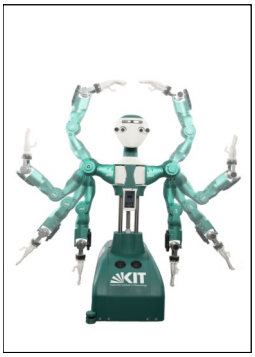


Maria Anna van Driel (Germany)

Maria Anna is the owner and founder of The Next Truth magazine, an investigative science journalist, columnist, foreign correspondent, ghost writer. She has a MA in ancient Alchemy, a BA in Metaphysics and a BS in Theoretical Physics. Her interest includes among others Mythology, Medieval and (pre) Egyptian Symbolism, Quantum-, Optical-, Particle-, and Astroparticle Physics. Maria Anna finds always the time to write new articles while having a nice chat with her (future) contributors. www.nexttruth.com

William John Murray (UK)

Physics professor and Ph.D. Bill Murray is an Edinburgh-born researcher. His involvement at CERN includes understanding the interactions and properties of the Higgs boson using the ATLAS detector at the LHC. He also searches for new physics, especially dark matter. Dr. Murray was the ATLAS Higgs convener from 2009 until 2011, physics coordinator from 2012 until 2014, and was right in the center of the Higgs discovery in July 2012. Most of his career, Dr. Murray was a researcher at RAL, in Oxfordshire and in 2013 became a professor at Warwick University, where he now teaches half time. A physics degree also lead Dr. Bill Murray to a Ph.D. position in Cambridge on the OPAL experiment at CERN. http://delphiwww.cern.ch/



Karlsruhe Institute of Technology (Germany)

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DESY.

DESY (Hamburg, Germany)

The Deutsches Elektronen-Synchrotron is one of the world’s leading accelerator centres. Researchers use the large-scale facilities at DESY to explore the microcosm in all its variety, from the interactions of tiny elementary particles and the behaviour of new types of nano-materials to bio-molecular processes that are essential to life. The facilities generate the world’s most intense X- ray light, accelerate particles to record energies and open completely new windows onto the universe. That makes DESY not only a magnet for more than 3000 guest researchers from over 40 countries every year, but also a coveted partner for national and international cooperation‘s. www.desy.de

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MPI for Radio Astronomy (Bonn, Germany)

The activities of MPI encompass the whole area of astronomical observations throughout the EM spectrum. Theoretical Astrophysics is an additional research field. To research the physics of stars, galaxies and the universe, RA looks into subjects like e.g. stellar evolution, young stellar objects, pulsars, magnetic fields in the universe, radio galaxies, quasars, galaxies at early stages of the evolution of the universe, cosmic ray(s), high-energy particle physics as well as the theory of stellar evolution and active galactic nuclei. www.mpifr-bonn.mpg.de

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Death Finds a Way or Mud
Chapter 8 "The Funeral"

By William John Murray

Elly and her mother opened the wrought iron gate of St Alban the Martyr's churchyard just as the rain started, and walked together towards the ancient Cotswold-stone building. As they walked slowly up the path Aaron Stevens came rushing and puffing after them. "Sorry, s'cuse me, late for choir", he exclaimed as he strode by. As he pushed through the church door his Rutherford Lab pass caught for a moment, but it followed him in as he disappeared inside. He must have come straight from work, Elly thought - how typical. They slipped through behind him; long habit made Elly genuflect momentarily as they walked into the nave. Once inside they made the tour of the Stations of the Cross - large paintings of the key stages in the crucifixion adorning both side walls. As they did it, she had a look at the congregation. There were already quite a lot of people in the Church, most of whom she knew, or vaguely knew. She wondered what made them come, and was grateful that they had. Mike and Matty were already in the 2nd row, with Gran, who had arrived that morning. Elly and her mother sat in front of them.

Father Richard Brennan, stilled the building by walking to the pulpit. He was young, having been appointed about a year before, straight from St Mary's seminary. Father Richard had an air of quiet authority, a seriousness about him that befitted the occasion. His calm, measured words, called the congregation to prayer, and then everyone rose for 'When I survey the wondrous cross'. At the end Father Richard surveyed his flock. "Andrew Beedle was a rare man, righteous and true. In a bizarre way I think I can best do him justice by breaking his trust." The people in front of him looked up in perplexity, and with interest.

Father Richard was already known for speaking his mind, even if it was hard to reconcile with church doctrine. "I am speaking of the Sacrament of Confession. I have heard many things under that seal, from many people. But Andrew confessed to nothing more than a poor life/work balance. His only sin was striving to achieve. He sought so much in his work. In a strange way I am reminded of the tower of Babel. He built his career - and then one momentary slip, one accident, and all his earthly success comes to naught. His death reminds us all of our own earthly limitations, and thus of the all-embracing love of the Father. "

Father Richard seemed to struggle for words, then turned and called Mary came to the lectern; She shared her love and grief with the congregation for a few painful minutes, and sat down. Then came the moment Elly had been waiting for with mixed feelings: "And now, can I ask his daughter, Eleanor to say a few words?" Elly walked up to stand beside him, and gazed down on the faces in front of her. Family, friends, colleagues. Andrew's death had been a shock to all, and they looked back up at her, hoping for some sort of understanding, or consolation, in her words. "Friends, I thank you. Andrew Beedle was a larger than life character. He grew up in Gloucester, the only child of Robert and Sally, and loved the world, in all its infinite variety." Elly talked of her father's life, his love for his wife Mary, and of their the pleasure he had taken in being able to give them all a big treat this year, a holiday spent walking, snorkeling, and sitting in the sun in Corsica.

Elly took a deep breath. Lying in Church did not come easily to her, but she could not believe his death was an accident. She needed to see their ›››

reactions to what she was about to say. “But his other love was his work. He invested so much of himself in it, purely for the joy of looking further than those who had come before. His gift for seeing ideas in other areas and connecting them together allowed him to make leaps in biochemistry, and his pleasure in doing so was obvious. He went much further than I was able to follow, but he made biochemistry sound so exciting I am sure that’s why I am studying it too. This last year he made a breakthrough of monumental proportions, something he felt unable to completely trust his colleagues with, and yet he wanted to explain it to someone. All summer he was talking about it at the dinner table, and he and I discussed all the details in the warm Corsican dusk. Perhaps it appealed to his vanity, lecturing to a student who could only be impressed - and yet I was impressed. For what he had achieved was the creation of life.” The faces of her audience below her, always attentive, suddenly seemed spellbound. She paused and there was not a sound in the church. Her eyes sought them out. Shi met her gaze, dark Chinese eyes looking calmly up at her. Gavin Standworth, Andrews’s boss, was shifting his weight from one leg to the other. Aaron in the choir stared at the floor. She could read nothing in their faces.

At a little cough from the priest she recollected herself and started again, talking of what he had meant as a father to herself, Mike and Matty, reminiscing over his favourite jokes and his old t-shirts. Finally she sat down. Afterwards the choir led, ‘Jesus walked this Lonesome Valley’ and then they all trooped out into the cold sunshine, carrying Andrew on his last journey, just a few short steps to a corner of the graveyard.

Father Richard seemed deeply moved as he conducted the last rights, and after Mary had dropped a wreath onto the coffin the first sods followed it. Elly and Mary stood in tears, with Mike and Matty beside them trying to look somber, respectful and grown-up all at once. Shi and Lola stood off to one side, looking over at them and talking.

Aaron came over, still in his choir robes, to offer them handshakes. “Well done, both of you, with the speeches. You really captured him and that isn’t easy”. Elly looked back at him, silently agreeing with him. Despite everything, she could not help liking Aaron. As they chatted, a man approached them; short, bearded, and with ruddy cheeks. He looked like someone’s favourite uncle, but Elly didn’t recognize him. “He was a great man, your husband, father, a great man, and one you should be very proud of.” “Well I am”, replied Mary, “But I am sorry, I don’t know you. Are you from RAL?” “Oh dear, there I go, not introducing myself”, laughed the interloper, ‘I am Peter Brown; I work for the Sunday Times. I thought you might like to give us a little exclusive; tell the true story of the man and his achievements. Is it really true he was able to create life?” “Oh for goodness sake, leave them alone” interjected Aaron, “Can’t you see they don’t want to talk to you?” “Well, I am just trying to be helpful; you have so many worries right now you don’t want to add money to the list - and there we can help” “Thank you, but no, thank you!” snapped Elly and the party turned and trooped out of the graveyard.

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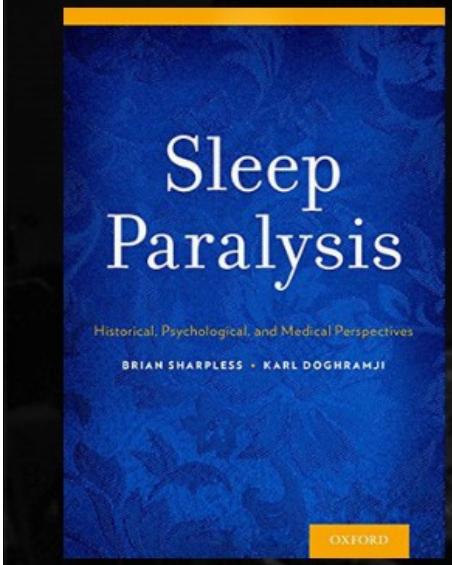
Next month chapter 9, "The Wake"



Dr. Brian A. Sharpless

WWW.BRIANSHARPLESS.COM

Humans throughout history have described a peculiar state between wakefulness and sleep during which they are consciously aware of their surroundings, but physically paralyzed. Sleep paralysis is also commonly accompanied by high levels of fear, feelings of suffocation, and hallucinations (i.e., waking dreams).

Drs. Brian Sharpless and Karl Doghramji synthesize the many literatures while providing practical guidance for the diagnosis and treatment of sleep paralysis. Included are medication suggestions and a new psychotherapy manual for mental health professionals.

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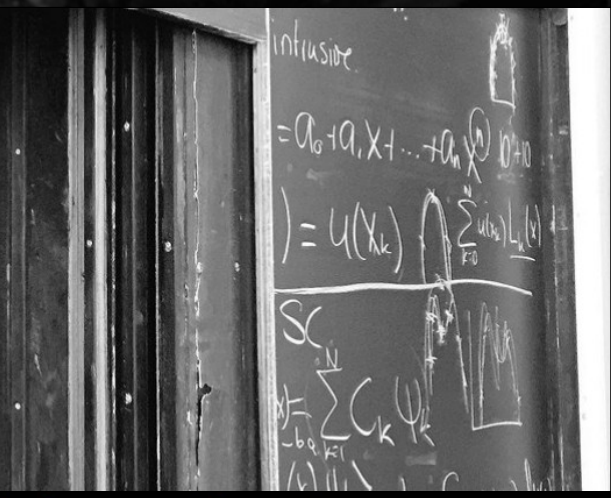
www.nbi.ku.dk



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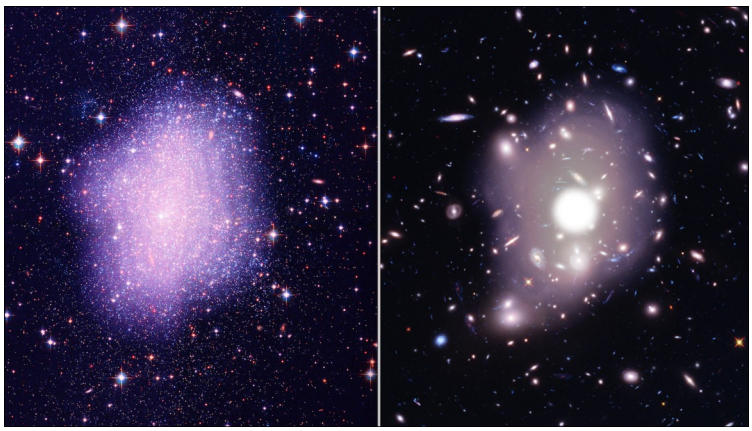
Dark Matter may be hitting the right note in small galaxies

DESY press release, 2019/02/26, **www.desy.de**

New study may explain distribution of dark matter in galaxies

Dark matter may scatter against itself only when it hits the right energy. This is what researchers from the Kavli Institute for the Physics and Mathematics of the Universe (Japan), DESY and the Austrian Academy of Science say in a study published in the recent issue of *Physical Review Letters*. Their idea can explain why galaxies, from the smallest to the biggest, have the shapes they do, providing a plausible solution for a long-lasting problem.

Dark matter is a mysterious and so far undetected form of matter that comprises more than 80 per cent of matter in today´s Universe. Its nature is unknown, but scientists think that it is responsible for forming stars and galaxies by its gravitational pull, a phenomenon that ultimately also led to our existence.



Astronomers observed that the dark matter does not seem to clump very much in small galaxies, but their density peaks sharply in bigger systems such as clusters of galaxies. It has been a puzzle why different systems behave differently. (picture: Kavli IPMU - Kavli IPMU modified this figure based on the image credited by NASA, STScI)

"Dark matter is actually the mother who gave birth to all of us. But we haven't met her; somehow, we got separated at birth. Who is she? That is the question we want to know," says author Hitoshi Murayama, professor at University of California at Berkeley and Principal Investigator at the Kavli Institute for the Physics and Mathematics of the Universe.

Astronomers have already found that dark matter does not seem to clump together as much as computer simulations suggest. If gravity is the only force through which dark matter can interact, only pulling and never pushing, then dark matter should become very dense towards the centre of galaxies. However, especially in small faint galaxies called dwarf spheroidals, dark matter does not seem to become as dense as expected toward their centres.

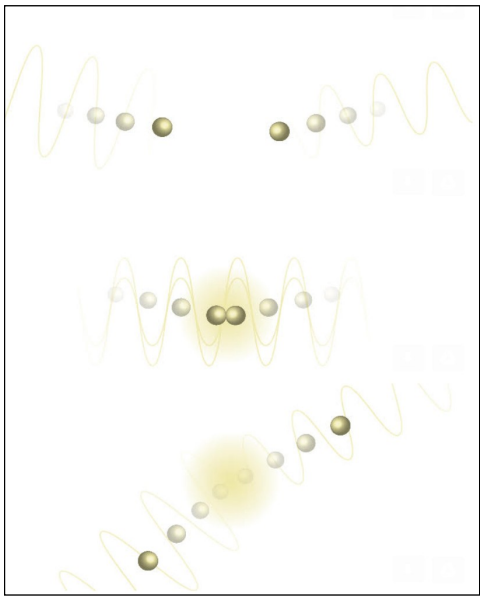
This puzzle could be explained if dark matter particles scatter with each other like billiard balls, allowing them to spread out more evenly after a collision. But one problem with this idea is that dark matter does seem to clump in bigger systems such as clusters of galaxies.

What makes dark matter behave differently in dwarf spheroidals and clusters of galaxies? The authors of the study have developed an explanation that could solve this riddle, supporting the so-called self-interacting dark matter hypothesis, according to which dark matter consists of particles which can collide. "If dark matter scatters with itself only at a low but very special speed or energy, this can happen often in dwarf spheroidals where the dark matter moves slowly. In clusters of galaxies, where it moves fast, the effect is rare. It needs to hit a resonance,"says Chinese physicist Xiaoyong Chu, a postdoctoral researcher at the Austrian Academy of Sciences.

Resonance is a phenomenon that appears every day. A playground swing has to be pushed at a special frequency so that it goes higher and higher. Or if you bring a swinging tuning fork near a guitar, the guitar string starts to vibrate only if it is tuned correctly. These are all examples for resonances, Murayama explains. ›››

The team suspects this is precisely what dark matter is doing: the dark matter particles are much more likely to hit each other when they are moving at a particular energy that corresponds to the resonance of the swing or the tuning fork.

"As far as we know, this is the simplest explanation to the puzzle. We are excited because we may soon know what dark matter is," says Murayama. However, the team wondered whether such a simple idea would explain the existing observational data correctly. "First, we were a bit skeptical that this idea will explain the observational data; but once we tried it, it worked like a charm!," says Colombian physicist Camilo Garcia Cely, a postdoctoral researcher at DESY.



If two dark matter particles aproach each other at a special speed, they "resonate" and stick together for a short moment, and move out to different directions afterwards, causing them to scatter. This way, dark matter can spread out so that we can understand the smooth profile in small galaxies. (picture: Kavli IPMU)

For their idea to work, the mass of the resonance has to be close to twice the mass of one dark matter particle. The team believes it is no accident that dark matter can hit the exact right note. "There are many other systems in nature that show similar accidents: for example, for the carbon production in stars, alpha particles hit a resonance of beryllium, which in turn hits a resonance of carbon, producing the building blocks that gave rise to life on Earth," says Garcia Cely.

"This behaviour of dark matter may also be a sign that our world has more dimensions than we see. If a particle moves in extra dimensions, it has a certain kinetic energy. For us who don't see the extra dimensions, we observe the energy actually as mass, thanks to Einstein's famous equation $E=mc^2$ – energy is equivalent to mass. Perhaps some particle moves twice as fast in extra dimension, making its mass precisely twice as much as the mass of dark matter," says Chu.

The team's next step will be to find observational data that backs their theory. "If our theory is valid, future and more detailed observations of different galaxies will reveal that scattering of dark matter indeed depends on its speed," says Murayama. He is also the leader of an international group that works on an instrument called the Prime Focus Spectrograph, currently under construction.

The US$80 million instrument will be mounted on the Subaru telescope atop Mauna Kea on Big Island, Hawaii, and will be capable of measuring the speeds of thousands of stars in dwarf spheroidals, thus being able to provide the data needed to check this new hypothesis.

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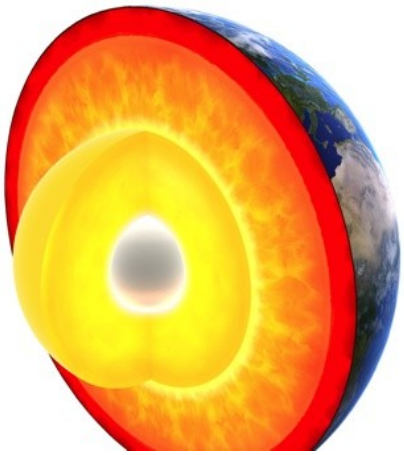

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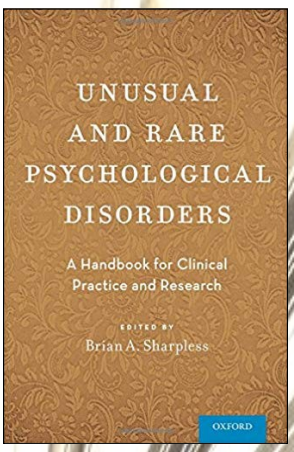

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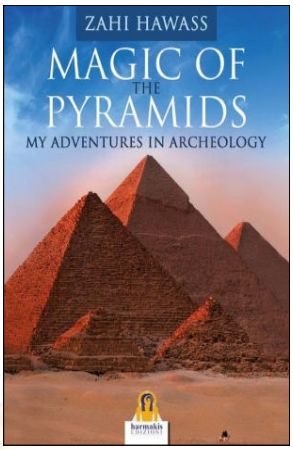

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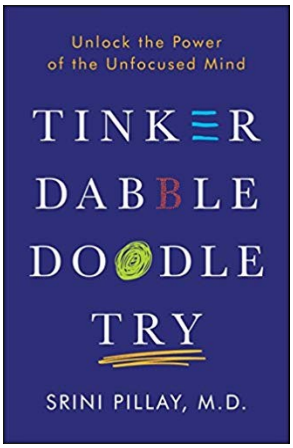

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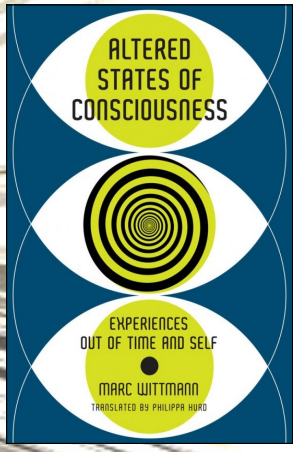

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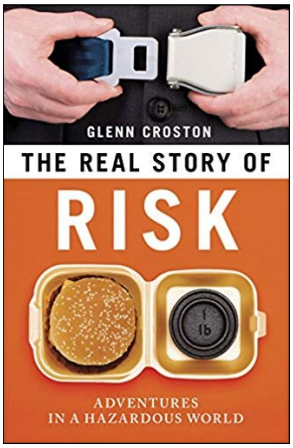

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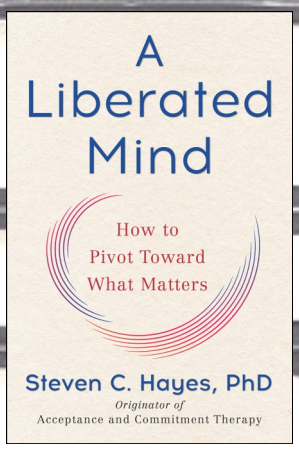

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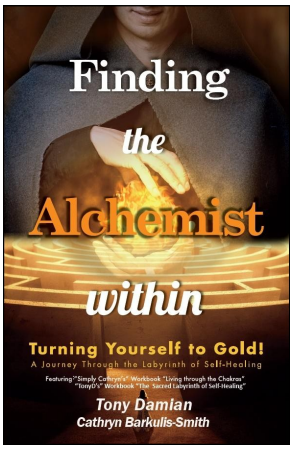

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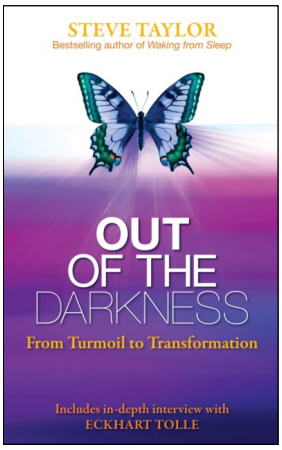

Dr. Steve Taylor
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The Big Bang Is a Psychological Event

And There is a Theory that Explains Why

Waldemar A Schmidt, PhD, MD, is Professor Emeritus at Oregon Health and Science University in Portland, Oregon, USA. He was born in Los Angeles, CA, but raised outside of the USA. Professor Schmidt began school in The Netherlands, where he learned to speak the Dutch language. Further schooling on Bahrain Island, in the Persian Gulf, thence to Beirut, Lebanon, New York City, and finally Oregon broadened his knowledge in both medicine and human psychology. Professor Schmidt's undergraduate degree was from Oregon State University, Corvallis, OR, and advanced training was in Portland, Oregon. An MD degree was associated with a PhD in Classical & Modern Anatomy, followed by postdoctoral training and academic practice in Pathology. His core interest, starting in early childhood, has been in "the human condition." Following retirement he entered a prolonged, intensive, and detailed study of human psychology - wherein he encountered Dr. G. Henriques "Unified Theory of Psychology" and the concepts and models entailed in the Tree of Knowledge paradigm. (https://en.wikipedia.org/wiki/Tree_of_knowledge_system) Dr. G. Henriques is a founding member of The Theory of Knowledge Society and actively pursues his desire to understand the genesis, nature, and treatment of mental distress. Professor Schmidt lives with his wife, an Emerita Professor of Anatomy, and his faithful K9 companion, the vizsla, (Dunantul's GCh Czardas of Tierah) listening to the name Charlie outside of Oregon City, the original "capital" of the Pacific Northwest Territory.

By Prof. Waldemar A Schmidt, PhD, MD

You are likely curious about the claim in my title. What follows puts my contention into perspective.

I have always been interested in human beings. Practicing academic medicine for 30+ years has provided me with the opportunity to engage in prolonged observation of patients, faculty, students, friends, family and acquaintances. They are such a varied lot of sizes, shapes, abilities, intentions, actions, and consequences. They are far more complicated than multiple genders alone! They also share ways whereby they show remarkable capacities to adapt to the realities of existence. In addition, they seem almost predictably unpredictable. This inner interest of mine, combined with a fortunate admission to medical school and some research time resulted in cementing my fascination in "the human condition."

Two observations occurred repeatedly in my work: 1) Humans are becoming increasingly confused and disoriented existentially; and
2) Despite my training and experience, I did not satisfactorily understand the workings of the human mind. Ending my practice provided the time to address this illiteracy. Fortuitously there was the internet, so I could work from home and comfort – no return to monastic scholasticism required! My decision to dive deeply into human psychology was principally based on (a) the idea that psychology is the basic science component of psychiatry, (b) psychiatry appeared confused about the role of psychopharmacology, and (c) because I needed to apprehend form of "normal mental function" before confronting "mental dysfunction."

A seminal moment occurred for me with the discovery of The Tree of Knowledge. This shepherded me to Henriques' *Unified Theory of Psychology*, which I found could deliver coherent and consistent accounts in a way that rationally illuminated the hitherto cryptic (at least to me) human mind.

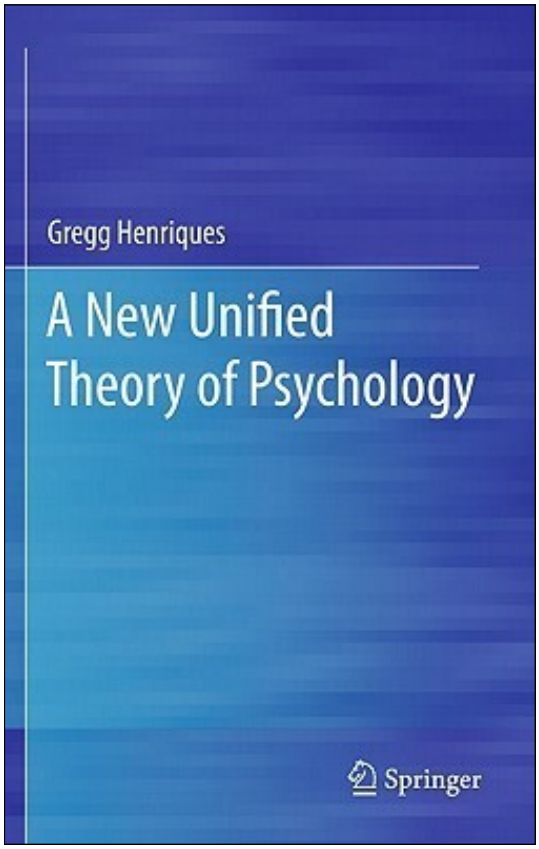
The key elements of the Unified Theory work like puzzle pieces to divulge the functional structure of the mind by revealing the interacting elements of the mind itself. For instance, Behavioral Investment Theory clarifies the core purposes and control processes involved in human behavior. The Justification Hypothesis (now referred to as Justification Systems Theory) illustrates that very human penchant and necessity to find and explain to others why we adopt certain thoughts and conducts. The Influence Matrix describes ›››

both the intrapsychic structure of human relational investment processes and allows us to comprehend overt interpersonal interactions.

OK, I know your question at this point: *What does all this have to do with the other theory to which I alluded and what is the association between psychology and the big bang?* Patience please, I'm getting there.

The Unified Theory does two other very important things pertinent to understanding the human condition. That is, it permits time-travel because it provides perspectives which are forward and backward in time.

Looking forward through time, it explicates the origins, needs for, and functions of the over-arching concept of "Culture" (as opposed to the myriad and diverse human "cultures"). As well, the Unified Theory explains Culture as an evolving rather than static structure. In fact, it highlights that what is happening now that is contributing our confusion is an emergence of the "digital world," which is changing everything. The unified theory captures this transition into a "digital meta-Culture" via a futuristic sounding notion called "the fifth joint point."



"A New Unified Theory of Psychology" introduces a system that addresses psychology's current theoretical and philosophical difficulties.
www.Amazon.com

The other direction of importance is backwards in time. The Unified Theory places human beings in a context of an evolving wave of energy and information which started at the big bang. That is, human beings are perceived as having arisen from animal life, which arose from matter, which arose from the condensation of energy, whose presence came from the big bang!

The Unified Theory's pan-temporal insight illustrates the origins, as well as the resolution of, our increasing experiential confusion and disorientation. For example, at a previous time we were convinced we were in all ways the center of the universe.

Now, however, we understand we reside on an infinitesimal globe within an immense volume of matter and space whose diameter exceeds 27.6 billion light years (i.e. 13.8 billion years ago x 2). And, we have no idea what exists beyond that limit!

Previously, we have been persuaded of supernatural entities which cared for and about each one of us personally. Presently, we apprehend that cosmic events occur impersonally and apparently without regards to our existence. Further, we comprehend substantial evidence which reveals our species arose, over time, from preceding entities which were not quite exactly like us. These changes destabilize the assumptions which lie at the very foundations of our existential adaptations and undermine those perceptions which enable our survival within and resilience to the vagaries of existence! No surprise, then, the blossoming existential angst.

With preceding foundational explanations of existence disputed, if not destroyed, how shall we humans meet our fundamental and compelling need to justify, explain, and provide a perspective of our place in the impersonal reality that is our current scientific understanding? This is exactly where the theory alluded to above comes to the rescue - in the form of The Unified Theory of Psychology!

Huh? Psychology rationalizes the universe?

Upon closer examination one realizes the Unified Theory is not singularly about psychology – in a very capacious sense it explains much, much more. In fact, it is about all that which has and does exist. And it does so without necessarily refuting other modern explications of territories of actuality, such as cosmology, chemistry and physics, animal behavior, and the emergence of the human mind and its most byzantine creation, Culture. ›››

It is for these sorts of reasons that I have come to see that the Unified Theory of Psychology and The Tree of Knowledge concept may be appreciated by an alias: The Consilient Comprehensive Existential Metatheory.

It is consilient in the sense of the definition of consilience: The concurrence of multiple inductions drawn from different data sets; the agreement, co-operation, or overlap of academic disciplines. It is comprehensive and existential because it is inclusive of all that which exists, either in actuality or in thought.

And it is a metatheory for the reason that it is a theory about theories. In short, The Unified Theory of Psychology (aka: The Consilient Comprehensive Existential Metatheory) provides a consistent, coherent, stable, and inclusive metaphysical and pan-temporal justification of Homo sapiens sapiens. By whatever name it goes by, it addresses much more than psychology! It is, in actuality, a coherent knowledge system.

That's why the big bang is a psychological event – or, more stringently - why the big bang has psychological consequences. Meanwhile, I'll be in this corner over here trying to sort out "the human condition" and various forms of human "mental dysfunction."

■ ■ ■

This article was originally published on Psychology Today, www.psychologytoday.com

What is Heliophysics?

Heliophysics is the study of the domain of the Sun-the heliosphere-from the nuclear core in the center of the Sun where hydrogen is transmuted into helium, producing the energy that drives changes throughout the entire solar system, to the edge of interplanetary space where the solar wind and magnetic fields cede control of the local physical conditions to the interstellar medium. That represents over a volume of over 108 AU 3 suffused with outflowing plasma, magnetic fields, and solar radiation, with temperatures ranging from near absolute zero to over 20 MK.

The heliosphere is an interconnected network of physical processes driven by a relentless but varying outflow of energy from the Sun in the form of electromagnetic radiation from y-rays to radio emissions, charged and neutral particles, and magnetic fields. All these forms of solar emissions interact in different ways in the wide range of environments from the hot solar interior, through the Sun's thin surface layers, into the extended solar corona, and throughout interplanetary space to the very edge of the solar system. Along their tortuous path, these emissions interact with different planetary environments, comets, asteroids, and interstellar gas- each with its unique response to the changing solar stimuli. HSD's goal is to understand this system of systems.

Accomplishing this goal involves the study of the complex interactions between electromagnetic radiation, thermal plasmas, energetic particles, and magnetic fields, with three principal objectives:

- To understand the changing flow of energy and matter throughout the Sun, solar atmophere, heliosphere, and planetary environments
- To explore the fundamental physical processes that characterize space plasmas
- To define both the origins and the societal impacts of variability in the Sun-Earth system

There are four major physical domains that encompass HSD's mission: the Sun, the inner heliosphere, geospace, and the outer heliosphere. In addition, each planet, moon, asteroid, and comet interacts with the solar output in a different way depending on its size, distance from the Sun, atmospheric composition, axial tilt, orbital eccentricity, and magnetic field. The Sun also interacts with the interstellar medium in a boundary layer called the heliopause.

Heliophysics has practical applications as well. Solar variability leads to a dynamically variable near- Earth environment with impacts on technological systems both in space and on the ground, and corresponding effects on life and society. This is referred to as "space weather."

Space weather has direct effects on satellite orbits, electronics, power systems, sensors, communications, GPS, power and energy industry, and commercial aviation. It is a concern in the realm of national defense and will be a major safety factor for deep-space exploration.

For more information about the Heliophysics Science Devision
www.science.gsfc.nasa.gov

About the Heliophysics Science Division

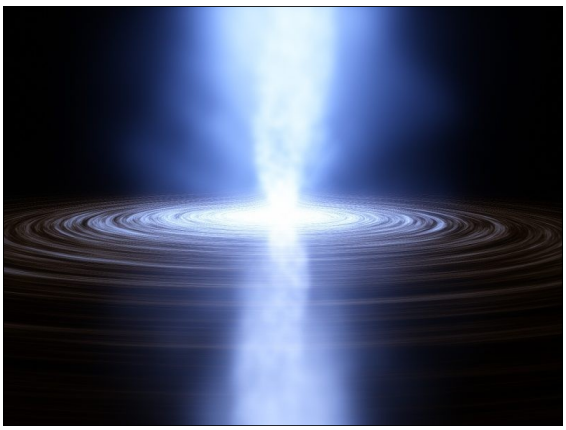
The Heliophysics Science Division (HSD) provides scientific leadership and expertise necessary to achieve NASA's strategic science goals in solar physics, heliospheric physics, geospace physics and space weather. It leads the definition and development of missions in support of these goals and performs fundamental research into solar structure and magnetic activity, the origins and acceleration of the solar wind, the effects of solar outbursts on the heliosphere, the response of the coupled magnetosphere-ionosphere system at the Earth and other planets to solar variability including solar irradiance.

Read the full article:
www.science.gsfc.nasa.gov

The Mystery of the Universe We Cannot See

By Maria Anna van Driel, www.nexttruth.com

The moment our universe being born was not with a whimper but with a bang and it was gone almost as soon as it happened. At least, that is what you are commonly told. But scientific evidence is slowly building up to support the idea that the Big Bang might not have been the beginning. This well known theory that represents where the laws of physics break down, in where space, time, matter and the energy within began from a singular point, and then expanded and cooled, giving rise over billions of years to the atoms, stars, galaxies, and clusters of galaxies spread out across the billions of light years that make up our observable Universe, is probably wrong according to some scientists.



It's invisible, and yet the motions of galaxies suggest it must be there!

Have we really being wrong all this time? Have we overlooked the power of an unknown form of energy density which is hypothesized to permeate all of space? Do we need to reevaluate our understanding of our physical world by looking in another direction what speaks of matter and antimatter do, in fact, obey separate laws of physics? To cut this compelling but beautiful picture of approximately 13.8 billion years that still explains so much of what we see, short… maybe we have being wrong about this term 'explosion' what suggest that something exploded, or expanded, from one center point outward into space.

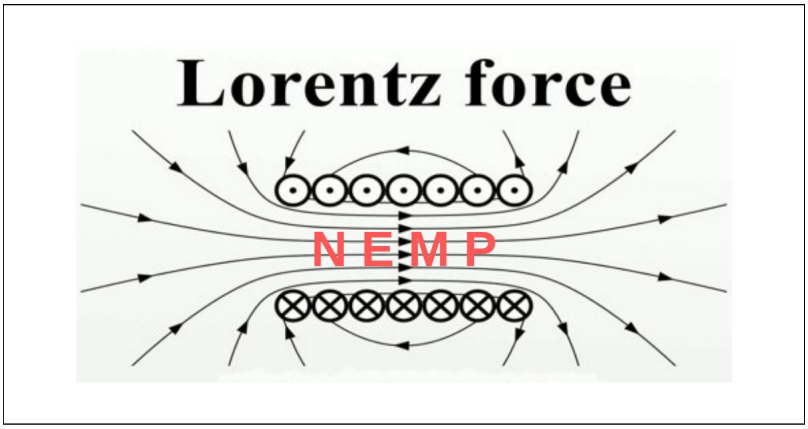
But before we plunge into this pond filled with 'missing stuff' and stir up some primordial cosmic ripples, here is a little experiment. Hold up your hand. Now put it back down. In that window of time, your hand somehow interacted with dark matter which is the mysterious none-reflecting matter that comprises the vast majority of the universe. Sciences best guess is that a million particles of dark matter passed through your hand just now. Still, a rebellious minority believes that dark matter is an illusion, and that galaxies maintain their shapes because of a new facet of gravity we have yet to properly understand.

I have written several times about black holes colliding and merging and, them behaving as so, creating an effect in an event similar to the Big Bang. Tempting as this mysterious picture is, this time I am going to questing my own previous sayings and propose to you another hypothesis within the mind dazzling behaviors of our universe what will probably sound to you as an idea coming from someone who is humming a strange song while playing with the 'toys in the attack' until it all comes alive. An out-of-the-box idea consisting e.g. electromagnetic waveguides, exited sonic booms, and a ghostly, elusive stuff that dominates our universe what is everywhere and, as far as human knowledge is concerned, also nowhere. I am going to combine several scientific theories and hypothesis which are not entirely new and take you beyond the human imaginary. And, if proven true, it could force us to take another look at the standard model of physics. Even this well known theory of the Big Bang looks like the winner being the beginning for our Universe; let's explore a hypothesis that sits most neatly between jaw-dropping and not entirely implausible, however, is one that credits bouncing black holes as the bursts' source. As if that was not enough to swallow, that could also mean the cosmos did not begin in a big bang as we have told it did.

So what is 'space'? Is it empty, or is it full of stuff that provides a medium through which photons, electromagnetic waves and everything else can move or being forced to slow down? Let me briefly grab back to a phrase of my previous article "What do you mean by evolution?" ›››

"Imagine a, slightly different to ours, solar system just beyond the borders of our own universe. This solar-system has a bright star what provides the required heat for subatomic particles to emerge which in turn create the basics for atoms after they bound. Also, planets, moons and even black holes can be found in this, by us, unseen solar-system containing to us strange life forms. Let us also imagine that the borders of our universe are not a straight line which science can calculate but is presenting itself as a wobbly and moving X-point…better known as a wormhole or EPR."

Now imagine this slightly charged wobbly wall of sound being a closed waveguide…a closed circuit so to speak, and has several passages through space-time when it comes close to a second or third waveguide what provides it the change of creating shortcuts. Shortcuts, wormholes or Einstein-Podolsky-Rosen bridge's (EPR) which are simply a rotating standing-wave in order to attract, draw in and speed up particles and gasses. This means that, in a hypothesis as this one, these EPR's are a bridge to a possible neighbor universe. A tunnel in where the frequencies are this high that, for instance, atoms start to vibrate immensely, being "Spagettified", fall apart and show-up as the smallest building blocks of matter on the other side…free quarks. Electrons, which are accelerating as they entering the EPR, are heating up and creating a form of high electric charge within this standing-wave. The kinetic energy of the protons creating a magnetic field what lies like a closed cloak around this electric field what is in motion. An effect what is better known as the Lorentz force.



The spin of a particle is related to the rotation of the EPR as well on its own speed while being inside the standing-wave. The electromagnetic field pattern of a mode depends on the frequency.

Within this rotating EPR, or bridge, every subatomic particle and every piece of debris is being compressed while accelerating. My best guess is that the behaviors within these EPR's are mostly common meaning nothing out of the ordinary is happening when these particles cross each other with warp speed and exchanging the normal amount of the information which they took from their universe and spread it into the next. This information can be picked up by those 'ghost' particles known as the flavor changing neutrinos meaning, cosmic evolution is following its path as it always have. Hypothetically speaking, when the sterile neutrino contains a primordial coded vibration what equals a wave length, which in turn, equals the velocity of the frequency what is creating a reaction that can be thought of as Neutrino-Photon flavor having a higher frequency, providing its behavior in speed, compared to ordinary light. Knowing that the electron makes a transition from a lower (energy) state (usually "ground" state) to an excited state as soon as the *atom is absorbing* or emitting *light* in discrete packets (*photons)*, we can even think of the Neutrino-Photon as an, by the Universe created, directed laser beam containing new information from a source yet unknown. Are our dreams and memories from the future?

Still, we are not at the end of the hypothesis… when the Lorentz force (a magnetic field on a moving electric field) is able to create the right distance between the subatomic particles, coming from both sides, inside the EPR for them to meet instead of colliding, a plausible change for 'melting' or 'glueing' the information to a single code can take place. And if we think of these subatomic particles approaching each other with warp speed and exchanging their information as they meet in the right conditions, and creating an electromagnetic nuclear pulse (NEMP) in this moment, we can think of this event as THE Big Bang. And maybe, just maybe something entirely new what has its origin in a NEM-field surrounded by an effect in the Lorentz force. Could it hiding itself in the process of nuclear electromagnetic gluon binding but has yet had to be measured by e.g. the MiniBooNE or the, yet to build, CERN's accelerator? Is science on the edge of finding a new medium what contains this ›››

'new' coded information from another universe with which it secretly feeds the newly, in plasma, build atoms on each side of an EPR?

But before we can observe these hot plasmas filled with particles containing extraterrestrial information, we need an effect what is similar to a Pulsed Plasma Thruster (PPT). "The first step for initiating a PPT pulse is ignition. The thruster's igniter, mounted close to the propellant, produces a spark that allows a discharge of the ESU between the electrodes to create a plasma. This plasma is called the main discharge. The main discharge ablates and ionizes the surface portion of the solid propellant, creating a propellant plasma. This plasma is then accelerated out of the thruster by the Lorentz force". (Source; **www.nasa.gov**)

Okay, I have to admit, this sounds like a futuristic device from another dimension but it is really not the case. And even NASA is researching its possibilities just over a decade now, their research continues and we can assume that more efficient and longer life PPTs will be developed.

However, our particles are still kept prison in this rotating EPR so, let's speed up a little bit in order to keep up with them as soon as they escape the tunnel, as fluorescent light bulbs, with warp speed due the pulse of the electrically charged ions and electrons, create a sonic boom and glide to a stop as they encounter a counter pressure of an electromagnetic density of which could very easily be dark matter.

Playing with this out-of-the-box hypothesis we also come across this mysterious number of 7.83 which is the Schumann resonance (named after physicist Winfried Otto Schumann who predicted it mathematically in 1952) and a theory in where the universe is…um, well acting as a strange kind of "atmosphere" only this atmosphere we call 'space'. Okay, it is technically not appropriate to describe space being one as well as it may sound very strange that the assumed space "atmosphere" of electrons look like a hexagonally crystal lattice. It appears like a solid body which is necessary to carry forward transverse waves, electromagnetic waves. With this said we could think of space being an atmosphere of which the envelope of it is just another state of the same things as we can find in the Earth's atmosphere. Taking it all together, this none-reflecting area in space, consisting standing electric and standing magnetic waves, is what we can think of as a wormhole or EPR. Adding gas to the EPR's Lorentz force (think back to the PPT from NASA) the ions can create a propellant plasma inside the tunnel of the EPR whereby these electrically charged ions and electrons can provide the correct thrust pushing the plasma out of the EPR's its grip with warp speed. An event like this would be a plausible explanation of how an inaudible sonic boom can be created and providing the plasma with the right frequency creating an effect in nuclear electromagnetic gluon binding.

Indeed, our Universe is definitely a strange place which is full of gases, funny acting particles, and closed waveguides and even…liquid? In this idea of space-time being a fluid, we have to view the "Super-fluid vacuum theory" (SVT) what is an approach in theoretical physics and quantum mechanics where the fundamental physical vacuum is viewed as super-fluid or as a Bose–Einstein condensate (BEC). And even it was suggested as long as half a century ago, the toys in the attic are truly starting to come alive as soon as we apply hot quark-gluon-plasmas to this idea which are behaving as a nearly perfect liquid.

And so the questions left; what is it that makes the universe, or this "atmosphere", expands or at least is showing a behavior in expanding? What is this mysterious "something" that is pushing us towards the boundaries of the universe? Could it be the aftershock, or echo, of sound waves of which we can find its birth in a primordial electromagnetic excited acoustic noise, or sonic booms, at the end or the beginning, depending from which direction you are observing the event, of a rotating EPR? If so, it would mean that the Big Bang is not this "explosion" we are familiar with but the moment in where particles, surrounded by ionized gas, go through a sound barrier after they have met under the right conditions whereby the distance is perfectly measured by a natural effect in the Lorentz force. Would that not mean that THE Big Bang is not the beginning of our universe?

Did life, as we know it, started in a nuclear electromagnetic gluon binding in a QGP while the right frequency was passing through which then created a strange reaction in a Doppler effect? Is this where we come from? It is a mind dazzling paradox indeed, but not entirely impossible. ■ ■ ■

The Physics of Beer Tapping

by American Physical Society, https://phys.org

An old, hilarious if somewhat juvenile party trick involves covertly tapping the top of someone's newly opened beer bottle and then standing back as the suds foam out onto the floor.

Now researchers from Carlos III University in Madrid, Spain and Universite Pierre et Marie Curie, Institut Jean le Rond d'Alembert, France, have produced new insight into the science behind foaming beer bottles by exploring the phenomenon of cavitation. They present their explanation at the annual meeting of the American Physical Society (APS) Division of Fluid Dynamics.

Cavitation, a phenomenon relevant to such common engineering concerns as erosion of ship propellers, is the mechanism by which bubbles appear in a liquid such as beer after an impact, said Javier Rodriguez-Rodriguez, the lead researcher from Carlos III University.

After a sudden impact against a bottle's mouth, back and forth movement of compression and expansion waves will cause bubbles to appear and quickly collapse. The team's investigation of beer bottle-fluid interactions demonstrated that the cavitation-induced break-up of larger "mother" bubbles creates clouds of very small carbonic gas "daughter bubbles," which grow and expand much faster than the larger mother-bubbles from which they split. The rapid expansion of these daughter bubbles gives the foam buoyancy.

"Buoyancy leads to the formation of plumes full of bubbles, whose shape resembles very much the mushrooms seen after powerful explosions," Rodriguez-Rodriguez explained. "And here is what really makes the formation of foam so explosive: the larger the bubbles get, the faster they rise, and the other way around." He adds that this is because fast-moving bubbles entrain more carbonic gas.

The team's work is believed to be the first quantitative analysis of the beer bottle foamover. "We wanted to explain the extremely high efficiency of the degasification process that occurs in a beer bottle within the first few seconds after the impact," Rodriguez said.

Beyond happy-hour enrichment, the study's findings can be applied to other engineering systems and serious natural phenomena such as the sudden release of dissolved carbon dioxide in the Lake Nyos disaster. ■ ■ ■

Are the bubbles in your pint of stout falling and rising?

It might be hard to believe your eyes, but the bubbles in your pint of stout really are falling. But everyone knows that bubbles rise, so what is going on? As your pint of stout settles, a circulating current is set up. Bubbles in the centre of the glass rise, causing liquid at the sides of the glass to sink, dragging the bubbles with them. This can happen in all fizzy liquids, but it's particularly noticeable in a pint of stout, such as Guinness, because of the colour of the liquid and the small bubbles that are easily moved by the current.

Experiment;

Try dropping a handful of peanuts in your stout. The nuts will slowly float to the top and fall back down again. Gas bubbles form on the peanuts, making them float upwards. When they reach the top the bubbles burst and the peanuts fall back down again. This experiment may take a while to get going – best use that anonymous pint someone has left on the side!
(If by any chance your pub has raisins, use them instead!)

X-ray Pulse Detected Near Event Horizon As Black Hole Devours Star

by Jennifer Chu | MIT News Office
Wednesday, January 9, 2019

On Nov. 22, 2014, astronomers spotted a rare event in the night sky: A supermassive black hole at the center of a galaxy, nearly 300 million light-years from Earth, ripping apart a passing star. The event, known as a tidal disruption flare, for the black hole's massive tidal pull that tears a star apart, created a burst of X-ray activity near the center of the galaxy. Since then, a host of observatories have trained their sights on the event, in hopes of learning more about how black holes feed.

Now researchers at MIT and elsewhere have pored through data from multiple telescopes' observations of the event, and discovered a curiously intense, stable, and periodic pulse, or signal, of X-rays, across all datasets. The signal appears to emanate from an area very close to the black hole's event horizon — the point beyond which material is swallowed inescapably by the black hole. The signal appears to periodically brighten and fade every 131 seconds, and persists over at least 450 days.

The researchers believe that whatever is emitting the periodic signal must be orbiting the black hole, just outside the event horizon, near the Innermost Stable Circular Orbit, or ISCO — the smallest orbit in which a particle can safely travel around a black hole.

Given the signal's stable proximity to the black hole, and the black hole's mass, which researchers previously estimated to be about 1 million times that of the sun, the team has calculated that the black hole is spinning at about 50 percent the speed of light.

The findings, reported today in the journal *Science*, are the first demonstration of a tidal disruption flare being used to estimate a black hole's spin.

The study's first author, Dheeraj Pasham, a postdoc in MIT's Kavli Institute for Astrophysics and Space Research, says that most supermassive black holes are dormant and don't usually emit much in the way of X-ray radiation. Only occasionally will they release a burst of activity, such as when stars get close enough for black holes to devour them. Now he says that, given the team's results, such tidal disruption flares can be used to estimate the spin of supermassive black holes — a characteristic that has been, up until now, incredibly tricky to pin down.

"Events where black holes shred stars that come too close to them could help us map out the spins of several supermassive black holes that are dormant and otherwise hidden at the centers of galaxies," Pasham says. "This could ultimately help us understand how galaxies evolved over cosmic time."

Pasham's co-authors include Ronald Remillard, Jeroen Homan, Deepto Chakrabarty, Frederick Baganoff, and James Steiner of MIT; Alessia Franchini at the University of Nevada; Chris Fragile of the College of Charleston; Nicholas Stone of Columbia University; Eric Coughlin of the University of California at Berkeley; and Nishanth Pasham, of Sunnyvale, California.

A real signal

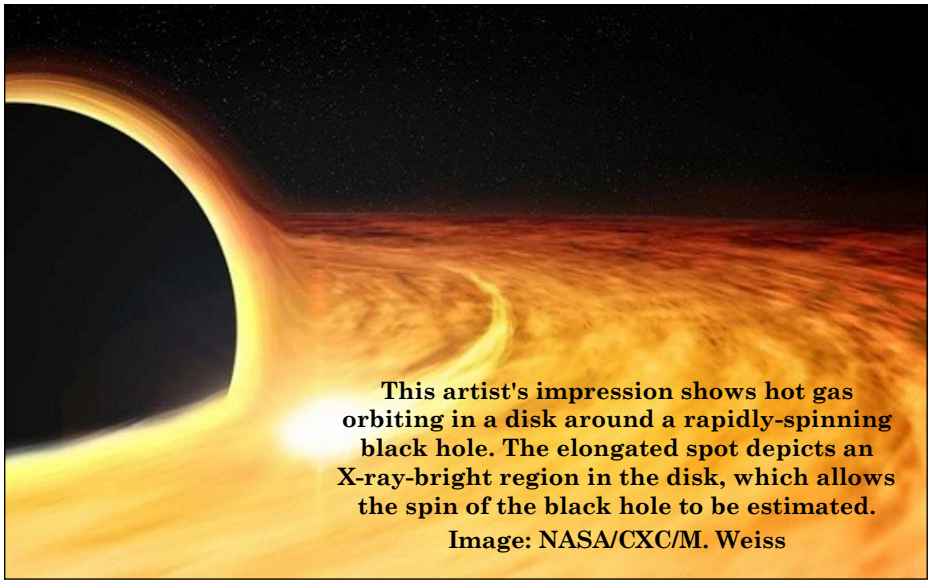
Theoretical models of tidal disruption flares show that when a black hole shreds a star apart, some of that star's material may stay outside the event horizon, circling, at least temporarily, in a stable orbit such as the ISCO, and giving off periodic flashes of X-rays before ultimately being fed by the black hole. The periodicity of the X-ray flashes thus encodes key information about the size of the ISCO, which itself is dictated by how fast the black hole is spinning.

Pasham and his colleagues thought that if they could see such regular flashes very close to a black hole that had undergone a recent tidal disruption event, these signals could give them ›››

an idea of how fast the black hole was spinning. They focused their search on ASASSN-14li, the tidal disruption event that astronomers identified in November 2014, using the ground-based All-Sky Automated Survey for SuperNovae (ASASSN).

"This system is exciting because we think it's a poster child for tidal disruption flares," Pasham says. "This particular event seems to match many of the theoretical predictions."

The team looked through archived datasets from three observatories that collected X-ray measurements of the event since its discovery: the European Space Agency's XMM-Newton space observatory, and NASA's space-based Chandra and Swift observatories. Pasham previously developed a computer code to detect periodic patterns in astrophysical data, though not for tidal disruption events specifically. He decided to apply his code to the three datasets for ASASSN-14li, to see if any common periodic patterns would rise to the surface.



This artist's impression shows hot gas orbiting in a disk around a rapidly-spinning black hole. The elongated spot depicts an X-ray-bright region in the disk, which allows the spin of the black hole to be estimated.
Image: NASA/CXC/M. Weiss

What he observed was a surprisingly strong, stable, and periodic burst of X-ray radiation that appeared to come from very close to the edge of the black hole. The signal pulsed every 131 seconds, over 450 days, and was extremely intense — about 40 percent above the black hole's average X-ray brightness.

"At first I didn't believe it because the signal was so strong," Pasham says. "But we saw it in all three telescopes. So in the end, the signal was real." Based on the properties of the signal, and the mass and size of the black hole, the team estimated that the black hole is spinning at least at 50 percent the speed of light.

"That's not super fast — there are other black holes with spins estimated to be near 99 percent the speed of light," Pasham says. "But this is the first time we're able to use tidal disruption flares to constrain the spins of supermassive black holes."

Illuminating the invisible

Once Pasham discovered the periodic signal, it was up to the theorists on the team to find an explanation for what may have generated it. The team came up with various scenarios, but the one that seems the most likely to generate such a strong, regular X-ray flare involves not just a black hole shredding a passing star, but also a smaller type of star, known as a white dwarf, orbiting close to the black hole. Such a white dwarf may have been circling the supermassive black hole, at ISCO — the innermost stable circular orbit — for some time. Alone, it would not have been enough to emit any sort of detectable radiation. For all intents and purposes, the white dwarf would have been invisible to telescopes as it circled the relatively inactive, spinning black hole.

Sometime around Nov. 22, 2014, a second star passed close enough to the system that the black hole tore it apart in a tidal disruption flare that emitted an enormous amount of X-ray radiation, in the form of hot, shredded stellar material. As the black hole pulled this material inward, some of the stellar debris fell into the black hole, while some remained just outside, in the innermost stable orbit — the very same orbit in which the white dwarf circled. As the white dwarf came in contact with this hot stellar material, it likely dragged it along as a luminous overcoat of sorts, illuminating the white dwarf in an intense amount of X-rays each time it circled the black hole, every 131 seconds.

The scientists admit that such a scenario would be incredibly rare and would only last for several hundred years at most — a blink of an eye in ›››

cosmic scales. The chances of detecting such a scenario would be exceedingly slim.

"The problem with this scenario is that, if you have a black hole with a mass that's 1 million times that of the sun, and a white dwarf is circling it, then at some point over just a few hundred years, the white dwarf will plunge into the black hole," Pasham says. "We would've been extremely lucky to find such a system. But at least in terms of the properties of the system, this scenario seems to work."

The results' overarching significance is that they show it is possible to constrain the spin of a black hole, from tidal disruption events, according to Pasham.

Going forward, he hopes to identify similar stable patterns in other star-shredding events, from black holes that reside further back in space and time.

"In the next decade, we hope to detect more of these events," Pasham says. "Estimating spins of several black holes from the beginning of time to now would be valuable in terms of estimating whether there is a relationship between the spin and the age of black holes."

This research was supported, in part, by NASA.

Read Orignial Article; **http://news.mit.edu/2019/tidal-disruption-flare-black-hole-spin-0109**

■ ■ ■

Scientists Conducting Fundamental Research With 'Speed Machines'

DESY's Press Officer Dr. Thomas Zoufal Weighs In

By Maria Anna van Driel, www.nexttruth.com

Particle physicists claim they understand the universe, but the complexity of this surprising paradox behind our universe reveals to us that still 95 percent of the universe is yet not understood nor has it been seen directly. Mind dazzling indeed but if our universe would not contain e.g. entropy, wiggling particles possessing their own "wiggle-room" so to speak and slow, non-excited, as they seem to be, "hippy particles" as some of its fundamental components, we would not have the complex world we see today, including you and me.

Particles at atomic and subatomic levels posses a certain complexity whereby they can show a beautiful phenomena known as 'murmuration' which is the behavior exhibited when huge flocks of birds (starlings to be exact) in migration form shape-shifting flight patterns whereby it appears the involving of some kind of shared consciousness or central intelligence. Like these birds, subatomic particles can behave in a similar manner whereby it seems that they are orchestrated by some higher power. This can drive them into a dark structure that winds up being complex, when seen as a whole. But in reality, what we witness is the emergent patterns from each individual particle simply doing it darndest not to collide with the particles nearby.

However, finding plausible answers these days with the avalanche of information produced by many of today's scientists due the experiments they are conducting, is not an easy task and thus I made an appointment with the Deutsches Elektronen-Synchrotron in Hamburg, Germany in order to satisfy some of my childhood euphoria and curiosity concerning the new knowledge in advanced technologies even more. Arriving at the enormous campus of DESY, two sympathetic portiers directed me to building 1 where I met Dr. Thomas Zoufal, PhD.

After completing his PhD in physics at the University of Hamburg, Dr. Zoufal has committed himself to DESY's PR-department in 2002 and has been tasked with since.

Dr. Zoufal, PhD, is DESY's press officer since 2002 (Hamburg, Germany)

Even the complexity of research projects like Alps II (Any Light Particle Search) for instance, looks a little bit blurry in the beginning, Dr. Zoufal explains in understandable language and great detail the experiment with which particle physicists want to prove the existence of the hypothetical Axion-like particles that might be constituents of the mysterious dark matter but haven´t been seen so far. "There are very serious theories saying that they have to be there!" Dr. Zoufal says.

But the 'Light-Through-The-Wall' experiment, which hopefully will provide more answers to what dark matter could be, is only one of many projects of DESY. Accelerator technology, photon science, particle physics and astro-particle physics are DESY's research interest. According to the website; "These four areas are the basis for mastering some complex challenges of the future."

And with a variety in research options and with its huge research infrastructures like the synchrotron radiation source PETRA III, DESY attracts more than 3000 guest researchers ›››

over 40 countries every year who join DESY´s scientists in turning the research center into a big think tank while plowing through mountains of data, looking for the tiniest building blocks of matter that make up our world, developing innovative high-tech materials and searching for sustainable solutions and new technologies with new conceptual approaches for future energy supply, climate protection and healthcare.

Indeed, your insight and curiosity with the latest innovative technologies science has to offer these days in accelerator technology starts with one of the world's leading accelerator centres: DESY.

For more information about DESY:
www.desy.de

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Dr. Zoufal: Welcome to DESY Maria. I am happy to take you on a small tour through our research center and to give you an impression of the research we are conducting here at DESY in Hamburg.

Q: Thank you Dr. Zoufal for letting us peer behind the screens of the Deutsches Elektronen-Synchrotron. Can you tell us a little bit about the history of DESY?

Dr. Zoufal: Yes, of course. DESY is an almost 60 year old laboratory and it all started with the small accelerator located in the middle. This accelerator was founded in 1959 and started operation in 1964. It was able to accelerate electrons up to 7.4 GeV.

In the end of the 1970ths the PETRA collider was build for experiments in particle physics and was also the place where the gluon was discovered in 1979, the force carrier of the so called strong force which sticks the quarks together. Then, in the 1980ths and 90ths, we started to build HERA where we collided electrons and protons. HERA is a unique collider so far, no one has done it before and afterwards. PETRA was used as pre-accelerator for the bigger HERA ring at that time.

After we switched the HERA collider off, in 2007, we gained the opportunity to change the former pre-accelerator PETRA into a very intense synchrotron light source. Even HERA is not active anymore it is still an interesting point and an attraction for the some thousand visitors who visit DESY every year.

Q: Are there any plans of re-using these accelerators in the near future?

Dr. Zoufal: Actually yes, we are using a part of the HERA tunnel again. The HERA bending magnets are following the curvature of HERA tunnel as well as the vacuum pipe in the magnets and when you want to sent light through it, any curve is looking ugly. Therefore are we straightening the vacuum pipes of the HERA magnets at the moment in order for the aperture to open up from 3.5 cm' to 5 cm's usable aperture. So far we have straightened 17 of the 20, or maybe 24, magnets which is the preparing for the installation of the magnets in the tunnel. We hope to start with the experiments in 2020.

We have a super-conducting proton accelerator in the tunnel with super-conducting magnets which we are using for the ALPS experiment what is looking for this mysterious dark matter. The magnets of the ALPS experiment will be mounted in straight parts of the HERA tunnel. So yes, we are planning in re-using parts of the HERA machine and parts of the tunnel but we don't actually have recent plans for using the whole HERA tunnel.

Instead we have switched to linear accelerators for electrons because they lose much energy in form of synchrotron radiation in curves. Over the last decades we have invented and enhanced a superconducting accelerator technology which is able to drive a new generation of research instruments called X-ray free-electron lasers. FLASH is the first small one we have here at DESY, and is the first Free Electron Laser (FEL) of this kind producing FEL-light in the soft X-ray regime by accelerated particles passing a long undulator magnet.

Q: DESY Hamburg is covering a huge area, conducting experiments with expensive machines and is home to many scientists, staff and students. Where do the finances come from to maintain this all?

Dr. Zoufal: The Federal Ministry for Education and Research of Germany is financing 90% of it and the city Hamburg and the state of Brandenburg (where we have a second location) are covering the other 10%. ›››

Q: Is DESY at the moment planning to build new accelerators?

Dr. Zoufal: Yes we do! One of our major tasks for the future is the project PETRA IV, a fourth-generation synchrotron light source. Our plan is to have the ultimate light source, a so called 'Diffraction Limited Storage Ring', a storage-ring based light source which physically cannot be built better. This project requires the rebuilding of the whole accelerator in the PETRA tunnel. Tiny magnets have to be build which are not only standing, as a sequence, behind each other but have to fit into each other in a complex scheme.

This will result in one-hundred times higher intensity of coherent light what can be bundled and focused onto a sample, making it the ideal light source for inhomogenuous, complex matter or even tiny samples. But there are also many other but smaller projects in DESY's agenda like ALPS and facilities for exploring the very efficient plasma acceleration.

Q: Is DESY looking for any new particles/ dark matter?

Dr. Zoufal: In terms of dark matter research we want to conduct experiments called IAXO (International Axion Observatory) and MAD MAX (MAgnetized Disc and Mirror Axion eXperiment) whereby huge magnets and optics will be used. IAXO for example will be following the sun in order to search for and measuring off the existence of the Axion-like particles which could be spread by the sun.

Q: What are Axions and how is science looking for them?

Dr. Zoufal: Axions are hypothetical particles which are predicted in extensions of the standard model. In experiments like ALPS we want to convert photons into an Axion-like particle in a strong magnetic field. The idea is that you have a set-up with an intense laserbeam that is kept in 10 superconducting HERA magnets which provide a magnetic field of more than 5 Tesla over a length of 100 metres. Behind a wall at the end, we have the same set-up of 10 magnets which also contains a strong magnetic field but with a very sensitive light detector at the end. In the first part, we increase the intensity of the laser in a so called optical cavity where the light, so to speak, is being trapped between mirrors. The idea is that in the strong magnetic field a photon can convert into an Axion-like particle which can pass the mirror and the wall in the middle. Behind the wall – which is tight for the light – the axion finds the same setup as before and can transform back into a photon. But the transforming ration of a photon into an Axion-like particle and back is that incredibly small that you need this very very intense laser, the very strong magnetic field and the very sensitive detector in order to have, maybe, one Axion spawning from a tremendous number of photons. ›››

Q: What is it that particle physicists at DESY want to proof with the Axion-like particle?

Dr. Zoufal: Straightforward? Dark matter! Think of it, the Universe is made up from matter, we see stars and planets but there are some 'special' things in the Universe which we don't understand if there is only matter. If you take a glance at galaxies which are rotating around a black hole, and you look at the speed of a rotation whereby the most outer stars should rotate very slowly around the black hole in order to have a stable system. But observing the behavior of the outer stars we see that they are rotating close to the same speed of those which are closer to the black hole. And this is what cannot be understood if there is only visible matter present in the universe. To solve this problem the so-called dark matter was being invented which is arranged as kind of clouds around galaxies but what hasn´t been seen or measured so far.

Q: Well, according to the article "Fresh data deepen mystery of dark-matter signal" which can be read on the website of "Nature, *International nature of Science*", science says that 20 years ago dark matter was measured but is never duplicated since.

Dr. Zoufal: I have not heard of that. Actually I haven't heard of anyone measuring dark matter so far. But there are different ideas and approaches of trying to find dark matter and one is currently in store here at DESY which is called the ALPS experiment. This is an experiment of which I explained to you earlier with the transformation of the photon to the Axion. We call it "Light-through-the-wall".

The idea is that dark matter particles might be very, very light. There are some theoretically extensions of the standard model (SM) that predict somehow that there might be a whole range of particles which could make up dark matter. No one knows for sure, but if they exist they might be created out of light – out of photons – in a strong magnetic field.

And things are getting even more complicated: the Universe is expanding quicker and quicker instead of slowing down. So we think that there has to be a 'special' kind of energy which is responsible for this acceleration in expansion. We call it "Dark Energy". If you calculate all this you have a pretty good idea of what the universe is made of. We assume that only 5% of the universe is made up of normal matter, 25% should be dark matter, and 70% is made of dark energy and we don't have a clue of what the latter might be.

Q: How will the 'Light-through-the-wall' experiment "see" the Axion?

Dr. Zoufal: The idea behind the "Light-through-the-wall" experiment is that there is an Axion-like particle that can travel through the wall and transform back to a photon so you measure a photon but you know that it had to be something different to a photon in-between. It is like with the well-known Higgs particle, you don't see the Higgs particle itself but you see the particles which are coming out of the decay of the Higgs particle and, after measuring these particles, you know that it is there without seeing it directly.

Q: That is really a 'spooky' behavior.

Dr. Zoufal: Yes it is but that is how particle physics works.

Q: How realistic is it for scientists finding the Axion with ALPS experiment?

Dr. Zoufal: Well, as I said: there are convincing theories that some Axion-like particles might be out there, and those particles would solve a bunch of questions in particle and astrophysics. But at the moment it is still only a model. But with ALPS we will build the most sensitive experiment for those elusive particles. And if you see the universe of only 5% matter and 70% of dark energy then what the h*ll is this 25% of the universe we call dark matter?!

This is why we want to enhance the first version of ALPS which has already conducted some experiments here at DESY in a smaller version with one magnet to 20 or 24 of these magnets in a row in the HERA tunnel.

Q: What where the results of this experiment with the first version of ALPS?

Dr. Zoufal: Well, we didn´t find axion-like particles but ALPS was the most sensitive experiment to those particles and has set the world-wide best limits for the existence of these particles, improving previous results by a factor of 10. And we gained experience in that type of experiment, ›››

so it paved the way to the bigger version ALPS II.

Q: How do people, who are living near DESY, react to the experiments being conducting this close to their homes?

Dr. Zoufal: Well, most of them are very proud of the research center actually. We have very close connections to our neighbors. We give tours of the research centre to some 10000 visitors over the year, and every two years we have open days so anyone who is interested can listen not only to what our scientist have to explain but also our engineers and our lab-technicians. Most of the people living around DESY know what´s happening beneath their feet.

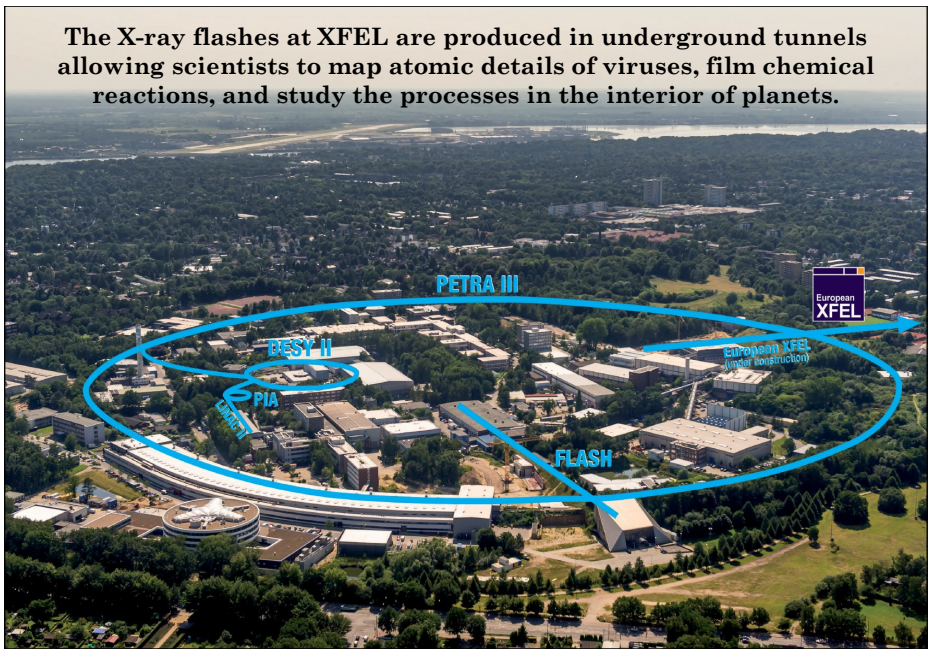
So, as soon as we start building a new machine like the European XFEL for instance, we reach out to the public and explain what we are doing and which experiments are being conducted. The whole campus is open to everyone who is interested and we try to open even the accelerator tunnels on Open Days to the general public if possible.

Q: I can imagine that excitement must be felt by many scientists here at DESY because 2020 is just around the corner.

Dr. Zoufal: Yes, this is all very exciting because the first version of the ALPS experiment already shifted the borders of knowledge with only a 9 meter long magnet. The new version of ALPS "light through the wall" experiment will contain a 200 meter long magnet with a much more powerful laser and a more sensitive and less noisy detector than the ones used in the previous experiment. Everything is being tested at the moment and so far no problems have been found.

Q: Can you explain us the FLASH experiment?

Dr. Zoufal: FLASH is the first single-pass Free-Electron Laser (FEL) for soft x-rays in the world and was constructed in the first place as a test bench for the accelerator techniques and for the proof of principle that these so-called XFELs can be built. The principle of X-ray FELs is that you accelerate tiny electron bunches in a linear accelerator and send them through a long series of magnets with alternating polarity. In these magnets the electrons send out synchrotron light which can amplify itself to X-ray laser light if everything is aligned very precisely.



The X-ray flashes at XFEL are produced in underground tunnels allowing scientists to map atomic details of viruses, film chemical reactions, and study the processes in the interior of planets.

The very start of FLASH´s first version was 1997 as a 100-metres-long test facility, than it was extended to 300 metres in 2002 and became a user facility in 2005. And in another extension it got a second undulator line for x-ray generation and a second experimental hall to serve more users. Yes, true, it is a quite old machine but many adjustments have been made since. One of the adjustments is for instance the extension of the terahertz beam-line whereby micro-wave radiation can be added to the experiment. When you stand in the hall of FLASH you will only see a lot of pipes coming out of the wall but if you really look closer the equipment of FLASH literally changes every single week, ever being the pilot facility for FEL experimental techniques and developments.

But the goal has always been to build the 3.4 km European X-ray laser project XFEL what reaches over 3.5 km here from the DESY campus to the city of Schenefeld and is in operation now since 2017. The European XFEL produces laserlight with a wavelength down to the 10th of a ›››

nanometer and with that wave-length you can make atoms visible.

Q: What is the one thing DESY want to find, or proof, with X-ray lasers?

Dr. Zoufal: Filming chemical reactions! The flashes of X-ray lasers are so short and intense that scientists can observe and film the chemical reactions in the nano-world of molecules – with laser light flashes which are only a few femto-seconds long. We are only at the beginning, but the idea is that you can make a movie of chemical reactions of catalysts what makes it easier to understand and influence the processes. Together with the conventional synchrotron radiation sources, we are able to take photos of the structure of molecules and do movies of their behavior during physical and chemical processes. That is why these synchrotron radiations are this valuable for the research in materials research as well as for medical uses and drug design.

Q: Just out of personal curiosity, what do you need to run an accelerator?

Dr. Zoufal: Well, first of all, you need a vacuum pipe which has to be (water) cooled because of the electrons which are running through it with an enormous speed, producing a lot of synchrotron light what in turn is producing heat. And because it is a long and small pipe you need a vacuum-pump at literally every single meter. Electrons are negatively charged and want to spread into a cloud so you always need to 'fold' them – and you want to steer the particles; so for bending and steering the electrons you need two-pole magnets and four-pole magnets for focusing the beam. The acceleration is done in so-called RF cavities where you feed-in electromagnetic waves. And to know where the particles exactly are in your vacuum pipe you can use some antennas in the vacuum pipe. Today we are using computers to steer the electron beam is but back in the old days scientists where literally turning knobs to fine-tune the magnets. But basically that is all you need to have an accelerator. (The proton bending magnets we cool with liquid Helium.)

Q: How do you switch off an accelerator?

Dr. Zoufal: The particles are accelerated to a very high speed of course carrying high energy but the amount of particles in the accelerator is quite low compared to normal matter. So, you can dump them in a so-called "beam-dump". Particles are being sent at top speed to this block which can be made of graphite and water cooled copper what gives an effect in thermal conduction. You don't slow down the particles; you just dump them in the block. But you have to be careful not to lose any particles on their way through the accelerator because when the whole particle-beam would hit a metal part of the accelerator at high energy, for example in the European XFEL, it might burn a hole into it. The vacuum would be lost and the accelerator would be damaged so. This is why we start very gentle and careful when we commission our accelerators.

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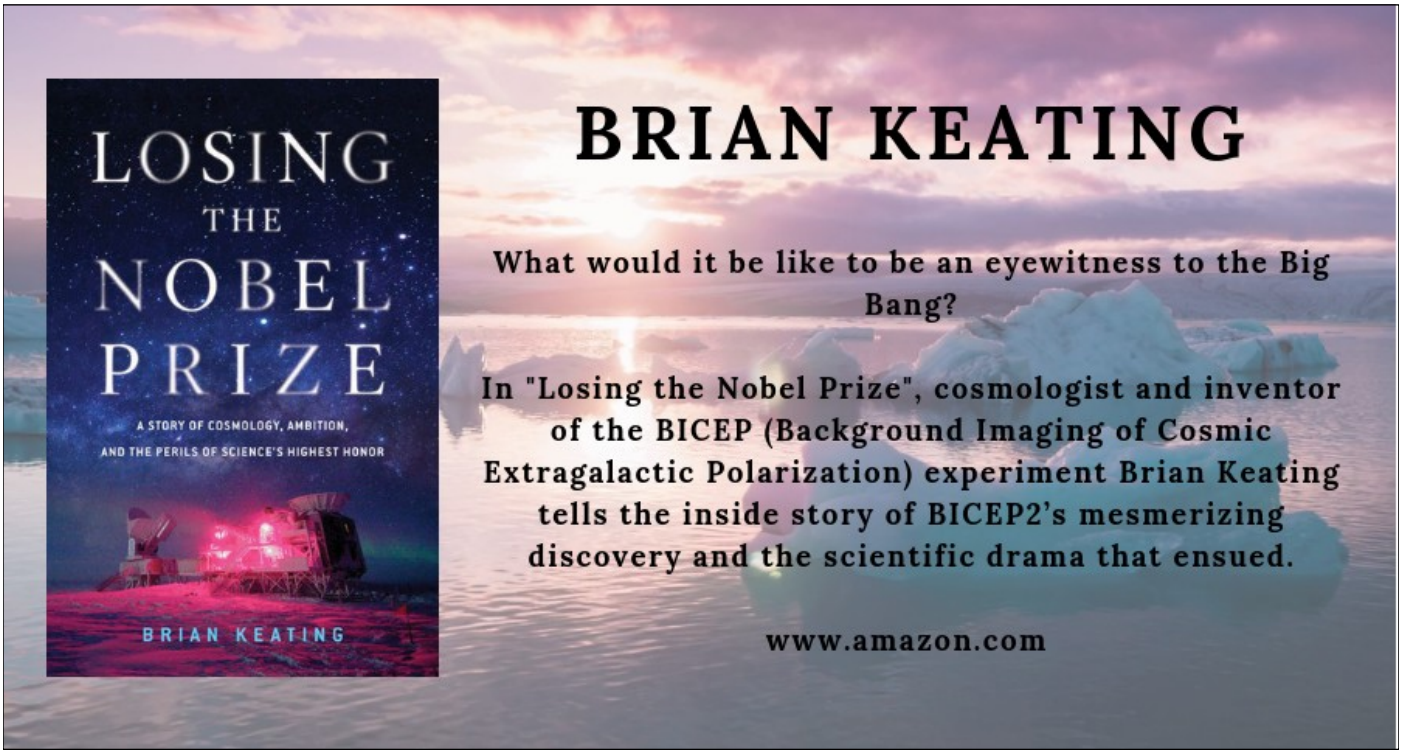
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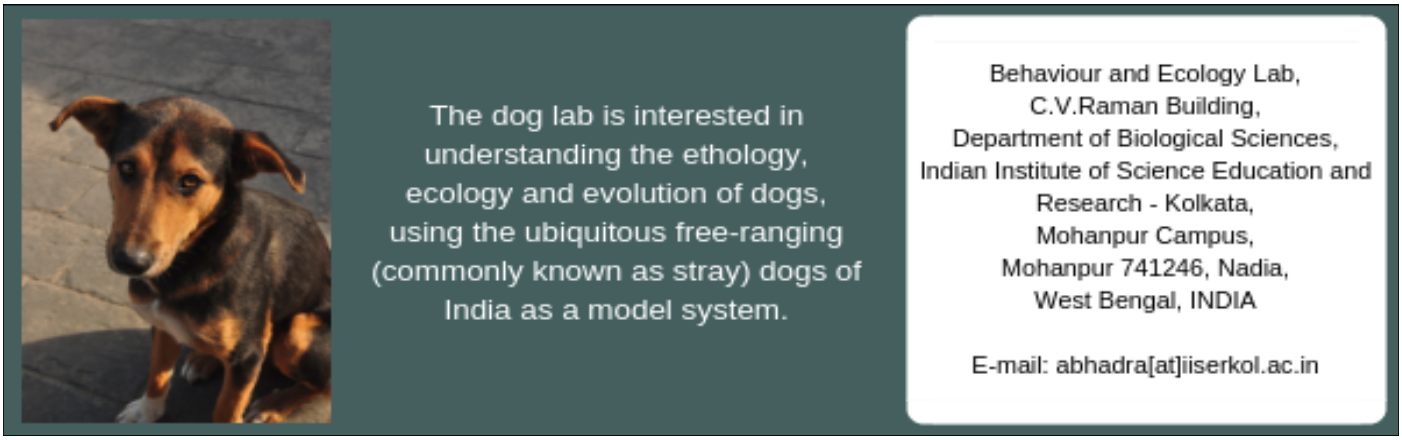
The dog lab is interested in understanding the ethology, ecology and evolution of dogs, using the ubiquitous free-ranging (commonly known as stray) dogs of India as a model system.
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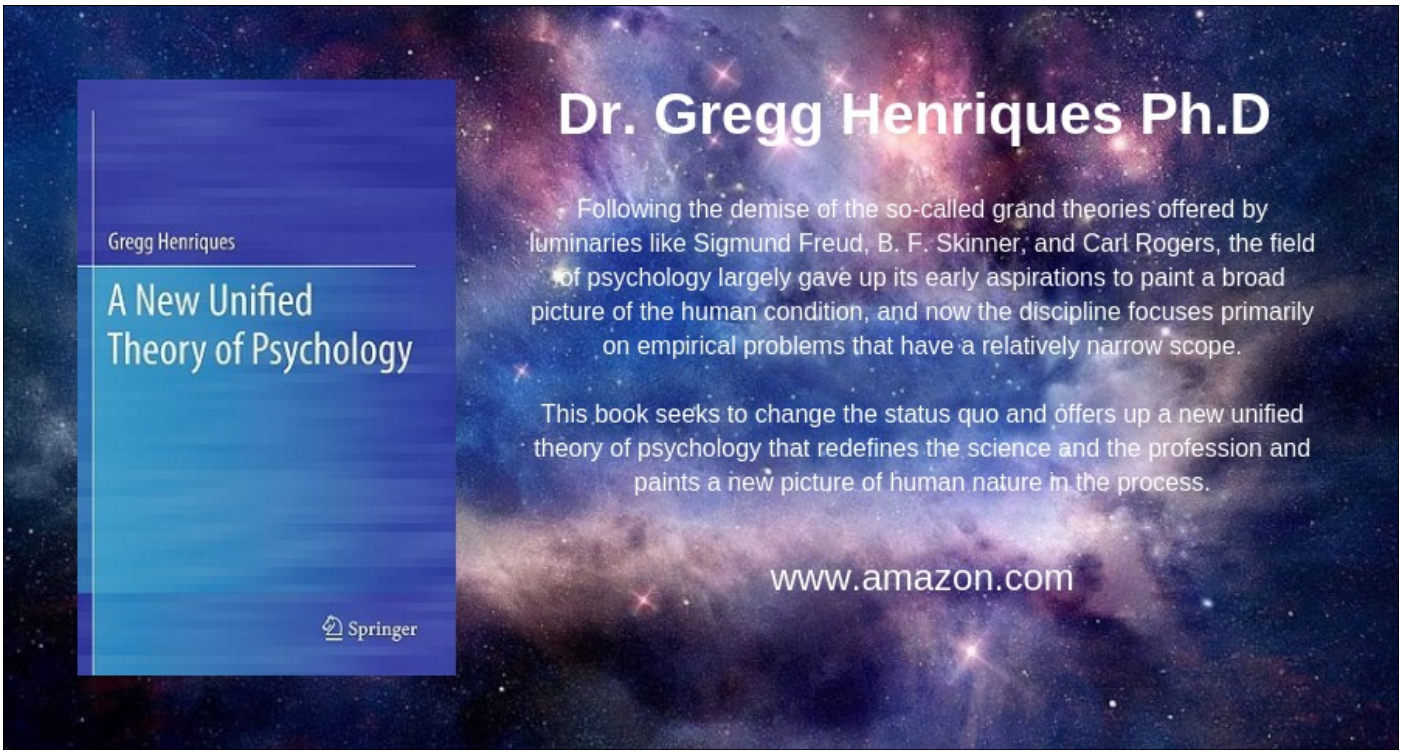
C.V.Raman Building,
Department of Biological Sciences,
Indian Institute of Science Education and Research - Kolkata,
Mohanpur Campus,
Mohanpur 741246, Nadia,
West Bengal, INDIA
E-mail: abhadra[at]iiserkol.ac.in


Gregg Henriques
A New Unified Theory of Psychology
Springer
Dr. Gregg Henriques Ph.D
Following the demise of the so-called grand theories offered by luminaries like Sigmund Freud, B. F. Skinner, and Carl Rogers, the field of psychology largely gave up its early aspirations to paint a broad picture of the human condition, and now the discipline focuses primarily on empirical problems that have a relatively narrow scope.
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On the Way Towards Self-Aware AI?

Press Release 2019, Karlsruher Institute of Technology, www.kit.edu

Alexa, Sophia, Watson: the ancient idea of a humanoid machine with superhuman powers has received fresh impetus by the progress achieved in AI research. Some actors offer the prospect of a "super intelligence" with self-awareness. But how realistic is this? Within the project "Clarification of Suspicion of Consciousness in Artificial Intelligence" funded by the Federal Ministry of Education and Research, technology assessment experts of Karlsruhe Institute of Technology (KIT) analyze this issue that has hardly been studied before.

High need for clarification: it is unclear and disputed whether machines may turn into conscious creatures thanks to artificial intelligence. (Image: Pixabay)

When the robot "Sophia" stepped up to the speaker's desk at a conference in Riyadh, Saudi Arabia, and explained to the half amused, half astonished audience its self-image of a learning and communicating machine in human form, public perception considered this a milestone on the apparently ever shorter way to an "awakening" artificial intelligence reflecting its individuality and its inner states. Also AI-based systems, such as the smart speaker "Alexa," IBM's interoperable super brain "Watson" or Google's self-learning chess giant "AlphaZero," boost the vision of a "super intelligence" which will be feasible within a foreseeable time and overshadow anything ever in the world. Renowned actors in science and the arts warn of the impacts of such a change of eochs, others speak of sheer utopic opportunities. Surprisingly, it is hardly ever asked what "conscious AI" is is and whether the scenarios of machines with an own existence may become reality.

This is the point of departure of the two-year research project "Clarification of Suspicion of Consciousness in Artificial Intelligence (AI Consciousness)." "We want to demystify the topic of AI consciousness," says project leader Professor Karsten Wendland of KIT's Institute for Technology Assessment and Systems Analysis (ITAS).

The computer scientist and technology assessment expert continues: "some consider it impossible that machines, in particular AI systems, will ever become 'conscious'. Others say that conscious AI systems already exist and still hide from us. We want to develop a common, transdisciplinary understanding and bring the results into public discourse."

To first analyze the current status of AI consciousness, the project team will use a mixed methods approach, which consists of a systematic acquisition of the debates in the special disciplines and in public discourse, expert interviews, and a bibliometric media analysis. In this way, typical positions, arguments, and narratives will be identified and described for the first time ever. "As analysts," project leader Wendland says, "we adopt a neutral attitude.

At the same time, we will not shrink back from including in our study highly courageous positions on AI consciousness that are rather rare ›››

rare in the European region, for instance, that it is not needed to distinguish between humans and machines, as they both are the results of creation." In a second step, experts, who have not yet been talking to each other, will be brought together to discuss central issues relating to AI consciousness. These transdisciplinary bridges, substantiated in workshops and symposiums, are to result in a transdisciplinary understanding of this both mysterious and delicate topic.

An important part of the project will be the generally understandable presentation of the state of knowledge developed by analysis and discourse and the communication of this knowledge to the interested public as well as to stakeholders and other scientific communities. This will be achieved by citizen dialog formats as well as by podcasts, brochures, and a planned website.

In addition, close exchange with scientific editors is envisaged. In line with its demystifying and clarifying approach, the project team wants to disseminate the results relating to the awakening AI consciousness in a transparent and still substantiated manner. "In this way, we want to extend and maybe even purify common knowledge and take up the suggestions resulting from this dialog process."

The project "Clarification of Suspicion of Consciousness in Artificial Intelligence (AI Consciousness)" is scheduled for a duration of two years until December 2020. Within the funding program "Innovations- und Technikanalyse" (ITA, innovation and technology assessment), it is funded by the Federal Ministry of Education and Research with a total of EUR 335,000.

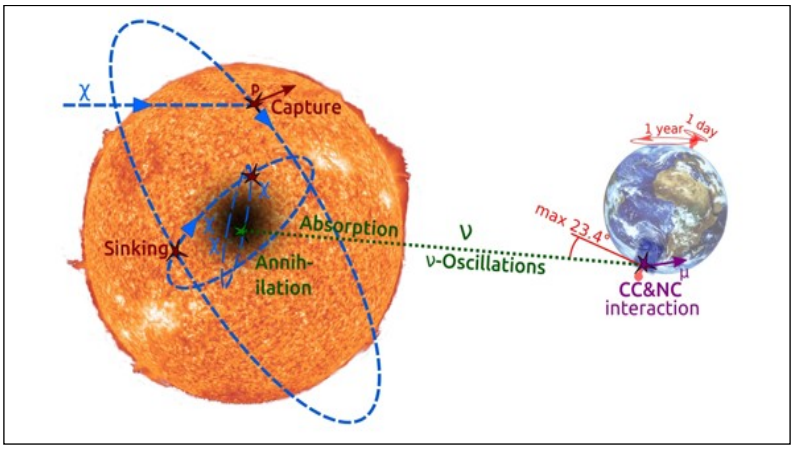
■ ■ ■

A New Experiment to Understand Dark Matter

Do we have to change our view on how Dark Matter interacts with standard matter?

Max-Planck-Institut für Radioastronomie, Bonn, **www.mpifr-bonn.mpg.de**

Is dark matter a source of a yet unknown force in addition to gravity? The mysterious dark matter is little understood and trying to understand its properties is an important challenge in modern physics and astrophysics. Researchers at the Max Planck Institute for Radio Astronomy in Bonn, Germany, have proposed a new experiment that makes use of super-dense stars to learn more about the interaction of dark matter with standard matter. This experiment already provides some improvement in constraining dark matter properties, but even more progress is promised by explorations in the centre of our Milky Way that are underway.



Around 1600, Galileo Galilei's experiments brought him to the conclusion that in the gravitational field of the Earth all bodies, independent of their mass and composition feel the same acceleration. Isaac Newton performed pendulum experiments with different materials in order to verify the so-called *universality of free fall* and reached a precision of 1:1000. More recently, the satellite experiment MICROSCOPE managed to confirm the universality of free fall in the gravitational field of the Earth with a precision of 1:100 trillion.

These kind of experiments, however, could only test the universality of free fall towards ordinary matter, like the Earth itself whose composition is dominated by iron (32%), oxygen (30%), silicon (15%) and magnesium (14%). On large scales, however, ordinary matter seems to be only a small fraction of matter and energy in the universe.

It is believed that the so-called dark matter accounts for about 80% of the matter in our Universe. Until today, dark matter has not been observed directly. Its presence is only indirectly inferred from various astronomical observations like the rotation of galaxies, the motion of galaxy clusters, and gravitational lenses. The actual nature of dark matter is one of the most prominent questions in modern science. Many physicists believe that dark matter consists of so far undiscovered sub-atomic particles.

With the unknown nature of dark matter another important question arises: is gravity the only long-range interaction between normal matter and dark matter? In other words, does matter only feel the space-time curvature caused by dark matter, or is there another force that pulls matter towards dark matter, or maybe even pushes it away and thus reduces the overall attraction between normal matter and dark matter. That would imply a violation of the universality of free fall towards dark matter. This hypothetical force is sometimes labeled as "fifth force", besides the well-known four fundamental interactions in nature (gravitation, electromagnetic & weak interaction, strong interaction).

At present, there are various experiments setting tight limits on such a fifth force originating from dark matter. One of the most stringent experiments uses the Earth-Moon orbit and tests for an anomalous acceleration towards the Galactic center, i.e. the center of the spherical dark matter halo of our Galaxy. The high precision of this experiment comes from Lunar Laser Ranging, where the distance to the Moon is measured with centimeter precision by bouncing laser pulses ›››

of the retro reflectors installed on the Moon. Until today, nobody has conducted such a fifth force test with an exotic object like a neutron star.

"There are two reasons that binary pulsars open up a completely new way of testing for such a fifth force between normal matter and dark matter", says Lijing Shao from the Max Planck Institute for Radio Astronomy (MPIfR) in Bonn, Germany, the first author of the publication in "Physical Review Letters". "First, a neutron star consists of matter which cannot be constructed in a laboratory, many times denser than an atomic nucleus and consisting nearly entirely of neutrons. Moreover, the enormous gravitational fields inside a neutron star, billion times stronger than that of the Sun, could in principle greatly enhance the interaction with dark matter."

The orbit of a binary pulsar can be obtained with high precision by measuring the arrival time of the radio signals of the pulsar with radio telescopes. For some pulsars, a precision of better than 100 nanoseconds can be achieved, corresponding to a determination of the pulsar orbit with a precision better than 30 meters.
To test the universality of free fall towards dark matter, the research team identified a particularly suitable binary pulsar, named PSR J1713+0747, which is at a distance of about 3800 light years from the Earth. This is a millisecond pulsar with a rotational period of just 4.6 milliseconds and is one of the most stable rotators amongst the known pulsar population. Moreover, it is in a nearly circular 68-day orbit with a white dwarf companion.

While pulsar astronomers usually are interested in tight binary pulsars with fast orbital motion when testing general relativity, the researchers were now looking for a slowly moving millisecond pulsar in a wide orbit. The wider the orbit, the more sensitive it reacts to a violation of the universality of free fall. If the pulsar feels a different acceleration towards dark matter than the white dwarf companion, one should see a deformation of the binary orbit over time, i.e. a change in its eccentricity.

"More than 20 years of regular high precision timing with Effelsberg and other radio telescopes of the European Pulsar Timing Array and the North American NANOGrav pulsar timing projects showed with high precision that there is no change in the eccentricity of the orbit", explains Norbert Wex, also from MPIfR. "This means that to a high degree the neutron star feels the same kind of attraction towards dark matter as towards other forms of standard matter."

"To make these tests even better, we are busily searching for suitable pulsars near large amounts of expected dark matter", says Michael Kramer, director at MPIfR and head of its "Fundamental Physics in Radio Astronomy" research group. "The ideal place is the Galactic centre where we use Effelsberg and other telescopes in the world to have a look as part of our Black Hole Cam project. Once we will have the Square Kilometre Array, we can make those tests superprecise", he concludes.

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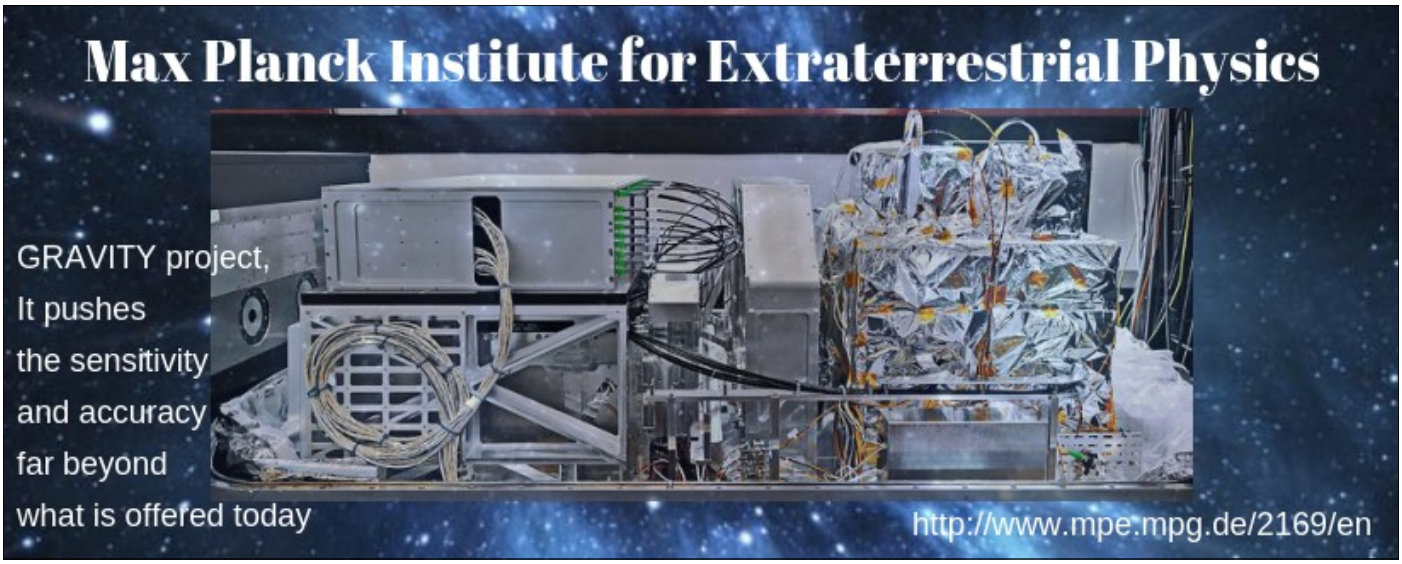

Longing for Ghostly Encounters

By Professor Krystine I. Batcho, www.lemoyne.edu

What do you miss most? Which memories are the most precious? Krystine Batcho, Ph.D., is a professor at Le Moyne College in Syracuse, New York. She is a widely respected expert in nostalgia and has raised each of these questions.

During her studying nostalgia she has found that people who are prone to nostalgia excel at maintaining personal relationships and choose healthy social ways of coping with their troubles. How do you look back at your childhood?

Professor Batcho has developed the Nostalgia Inventory Test, which measures how often and how deeply people feel nostalgic. The Nostalgia Inventory has been translated into multiple languages, including Chinese, Polish and Spanish, has been used in numerous research studies and made available as an app. www.playbuzz.com Professor Batcho's scholarly publications have been widely cited, and she is frequently interviewed by the media on topics of current interest, including the impact of social media. She teaches courses in cognitive psychology, learning, and decision making but nothing gives her greater joy than working with her students at Le Moyne. And they certainly look back on her classes fondly.

For more information about Professor Batcho's research; www.researchgate.net

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"Ghosts and Hauntings Aren't Just for Halloween."

Ghostly matters are no longer topics simply for Halloween. The popular appeal of ghosts and hauntings is evident in the plethora of television programs such as *A Haunting*, *Celebrity Ghost Stories*, *Ghost Adventures*, *Ghost Hunters*, *My Ghost Story*, *Ghostly Encounters*, and many others. Does the increase in paranormal programming reflect a corresponding increase in belief in supernatural phenomena such as ghosts and hauntings?

Prof. Batcho's work has been featured in the New York Times and Washington Post, as well as in Oprah magazine. **vimeo.com**

To the extent that self-report data reveal something of a person's beliefs, tracking polls suggest a trend toward more widespread belief or willingness to report belief in paranormal phenomena.

According to Gallup polls, 11% of Americans surveyed reported believing in ghosts in 1978, and in 2005, nearly three times as many (32%) agreed that ghosts or spirits of dead people can come back in certain places or situations. Similarly, 37% of those surveyed in 2005 believed that houses can be haunted, compared with 29% of those surveyed in 1990. On a more personal level, polls conducted by the Pew Research Center found twice as many Americans reporting that they had seen or been in the presence of a ghost (18%) in 2009 than in 1990 (9%). In 2009, 29% reported that they had felt in touch with someone who had already died, compared with only 17% in 1990.

Even though tracked increases have been small to moderate, any increase should be surprising given the emphasis on science in American culture and sophisticated scientific and technological knowledge. The paradox is highlighted in shows focused on paranormal investigators using equipment presented as "scientific." Perhaps couching the paranormal within a technical context makes supernatural material more acceptable to an audience educated to seek ›››

Validation in scientific evidence. With or without a scientific ambience, stories of ghostly encounters clearly appeal to many viewers. Whether someone believes in ghosts, is open to the possibility they exist, or would like them to be real, the construct of ghostly encounters satisfies a deep need for continuity, especially during times of rapid change and fear of loss. Mobility, separation, and divorce transform families into long distance relationships, upgrades make existing gadgets obsolete with people feeling left behind, and a kaleidoscope of changing celebrities, fashions, and fads has made permanence seem impossible. Feelings of loss contribute to nostalgic yearning for something that can be counted on to endure.

In the afterglow, love goes on and on.

Just as nostalgia keeps alive in memory what has been lost in the past, ghostly encounters reflect the hope that somehow we won't lose forever the ones we love. This desire is captured in the song *Shadows of the Night*: "In this world that we know now, life is here and gone. But somewhere in the afterglow, love lives on and on." In a time of communicating in 140 character posts, e-cards, and abbreviated messages punctuated with emoticons, pictograms and ideograms, relationships have faced challenges that threaten longevity and pose the likelihood of unresolved issues that outlast our hurried lives.

The thought that we will have all the time we need to solve our problems in the leisure of the afterlife is comforting as we struggle to deal with financial, work, health, and interpersonal stress. Such thinking can interfere with efforts to keep relationships healthy if it leads to procrastination. On the other hand, by reminding us of the transience, fragility and unpredictability of life, ghostly notions of an afterlife can deepen our present appreciation of those we love and who make our lives worth living.

Technology has transformed concrete connections to our past and to those we love and have loved. We recognize that photos, voice and text messages, contact information, videos, and celebratory, anniversary and sympathy cards that exist as digital files can disappear in an instant as a computer crashes, a mobile phone is lost or stolen, or a gadget becomes obsolete. The vulnerability of records that keep emotional bonds strong contribute to a yearning for permanence and make it tempting to imagine life continuing on in an unknown format that can be perceived only once a means of decoding the files is discovered. Just as nostalgic memories are ghosts of our past, ghosts can be considered the future memories of our lives.

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This article original appeared in Psychology Today, www.psychologytoday.com

"Nostalgia helps keep you connected in terms of your self-identity," Dr. Batcho said. "It connects you to your own past through the continuity of self."

Quoted from an article published in The New York Times on Sept. 8, 2017

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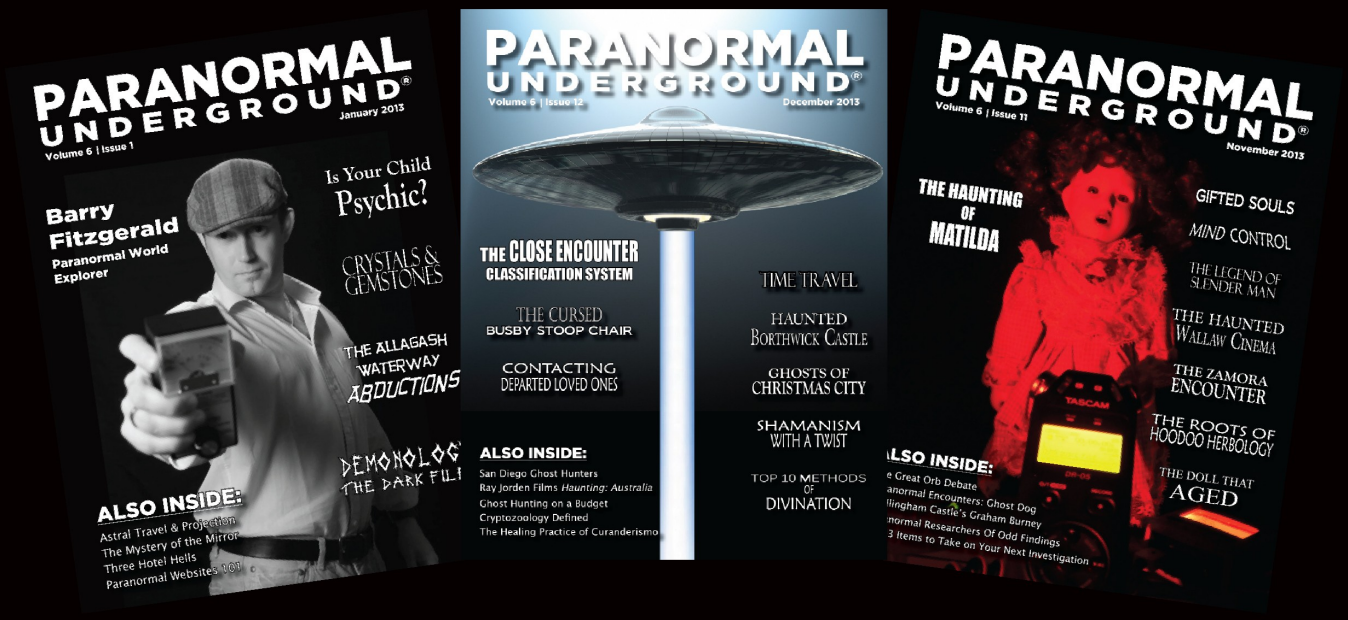

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