Our Team

Nao Suzuki

Research Area: Astrophysics

Kavli IPMU Assistant Professor

How does the scenery look like beyond that mountain? What kind of world may we encounter beyond the horizon? Our adventurous nature and curious mind has led us to observe the universe since ancient times. I am one of the drifters setting out to discover a new world in this long history of exploration. At the University of California, I have been studying the cosmological parameters that shape the universe today. We measured the baryon to photon ratio at one second after the Big Bang using the latest instrument on the 10-m Keck Telescope. With the Supernova Cosmology Project team, I studied dark energy using distant supernovae with the Hubble Space Telescope. We observationally proved the existence of non-zero dark energy with a 99.999% confidence level and probed the expansion history of the universe; its expansion turned into the acceleration from the deceleration about 7 billion years ago. At Kavli IPMU, I would like to study the mysteries of dark energy and explore the deepest universe, which no one has seen before using the new instruments on the Subaru telescope. I am fascinated by the fact that all of the genius minds around the world come together as one mind and attempt to unlock the mysteries of the universe, and I find that the future of mankind is full of hope. I do believe that the next generation telescope will find a life form in the universe that would change the world in the near future.

Ran Huo

Research Area: Theoretical Physics

Postdoc

My research interest is in particle physics beyond the standard model. Supersymmetry that roughly doubles the particle content is by far the most promising extension of the standard model, which predicts physics up to a fundamental scale where all three interactions are unified into a single one. Dark matter should have a particle physics origin, and it can be interpreted in many models. Also the matter/anti-matter asymmetry in the universe can be interpreted through particle physics mechanisms such as electroweak baryogenesis and leptogenesis.

Tirasan Khandhawit

Research Area: Mathematics

Postdoc

My research interests are in low-dimensional topology and geometric topology. Especially, my research has been focused on the Seiberg-Witten Floer theory of 3-manifolds and 4-manifolds. My current work is to extend Manolescu's and Kronheimer-Manolescu's construction of the Floer homotopy type, a stable homotopy object whose appropriate homology gives back monopole Floer homology, to general 3-manifolds. Furthermore, I try to extend Bauer-Furuta's stable homotopy invariants to general 4-manifolds with boundary.

Jonathan Maltz

Research Area: Theoretical Physics

Postdoc

My work has focused on formulations of de Sitter space and early universe cosmology, through FRW-CFT and dS-CFT. My interests include Mathematical physics, Liouville theory, and Non-Critical String Theory as well as extending the formulations of M-theory and the web of Dualities that tie the various String Theories together. I am also working on Vasiliev Higher Spin Gravity as well as its relation probing new limits of the AdS-CFT correspondence and various aspects of Matrix Models. I also have an interest in the non perturbative aspects of field theories and M theory.

I think the IPMU is the perfect place for my first postdoc as it continues the interdisciplinary and multi varied research experience that I had in my graduate studies at Stanford.

Ryo Namba

Research Area: Cosmology

Postdoc

My major research interests have been the effects from particle interactions during inflation. Couplings between different fields can lead to particle production, and the produced quanta can in turn interact with cosmological perturbations, leaving visible imprints on the non-Gaussianity and gravitational-wave (GW) signals. In some cases, GW signals from this mechanism can be large enough to be detectable even at the terrestrial GW detectors. I also studied models of vector fields that break the rotational invariance of space, which can result in broken statistical isotropy in the cosmic microwave background and large-scale structure.

Nobuhiro Okabe

Research Area: Astronomy

Postdoc

A statistical weak-lensing study for clusters, based on the exquisite Subaru Hyper Suprime-Cam (HSC) lensing data, measures properties of the dark matter distribution in clusters in great detail, such as spherically averaged radial profiles, halo shapes, subhalo masses, and their redshift evolutions. It enables us to make a stringent test of the CDM structure formation scenarios on small scales. I am very interested in these lensing studies as well as the interplay between dark matter and baryons based on multiwavelength data-sets.

James Wallbridge

Research Area: Mathematics

Postdoc

My current research is focused on understanding more about physical field theories using tools from derived algebraic geometry and higher category theory. In particular, I am studying what it means to geometrically quantise a classical field theory in order to construct its associated extended quantum field theory. Understanding quantisation from a higher categorical point of view is expected not only to illuminate parts of known physical systems at a quantum level but address some problems with theories that have so far resisted a meaningful quantisation.