Bright Horizons™ 8

W. MEDITERRANEAN

October 28th – November 6th, 2010

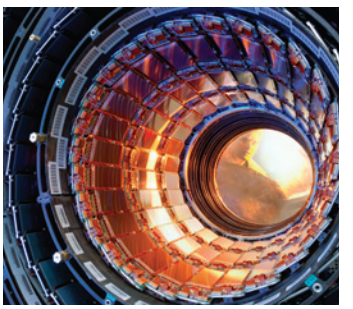
www.InSightCruises.com/SciAm8

SEEK OUT UNCHARTED TERRITORY AND REVISIT CLASSIC SCIENCE in a Western Mediterranean whirl on Bright Horizons 8. Join a cadre of experts who share critical traits — juggling the pragmatic and the possible, driven to challenge the status quo. Foster your need to know. Explore Iberia, where science went mainstream in medieval times. Venture into Casablanca with a companion, and chart the geometry of North Africa.

Gravitate to a new understanding of magnetism's role in terrestrial and scientific exploration. Absorb the cultural importance of space exploration and implications of our new comprehension of space and time. Ponder nature's preference for matter over antimatter, and the superlatives of CERN's Large Hadron Collider. Practice mind over matter thinking about the structure and function of the brain. Unfold the story behind the science with cutting edge, Nobel-grade ribosomal knowledge.

Carpe diem. Set a course beyond the obvious and gain insights and new angles into space exploration, neuroscience, particle physics, ribosomes, and magnetism. Join the Bright Horizons 8 community on Costa Cruises' mv Magica October 28 – November 6, 2010. Plan now to share tapas with a friend, explore a Moroccan kasbah, and advance your science agenda. Get the details at **InSightCruises.com/SciAm-8 or call Neil or Theresa at 650-787-5665.**

SCIENTIFIC AMERICAN TRAVEL



PARTICLE PHYSICS

Speaker: **James Gillies, Ph.D.**

Particle Physics: Using Small Particles to Answer The Big Questions — Particle physics is the study of the smallest indivisible pieces of matter — and the forces that act between them. Join Dr. Gillies and catch up on the state of the art and challenges ahead as physicists continue a journey that started with Newton's description of gravity. We'll look at the masses of fundamental particles, dark matter, antimatter, and the nature of matter at the beginning time.

The Large Hadron Collider: the World's Most Complex Machine — The LHC is a machine of superlatives — a triumph of human ingenuity, possibly the most complex machine ever built. James Gillies traces particle physics technologies from the invention of particle accelerators in the 1920s to today, and then focuses on the LHC itself. You'll get a perspective on how these tools have allowed us to make phenomenal progress in understanding the Universe, and how they have revolutionized our everyday lives.

Angels, Demons, Black Holes, and Other Myths: Demystifying the LHC — Along with humankind's natural curiosity comes a fear of the unknown. As LHC's first beam day approached in 2008, a handful of self-proclaimed experts struck up an end-of-the-world tune — and the whole world knew they were there. Like its predecessors, the Large Electron-Positron Collider (LEP) and Relativistic Heavy Ion Collider (RHIC), the LHC never posed the slightest risk to humanity. However, the dangerous scientist has always made for a good story and that's something that Dan Brown exploited to the full when writing Angels and Demons. Dr. Gillies will cover the fact behind the fiction of Angels and Demons and black holes at the LHC, and share the behind-the-scenes on how CERN lived with the hype.

THE AMAZING BRAIN

Speaker: Jeanette J. Norden, Ph.D.

General Organization of the Central Nervous System — We begin with an introduction on how the central nervous system is divided into structural and functional areas. This knowledge will allow us to understand why after a stroke an individual might be blind, but not know it; why an individual might lose the ability to speak, but not to understand language; why an individual might be able to describe his wife's face, but not be able to pick her out from a crowd.

Cellular and Molecular Organization of the Central Nervous System — In this session we will focus on the structure of individual neurons and on how neurons in the central nervous system are believed to be connected to each other by an estimated 100 trillion synapses. This understanding of the structure of individual neurons and on how neurons communicate with each other allows us to have insight into disorders as diverse as depression and multiple sclerosis.

Parkinson's Disease and Other Disorders of the Motor System — Movement is a complex behavior controlled by a number of different subsystems in the brain and spinal cord. Knowing what each of these subsystems do to allow us to move will provide the knowledge necessary to understand the loss of normal motor movement in Parkinson's disease, spinal cord injury, and other disorders of the motor system.

Alzheimer's Disease — Alzheimer's disease is the most common neurodegenerative disease in the United States. We will explore what is currently known about this devastating disorder, and about the specific areas of the brain which are affected. Next we discuss the risk factors associated with Alzheimer's disease. Finally, we will end this lecture series with a discussion of what you can do to decrease your risk of getting this disease and on how to keep your brain healthy!

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ASTRONOMY

Speaker: **Steven Dick, Ph.D.**

Life on Other Worlds — It's a unique time in human history as we explore for life beyond Earth. Where do we stand in the search for life, both inside the solar system and beyond? And what would be the impact of the discovery of extraterrestrial intelligence on our society? Dr. Dick's answers will beget more questions — get in on the discussion!

A Tour of the Universe: Astronomy's Three Kingdoms — Our view of the universe has evolved over the last century, from a static anthropocentric cosmos a few thousand light years across to a dynamically evolving universe spanning billions of light years. We've discovered cosmic objects like pulsars, quasars, and black holes. Travel with Dr. Dick through billions of light years of space and time as we explore the discovery and classification of objects in astronomy's three kingdoms: the planets, the stars, and the galaxies.

Exploration, Discovery, and Culture: The Importance of the Space Age — Fifty years into the Space Age and 40 years after the Apollo program put 12 men on the Moon, exploration is at a turning point. Should humans return to the Moon and go to Mars? Are robotic emissaries enough? What motivates spaceflight? Should we spend money on space with so many problems on Earth? Join Dr. Dick in contemplation of the importance of exploration to culture.

Cosmic Evolution and Human Destiny — We now see the universe in the context of 13.7 billion years of cosmic evolution. What are the implications of this understanding of space and time in the short and long term? How does it affect our religions and philosophies? What is the long-term destiny of humans? Join us in a journey through science fiction, science fact, and scientific extrapolation as we ponder human destiny in a new context.

MAGNETS

Speaker: **Michael Coey, Ph.D.**

What the Ancients Knew — The mysterious behavior of lodestones — rocks naturally magnetized by lightning strikes — and their strange love for iron was known in ancient China, Greece, Sumer, and Mesoamerica. The directional property was used first for geomancy and then, a millennium later, for navigation. The great voyages of discovery of Africa by the Chinese and America by the Europeans all depended on the compass. The ancients dreamt of levitation and perpetual motion. So do we.

Science Rules the Earth: OK? — Robustly polemical, but insistently evidence-based, William Gilbert's De Magnete (c. 1600) was the first modern scientific text. His insight that the Earth was a great magnet and insistence that data trumps speculation led to the heroic magnetic crusade of the 1830s, an understanding of how the Earth moves by plate tectonics, sunspots, and a way to date pottery. Join Dr. Coey and learn how science trumped charlatans with the truth and predictive power of their "magic".

The End of an Aether — The modern world began in 1820, when Hans-Christian Oersted stumbled on the connection between electricity and magnetism. The news spread like wildfire across Europe as electromagnetism spawned motors and generators, electric trains and mains power, telegraphs, radio and magnetic recording — all before 1900. If Maxwell's equations were the greatest intellectual achievement of the century, the origin of magnetism was one of its greatest puzzles — a puzzle that could only be understood with relativity, quantum mechanics, and Dirac's electrons with spin.

Billions of Magnets for Billions of People: How and Why — When the magnet shape barrier was shattered in 1950, the technology that serves our modern lives could emerge. Tune in and learn about the small, powerful rare-earth magnets that power countless gadgets and one of the greatest modern scientific miracles — magnetic recording. Why and how have magnets have multiplied a billion-fold? Is it true that today we now make more magnets than we grow grains of rice? Dr. Coey will give you the answers to these questions, plus those to questions you hadn't even pondered.

SCIENTIFIC AMERICAN TRAVEL

Cruise prices vary from $969 for an Inside Stateroom to $2,829 for a Full Suite, per person. For those attending our program, there is a $1,375 fee. Government taxes, port fees, and InSight Cruises' service charge are $270 per person. For more info **contact Neil at 650-787-5665 or neil@InSightCruises.com**

Private, Insider's Tour of CERN

October 25, 10am–4pm — From the tiniest constituents of matter to the immensity of the cosmos, discover the wonders of science and technology at CERN. Join Bright Horizons for a private pre-cruise, custom, full-day tour of this iconic facility.

Whether you lean toward concept or application there's much to pique your curiosity. Discover the excitement of fundamental research and get a behind-the-scenes, insider's look of the world's largest particle physics laboratory.

This trip is limited to 50 people. For questions and hotel pricing, please contact Neil or Theresa, or give us a call at (650) 787-5667.

Our full day will be led by a CERN official and physicist. We'll have an orientation; visit an accelerator and experiment; get a sense of the mechanics of the large hadron collider (LHC); make a refueling stop for lunch in the Globe of Science and Innovation; and have time to peruse exhibits and media on the history of CERN and the nature of its work.

To take advantage of this unrivaled insider access to CERN, rendezvous on October 25, 2010 in Geneva, Switzerland. The additional price is $175 and includes

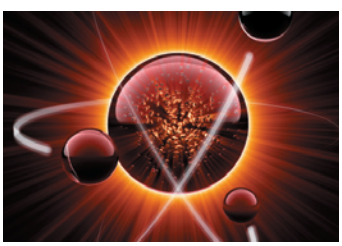
- Entrance to CERN
- Lunch at CERN
- A round-trip transfer from our Geneva hotel to CERN
- And then on October 27, the transfer from our hotel to Genoa, Italy.

THE GEOLOGY OF THE MEDITERRANEAN BASIN

Speaker: **Zvi Ben-Avraham, Ph.D.**

Tectonics of Continental Margins Around the Eastern Mediterranean Sea — We know the fate of the Mediterranean basin. Nestled in the midst of Africa-Eurasia convergence, it is progressively shrinking and will eventually vanish. Basin margins record these dramatic events. The Mediterranean seafloor is being consumed, sliding northward under the seismically active Calabrian, Ionic, Hellenic, and Cyprian margins. Tune in to Dr. Ben-Avraham's discussion of the geological, ecological, and human consequences of the geological evolution of the Mediterranean basin.

The Dead Sea Fault and its Effect on Civilization — The Dead Sea fault (DSF) is the most impressive geological feature in the Middle East. It is a plate boundary, which transfers sea floor spreading in the Red Sea to the Taurus collision zone in eastern Turkey. The DSF is an important part of the corridor through which hominids set off out of Africa. Join Dr. Ben-Avraham for a look at the remarkable paleoseismic history of the DSF, going back about 70,000 years. Learn how geological activity affected human history and politics in ancient days, and how the interplay of geology, ecosystem, and human activity are of ongoing concern and discussion.



PARTICLE PHYSICS IN TREATING CANCER

Speaker: **James Welsh, M.D.**

Subatomic Frontiers of Radiation Therapy
The connection between quarks and cancer therapy might at first appear a bit obscure but hadrons may prove to be a critical component of twenty-first century oncology. In this lecture we shall review the basic molecular and cellular mechanisms whereby normal cells transform into cancer cells and then discuss some of the means through which this understanding has been exploited, such as the advent of the molecular targeted therapies. We shall then briefly review some principles of radiobiology and radiation therapy. Finally we will review some basics of the Standard Model and how this relates to the next frontier in cancer management — hadron therapy.