Announcement & Call for Abstracts

Dear Friends,

We are pleased to announce the 30th annual conference ‘The Science of Consciousness’ (‘TSC’), April 22-26, 2024 at the beautiful Loews Ventana Canyon Resort in the hills above Tucson, Arizona. The conference is hosted and sponsored by the University of Arizona, Center for Consciousness Studies and co-sponsored by the University of Michigan, Center for Consciousness Science.

We invite and welcome abstract submissions and workshop proposals. Please see information further below.

2024 TSC Conference Themes
Cortical Oscillations and Traveling Waves
Pschedelics and Psychoplastogens
Astrobiology and Astroconsciousness
Dual Aspect Monism
Megahertz EEG and DoDecoGraphy (DDG)
Theories of Consciousness
Consciousness and Reality
Artificial Intelligence (AI) and Consciousness
Monitoring Consciousness in Altered States
Searching for Consciousness in Cerebral Organoids
Brain Symmetry
Microtubule Time Crystals – Virtual Reality Experience
Keynote Speakers
Earl K Miller
Susan Schneider
Dante Lauretta
Anirban Bandyopadhyay

Plenary Speakers
Tanya Luhrmann       Pieter-Jan Maes       Paavo Pylkkanen
Donald Hoffman       Deepak Chopra       Santosh A. Helekar
Steven Laureys       Sawsan Wehbi        Bill Seager
Brian Muraresku      Stuart Hameroff      Zirui Huang
George Mashour       Harald Atmanspacher  Aaron Schurger
Sir Roger Penrose    Dinesh Pal           Dimitris Pinotsis
Caleb Scharf         Alysson Muotri       Andre Bastos
Hartmut Neven        Dean Rickles         Pulin Gong

History and Overview
The 1994 TSC conference was the world’s first interdisciplinary gathering devoted to the study of consciousness. Prominent speakers addressed a packed auditorium at the University of Arizona hospital in Tucson, but it was then-unknown philosopher David Chalmers who captured the moment, describing the now-famous ‘hard problem’ of phenomenal conscious experience, distinguishing it from relatively easy problems like attention, memory and behavior. Bernard Baars presented his Global Workspace theory, Ben Libet described the timing of conscious experience, and Christof Koch argued that consciousness emerged from complex computation among simple brain neurons, signaling only via membrane surfaces and synapses. Stuart Hameroff discussed how microtubules inside neurons could help account for consciousness, and Roger Penrose spoke about consciousness as something other than computation, requiring a quantum connection to the most basic level of the universe.

These views have echoed for 30 years. Most continue to see consciousness as described by Baars, Koch and many others, an emergent property of complex computation among simple brain neurons, promoting the notion that AI will be conscious. But some consider consciousness a fundamental feature of the universe, e.g. subtly connected to the brain through quantum vibrations in microtubules inside neurons, as suggested by Penrose and Hameroff. Some consider consciousness to be an illusion, others believe reality to be the illusion.

Despite disparate views, we’ve learned a lot in 30 years, and have a lot more ahead.
Themes, speakers and sessions at the upcoming conference will include:

**Cortical Oscillations and Traveling Waves**

Professor Earl K Miller’s lab at MIT has shown cortical feedback to be oscillatory traveling waves which inhibit feed-forward sensory inputs which are predicted and recognized (Predictive Coding). But cortical feedback does not inhibit novel, or ‘oddball’ feed-forward inputs which can then become conscious. Earl Miller will give a Keynote talk, and with other plenary speakers delve deeply into the role of cortical oscillatory traveling waves in consciousness.

**Psychedelics and Psychoplastogens**
The topic of psychedelics has grown significantly in society, medicine and academic discourse. Psychedelics are also ‘psychoplastogens,’ causing neurite sprouting, neuronal growth and synaptic formation through cytoskeletal activities, and they bind and may act on 5HT2A receptors inside neurons as well as on surface membranes. Clinical trials of psychedelics in medicine and psychiatry, and their use in personal and spiritual development, have been favorable, and we now know psychedelics have been used in nearly all cultures for millennia. Author Brian Muraresku (‘The Immortality Key’) will speak on the role of psychedelics in the origins and development of ancient and contemporary religions and rituals, e.g. the ‘Last Supper’. Stanford Anthropology professor Tanya Luhrmann (‘When God Talks Back’) will discuss the history of psychedelics and other states of consciousness including ‘hearing voices’, and cultural aspects of psychosis and dissociation.

**Astrobiology and Astroconsciousness**
Thus far consciousness is recognized only in living systems, but life’s nature and origin remain unknown. We do know that organic, aromatic hydrocarbon ring molecules are essential as core components in biological lipid membranes, nucleic acids and proteins, and also comprise psychedelics and most psychoactive neurotransmitter molecules. Organic rings may be essential to life and consciousness because their delocalized electron ‘pi resonance’ clouds support quantum coherence, and form quantum-friendly ‘decoherence-free’ subspaces, protected within ‘warm, wet and noisy’ biology. Organic rings are also implicated in ‘origin of life’ scenarios both in ‘Primordial soup’ hypotheses on earth, and/or from extraterrestrial sources. Polyaromatic hydrocarbons (PAHs) pervade interstellar dust, are formed by stars, float in space and atmospheres, and are found in meteorites which crash on earth. NASA’s OSIRIS REx probe, led by University of Arizona Planetary scientist and conference Keynote speaker Dante Lauretta, recently returned from the asteroid Bennu with carbonaceous material whose PAHs will be analyzed using quantum optical and pharmacological tests, and results compared with those of biomolecules.
Dual-Aspect Monism is a philosophical position framing consciousness and its relation to the physical by considering the mental and the physical as two aspects of one underlying reality which is neither mental nor physical. In Western history, dual aspect monism goes back to Spinoza, but has links to Platonic thinking and even to Eastern spirituality (such as nonduality). In the 20th century it was revitalized by foundational work in quantum physics and depth psychology, as outlined Wolfgang Pauli, Carl Gustav Jung, Arthur Eddington, John Wheeler, David Bohm, and Basil Hiley. Harald Atmanspacher will speak and lead discussion.

Megahertz EEG (‘Dodecography’)  
Electroencephalography (EEG) celebrates its 100-year anniversary in 2024. Recording brain electrical signals from the scalp in frequency bands up to 100 hertz (‘Hz’), EEG is very useful, but the origin and overall relation of EEG to consciousness and brain function remain mysterious, there being no ‘unified theory’ of EEG. However, over the past 15 years Anirban Bandyopadhyay has used nanotechnology to study cytoskeletal microtubules inside neurons and has found oscillations and conductances in self-similar resonance patterns (‘triplets-of-triplets’) which repeat in hertz, kilohertz, megahertz, gigahertz and terahertz, every 3 orders of magnitude over 12 orders. At a larger scale of neuronal networks, Anirban’s team has used dielectric resonance probe arrays to map spontaneous megahertz and gigahertz excitations inside neurons. Recently megahertz and gigahertz oscillations with triplet patterns (DDG) have been detected from the scalp in humans. Conventional EEG may actually be interference ‘beats’ of faster DDG oscillations in microtubules. At the conference, Anirban Bandyopadhyay will discuss and demonstrate DDG, a new unified model of EEG.

Theories of Consciousness  
Theories of consciousness have persisted and consolidated since 1994. Baars’ ‘Global Workspace’ became Dehaene and Changeux’s more anatomical ‘Global Neuronal Workspace’ (‘GNW’), and Rosenthal and Lau popularized ‘Higher Order Theory’ (‘HOT’), frontal ‘top-down’ cortical projections. Integrated Information Theory (‘IIT’) by Tononi and Koch emphasized optimal information integration, characterized by the term ‘Phi’. Championed by prominent authorities, IIT became ‘the leading theory’, but was critically characterized as ‘pseudoscience’. Another theory, Predictive Coding/Recurrent Processing (PC/RP) by Lamme, Friston and others suggest the brain continually compares its models of the world to sensory inputs, inhibiting those which match prediction, and enabling consciousness of novel or ‘oddball’ inputs which don’t. Operating at multiple smaller, faster, quantum scales inside neurons, the Orch OR theory (orchestrated objective reduction) by Penrose and Hameroff suggests microtubules inside neurons ‘orchestrate’ quantum vibrations which enable sequences of Penrose objective reduction (OR), and moments of conscious experience. How to decide? Cognitive neuroscientist Aaron Schurger is co-authoring a book about theories of consciousness and will present his objective overview and comparison of a dozen theories. A panel discussion among proponents of different theories will follow.

Consciousness and Reality  
Is consciousness an illusion, as many neuroscientists say? Or is external reality the illusion, as Eastern philosophers and others contend? In this session a neuroscientific view of consciousness as illusory will be presented. Then Donald Hoffman will discuss ‘conscious realism’, in which reality consists of conscious agents interfacing with illusory reality, like icons
in a computer game. Hoffman and colleagues claim this ‘conscious realism’ extends outside spacetime in a complex amplituhedron geometry. Deepak Chopra will give the traditional view from ancient Eastern philosophy that an all-encompassing consciousness is our reality, and that the material world is illusion.

**Artificial Intelligence and Consciousness**

Artificial Intelligence (AI) is growing rapidly. Large Language Models (LLMs) like ChatGPT seem conceivably conscious, and most theories of consciousness are purely computational. Meanwhile, AI technology promises upgrades in cognitive function and consciousness through implants, interfaces and other technologies. Philosopher Susan Schneider, Director of the Center for the Future Mind at Florida Atlantic University, former Astrobiology Chair at NASA and author of ‘Artificial You: AI and the Future of the Mind’ will be Keynote Speaker at the conference, discussing Mind Design, Global Brain

**Monitoring Consciousness in Altered States**

Much can be learned from extremes of consciousness. Steven Laureys is a clinical neurologist and world authority in the care of brain-damaged patients with altered states of consciousness, ranging from fully unconscious coma to fully aware, but ‘locked-in’ syndromes. He and his colleagues employ PET, fMRI and structural MRI, EEG, ERP with clinical signs, verbal and TMS stimulation to find conscious awareness. In recent years Laureys has used these same techniques to study consciousness in enhanced meditative states and is the author of ‘The non-nonsense meditation book’. Also, Santosh Helekar will describe his ‘sentiometer’ which uses a version of the double slit experiment to detect consciousness.

**Searching for Consciousness in Cerebral Organoids**

Cerebral organoids are artificially grown miniature organs resembling the brain. Cultured from pluripotent stem cells and developing over months in a rotating bioreactor, cerebral organoids generate measurable EEG-like behavior, comparable to a pre-term infant. UCSD’s Alysson Muotri discovered organoid EEG-like frequencies could phase couple, and Alysson will speak about effects of anesthesia and psychedelics on organoid ‘EEG’.

Hartmut Neven from Google Quantum AI will discuss a project looking for quantum spin and entanglement in cerebral organoids. Nuclear spin is a stable quantum property in the brain, and xenon is an inert gas anesthetic with several isotopes, e.g. differing by spin 1/2. Previous work showed that xenon with ½ spin was a significantly weaker anesthetic, e.g. determined by mice righting reflex, than xenon without spin 1/2. This was taken to imply that the spin ½ promoted consciousness, possibly by increasing entanglement, and thus partially antagonized the xenon anesthetic effect. Hartmut’s group will look at effects of xenon isotopes on EEG-like activity in organoids as evidence for spin and entanglement in the brain, and possible future interfacing between brain and quantum computer.
Special Presentations

Symmetry in the Brain
Sir Roger Penrose

Microtubule Time Crystals – Virtual Reality Experience
Pieter-Jan Maes

Call for Workshop Proposals

TSC Workshops are 4 hour parallel sessions on particular topics Monday morning, afternoon and evening April 22, 2024. Attendance is included in registration, and Workshop presenters receive 2 free registrations. Please submit a brief abstract (500 words maximum) on the topic, speakers, and significance to consciousness studies by email by November 20 to center@arizona.edu. Currently scheduled workshop topics include (there will be 10 total)

1) Education in Consciousness Studies
2) Dual Aspect Monism
3) Meditation and Eastern spiritual practices
4) Psychedelics

Links

ABSTRACTS - Submissions - Now Open – Deadline: December 15

WORKSHOP Submissions – please email proposals to center@arizona.edu Deadline: November 20.

GROUP HOTEL BLOCK (LOEWS) - RESERVATION LINK - NOW OPEN
LOEWS Ventana Canyon Resort - Tucson (Room Block closes March 29) $169 per night
Group Rates Available: April 17 through May 1, 2024

CONFERENCE REGISTRATION (Eventbrite) - Opens November 2023 (early reg: Standard $550; Student: $450.

Activities and Social Events
TSC 2024 will include plenary sessions, in-depth workshops, concurrent presentations, poster sessions, book and technology exhibits, health & wellness exhibitors, tennis-centric.
Welcome Reception (Tues), Dinner (Thurs optional), Poetry Slam (Fri).