Our Team

Marco Bertolini

Research Field: Theoretical Physics (Particle Theory)

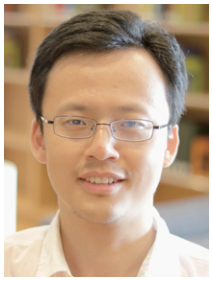
Postdoc

My research interests focus on the interplay between geometry and the physics of string theory and quantum field theory. One of the areas of my research is the study of conformal field theories in two dimensions with (0,2) supersymmetry. I am interested in the stringy geometric structures emerging in the corresponding moduli space. More recently, I became interested in the connection between F-theory, a non-perturbative description of a certain class of string theory vacua, and a class of (1,0) superconformal field theories in six dimensions.

Yalong Cao

Research Field: Mathematics

Postdoc



My research lies in the intersection between algebraic geometry, differential geometry and string theory. More specifically, I have been studying Donaldson-Thomas type theory on Calabi-Yau 4-folds, which is a way to count 'instantons' or coherent sheaves on CY4.

DT4 theory could be viewed as a complexification of Donaldson's theory on oriented 4-manifolds. Formally, DT4 theory should fit into a topological quantum field theory relating instanton countings on Spin(7), G2 and CY3 manifolds. Nevertheless, I prefer restricting to the algebraic subcase for CY4 and CY3. Basically, for a simple degeneration X_t of CY4 into two 4-folds glued along their anti-canonical divisor Y, we expect a gluing formula relating DT4 invariant of the generic fiber of X_t and relative DT4 invariants of those two 4-folds (which are elements in the DT3 cohomology of Y).

Peter Cox

Research Field:: Theoretical Physics (Particle Theory)

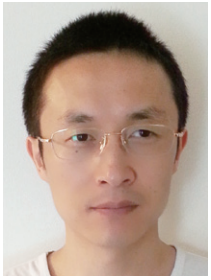
Postdoc

My research focuses on physics beyond the Standard Model and in particular on models that seek to address the naturalness of the electroweak scale. An interesting possibility is that the Higgs may arise as a bound state of some new strong dynamics. I have studied this possibility through the use of warped models in 5D, which can provide a weakly-coupled dual description. More generally, I am interested in BSM phenomenology and looking at how current experiments, such as the LHC and dark matter searches, can be used to explore these models.

Jiaxin Han

Research Field: Astronomy

Postdoc



My research interests lie broadly in cosmology and galaxy formation, with a strong interest in understanding the nature of dark matter. My past research has been mostly devoted to the hunt for dark matter, both theoretically and observationally, with experiences in cosmological numerical simulation, gravitational lensing, dynamical modelling and gamma-ray dark matter detection. I always enjoy exploring new fields and innovating new approaches. Advanced statistics and efficient computation are extensively used throughout my works.

Daisuke Kaneko

Research Field: Experimental Physics

Postdoc

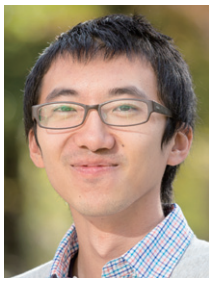
Our group is performing an experiment called POLARBEAR, which is aiming at the discovery of the B-mode polarization of cosmic microwave background (CMB). From the CMB, we can obtain information about the inflation of the early universe, mass of the neutrino, etc.

Currently the experiment is being conducted at Atacama in Chile, and an upgrade project to the POLARBEAR-2 is underway. I would like to contribute to the development of the upgraded receiver with my experience in experimental particle physics.

Ting-Wen Lan

Research Field: Astronomy

Postdoc



My research focuses on extragalactic and data-intensive astronomy. More specifically, I have made use of large survey datasets with statistical techniques to investigate the interplay between various components of the Universe, including dark matter halos, stars, and gas. At Kavli IPMU, I will explore novel datasets provided by the SuMIRe project; this will open a whole new window towards our understanding of how galaxies form and evolve through cosmic time.

Kallol Sen

Research Field: Theoretical Physics

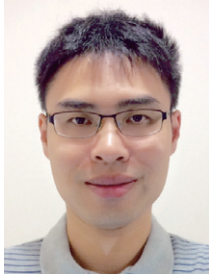
Postdoc

Conformal field theories have been in use for quite some time as a tool towards understanding the strongly coupled field theories when a conventional Lagrangian description is not available. This tool has gained more mileage after the revival of the conformal bootstrap program in the recent years where using the symmetries, it is possible to retrieve nontrivial information about the field theories at strong coupling. Currently my research is focused on a more detailed understanding of the Bootstrap formalism and its applications to various field theories. Using the numerical and analytical aspects of the formalism it is possible to explore field theories at both weak and strong coupling. A knowledge of the operator content of the theory and various interactions might actually pave the way for building up the Lagrangian description where it is not available.

Po-Yen Tseng

Research Field: Theoretical Physics (Particle Theory)

Postdoc



I mostly study the fundamental Higgs particle and dark matter. These two particles were forged from hundreds of years of human scientific history and represent our understanding between the micro and cosmic worlds. Higgs, according to our understanding, gives mass to other fundamental particles. As for dark matter, which composes a quarter of our universe, we don't know what it is.