Our Team

Ivan Chi-Ho Ip

Postdoc

Research Area: Mathematics

My major research interest is on the representation theory of quantum groups and its relations to the classical matrix groups. In particular, currently I am working on the class of positive principal series representations of split real quantum groups, which has a strong parallel to the theory of compact quantum groups.

The whole program involves several related theories, including Faddeev's modular double, the quantum dilogarithm and q-special functions, harmonic analysis on semigroup, cluster algebras, Lusztig's parametrization of total positivity, C*-algebra and unbounded operators. It is expected to have applications to construction of new Topological Quantum Field Theories (TQFT) and Categorifications.

Claire Lackner

Research Area: Astronomy

Postdoc

Galaxy morphology is strongly correlated with a host of other galaxy properties: stellar ages, metallicities, stellar mass, gas fraction, and local environment. Taken together, these properties can tell us a lot about how different types of galaxy form and evolve. I am particularly interested in the effects of local environment on galaxy morphology and star formation and studied this problem at redshift zero in detail for my dissertation work. The new Hyper Suprime-Cam on Subaru will allow us to extend studies of galaxy morphology and environment to higher redshifts and smaller stellar masses.

Charles Melby-Thompson

Research Area: Theoretical Physics

Postdoc

Anisotropy has recently arisen in several contexts in theoretical physics. My prior research with Petr Horava dealt with Horava-Lifshitz gravity, a theory of dynamical spacetime whose anisotropy makes power-counting renormalizability possible, and in part my current research applies ideas from this work to obtain a broader understanding of quantum gravity and holography. Current research topics include: holographic duals of field theories with anisotropy and their relation to Horava-Lifshitz gravity; Weyl and other anomalies in anisotropic theories; and three-dimensional quantum gravity. My broader interests include string theory and mathematical physics, but I am always ready to try something new.

René Meyer

Research Area: Theoretical Physics

Postdoc

My research is primarily concerned with the application of gauge/gravity duality to strongly coupled and correlated real-world systems such as the quark-gluon plasma, the high temperature cuprate superconductors, or the fractional quantum hall effect. These systems, involving fermions, mostly are not accessible by traditional methods such as lattice gauge theory or the usual approximations in condensed matter physics, and their physics hence remains elusive. The goal of my research is to use gauge/gravity duality, a string-theory inspired reformulation of such strongly coupled and correlated problems in terms of gravitational degrees of freedom, to gain new insight into the dynamics of these problems or, with a bit of luck, to even solve these systems completely.

Anupreeta More

Research Area: Astrophysics and Cosmology

Postdoc

Gravitational lensing provides one of the best ways to probe matter distribution in the Universe. Strong gravitational lens systems are not only visually spectacular but also teach a great deal about the seen (e.g. galaxies) and the unseen (e.g. dark matter). I mainly use observations of strong lensing to understand matter distribution from galaxy to cluster scales. Recently, I have been developing automated techniques to find strong lenses in large surveys. At Kavli IPMU, I look forward to applying these techniques to data from the SuMIRe project and intend to further our understanding of matter distribution using strong lensing.

Surhud More

Research Area: Astrophysics and Cosmology

Postdoc

Astronomical observations in the last couple of decades indicate that a large portion (~96%) of the energy density of the Universe is made up of two mysterious and poorly understood components: dark matter and dark energy. My research focuses in understanding the connection between the observable properties of galaxies and the dark matter clumps in which they reside. This allows us to use galaxies as shining beacons to explore the parameters that describe our "dark" Universe. My research focus at Kavli IPMU will be to design optimal ways of extracting cosmological information from galaxy surveys planned as part of the SuMIRe campaign.

Mauricio Romo

Research Area: Theoretical Physics

Postdoc

My current research focuses on different aspects of the interplay between field theory and geometry that we can learn from string theory. On one hand, the study of Seiberg-like dualities in 3d superconformal field theories describing M2-branes probing non-compact Calabi-Yau four-fold singularities. On the other hand the study of 2d nonabelian gauged linear sigma models whose target spaces are compact Calabi-Yau three-folds. In this context I'm interested in topological invariants that we can extract by studying these field theories and their relationship with mirror symmetry.

Charles Siegel

Research Area: Mathematics

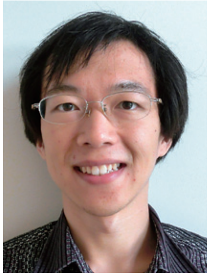
Postdoc

My research is about the geometry of curves and how they can vary in family. I am especially interested in classical problems and wrote my thesis on the Schottky problem, which can be summarized as the question of what are the possible integrals around closed loops on Riemann surfaces. I am currently working on extending some of the tools that are useful in attacking such problems, including Prym varieties of covers of curves, maps defined by modular forms, and the geometry of moduli spaces.

Yi Wang

Research Area: Cosmology and Theoretical Physics

Postdoc



My research focuses on inflation, including non-Gaussianities, cosmic perturbation theory and inflation models. In the field of non-Gaussianity, we have shown a natural possibility of quasi-local shape non-Gaussanity with continuous squeezed limits. We also calculated the large trispectra for general single field inflation. Using cosmic perturbation theory, we have shown that inflation is UV sensitive to loop corrections. We have also built a few inflation models, such as quasi-single field inflation and multi-stream inflation.