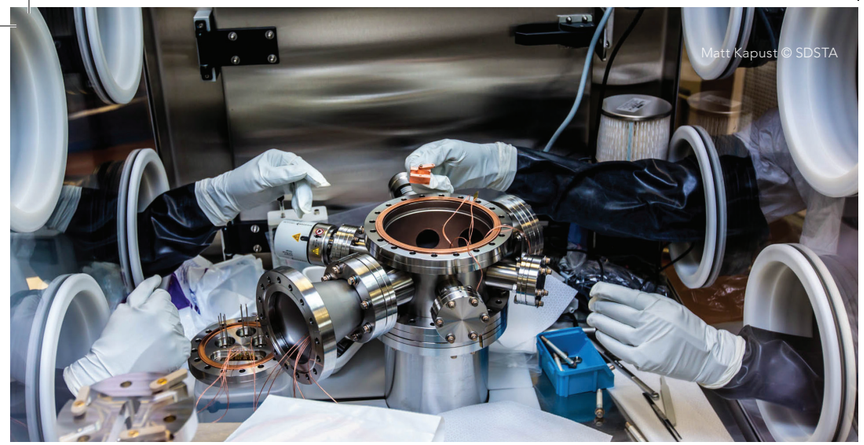

SPONSORSHIP OPPORTUNITIES

- Semi-annual workshops
- Visiting scholars program
- Graduate student fellowships
- Postdoctoral fellowships
- Young faculty fellowships
- Endowed professorships
- Undergraduate education
- Instrumentation seed funding
- Public outreach
- K-12 education

TECHNOLOGY & INNOVATION

Progress at the forefront of science requires the development of advanced technologies—such as ultra-pure materials and advanced electronics—and innovative techniques, including the construction of new mathematical theories and the application of cutting edge computational capabilities. The CoSMS Institute helps promote and disseminate advanced experimental and theoretical approaches among its participants and the broader community.

MISSION

Uniting scientists to advance our understanding of the universe, using state-of-the-art technology, modern mathematical theory, and advanced high-performance computing.

VISION

A collaborative community of theorists, experimentalists, instrument builders, and observers from a wide range of disciplines working together to address the most pressing questions in physics, astronomy, and cosmology.

15-3934-CAS

Institute for Cosmology, Subatomic Matter & Symmetries

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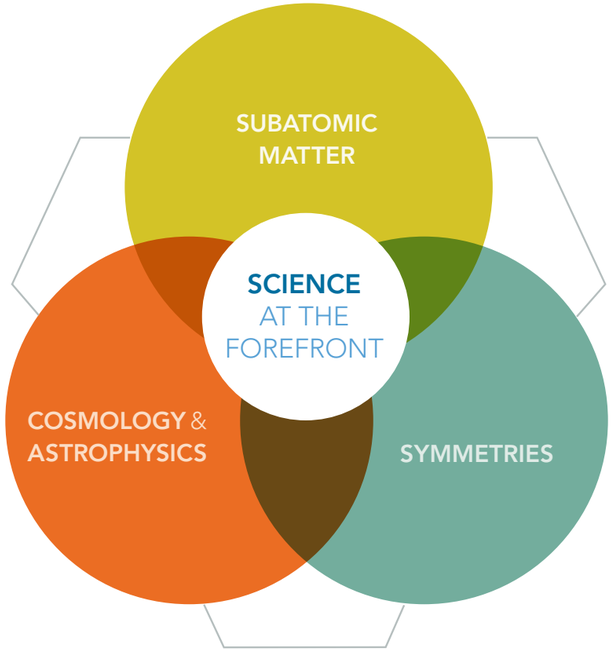
COSMS INSTITUTE

DELIVERING SCIENCE AT THE FOREFRONT

Institute for Cosmology, Subatomic Matter & Symmetries



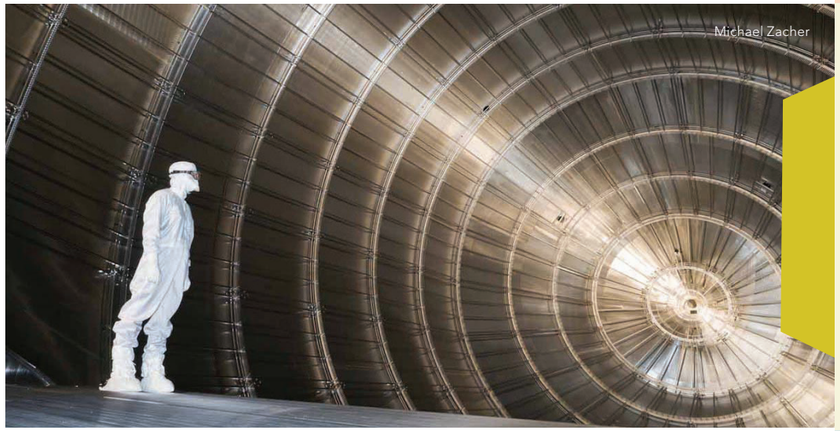
Discoveries in subatomic physics, astrophysics and cosmology have revolutionized our view of matter and the cosmos. These observations have given rise to a set of intertwined questions concerning fundamental symmetries, the interactions and substructure of subatomic matter, the formation of large scale structure in the universe, the creation of the elements, and the nature and role matter and energy play in the cosmos. Answering these questions requires forging connections among theorists, experimentalists, and observers from a wide range of disciplines spanning physics, astronomy, and cosmology.

The CoSMS Institute unites scientists to advance our understanding of the universe.


Tim Abbott, CTIO

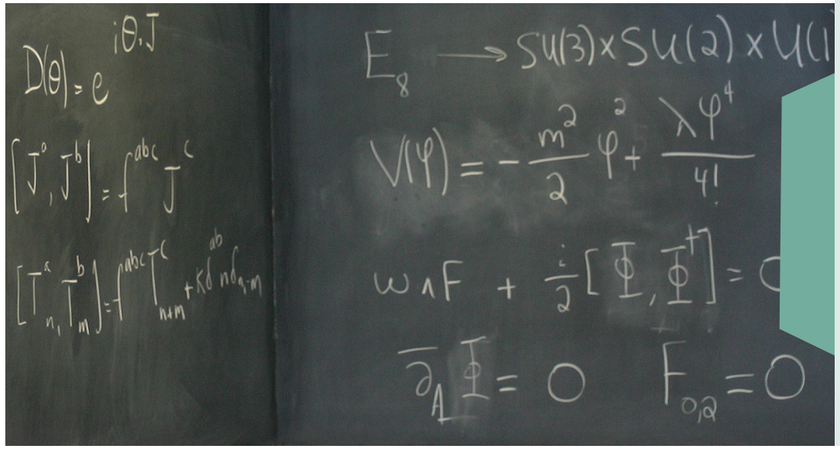
COSMOLOGY & ASTROPHYSICS

Large astronomical surveys and precision cosmology measurements have dramatically altered our view of the universe, including structure formation, matter, and fundamental interactions. Coupled with nuclear astrophysics measurements, these observations offer insight into where and how the elements are created. Dark matter and dark energy comprise most of the mass (energy) in our universe, but neither is included in our standard model. Increasingly sensitive observations and measurements in the laboratory and cosmos will further illuminate the nature of matter and our universe.


Michael Zacher

SUBATOMIC MATTER

Neutrinos are among the most abundant particles in the universe and may influence how the universe evolved. Increasingly precise measurements of neutrino oscillations have revealed that neutrinos have non-zero masses, telling us that our standard model of fundamental interactions is incomplete. These revolutionary results have spurred new experiments to further probe neutrino properties and test fundamental symmetries. These and other laboratory-based measurements may explain the mystery of why we observe a preponderance of matter, instead of a balance of matter-antimatter in our universe.



SYMMETRIES

A corresponding conservation law or principle accompanies each observation of a continuous symmetry in nature. Current knowledge of fundamental interactions in subatomic matter is based on both observations of symmetries and the discovery of broken symmetries, including parity violation in the weak interaction and the Higgs field, which gives rise to the masses of fermions and gauge bosons. Theoretical physicists in the Institute seek to complete the description of subatomic interactions and, in addition, to unite the four fundamental forces—strong, electromagnetic, weak, and gravity.