Our Team

Neil David Barrie

Research Field: Theoretical Physics

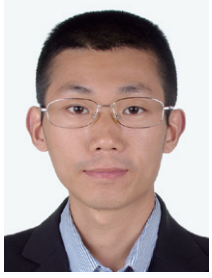
Postdoc

My research interests focus mainly on the interconnectivity of particle physics dynamics and the physics of early universe cosmology. Through such investigations, possible beyond the Standard Model physics can be tested through considering observational searches in combination with particle phenomenology at terrestrial experiments. In the past, I have been particularly interested in the implications of quantum anomalies in the settings of baryogenesis, inflation, and gravitational waves. I plan to continue exploring these possibilities along with other astroparticle physics models.

Shao-Feng Ge

Research Field: Theoretical Physics

Postdoc



I have been mainly working on new physics beyond the Standard Model of particle physics, including neutrino, dark matter, collider, and electroweak symmetry breaking models. Recently we proposed the TNT2K (Tokai and Toyama to Kamioka) experiment in Japan for better CP measurement with neutrino oscillation. It's a combination of T2(H)K and muon decay at rest part (muSK or muHK), using the same SK or HK detector. This configuration can significantly improve the CP phase uncertainty for the currently preferred maximal CP, remove degeneracy, and increase statistics. In addition, it can guarantee CP sensitivity against non-orthodox models, such as non-standard interactions and non-unitarity mixing. I hope this proposal can be finally realized and help Japan to win the competition of measuring the leptonic Dirac CP phase.

Tilman Hartwig

Research Field: Astronomy

Postdoc

I study the nature of the first stars in the Universe with high-resolution computer simulations. Depending on their mass, the first stars eject heavy elements into the interstellar medium when they die as supernovae. We can observe this specific chemical fingerprint in the oldest stars in the Milky Way and constrain their progenitor masses. My simulations help to correctly interpret observations, to optimise upcoming surveys, and to eventually constrain the characteristic masses of the first stars.

Tatsuki Kuwagaki

Research Field: Mathematics

Postdoc

I am broadly interested in mathematical physics, especially around mirror symmetry. Recently, my research has been about the application of the microlocal method to symplectic geometry. For example, I proved homological mirror symmetry for toric varieties using this method. Currently, I am trying to use the method to understand/compute Fukaya categories of compact symplectic manifolds.

Jin-Mann Wong

Research Field: Theoretical Physics

Postdoc

My research pursuits lie within the areas of F-theory and M-theory. In the former, my research has focused on understanding geometric aspects of elliptically fibered Calabi-Yau manifolds related to the presence of additional U(1) symmetries in F-theory compactifications. With regards to the M-theory, I am interested in compactifications of the M5-brane theory down to various dimensions and how the lower dimensional theories can be used to understand aspects of three- and four-manifolds, and the conjectured 4d–2d correspondence.

Louis Yang

Research Field: Theoretical Physics

Postdoc

My research interests lie at the interface of theoretical particle physics, cosmology, and astrophysics. In particular, I have been working on the dynamics of the Higgs field condensate in the early universe. During inflation, scalar fields can develop large vacuum expectation values, which later relax in the reheating stage of the universe. The relaxation of the Higgs or other scalar fields can play an important role in the history of the universe. Beside this, I am also interested in the possible connection between the dark matter and the Higgs vacuum stability problem.

Tea Break:

What's "IPMU Mechanism Length"?

One day, I encountered a mysterious string of words while I was Googling something with keywords including "IPMU." It is shown below, copied from the web page from which I found it. It seems to have been created from a corresponding Japanese page using a free machine translation service on the internet. If you understand a bit of Japanese, you can readily figure out what the latter half, "IPMU mechanism length," refers to. Here "mechanism" is translated back into 機構 in Japanese, while "length" is translated back into 長. As we all know, "IPMU機構長" normally translates into "IPMU Director."

turnip re-Mr. IPMU mechanism length

Although AI has greatly developed, it seems that free machine-translation services on the internet can still create incomprehensible nonsense.

Now, please look at the figure once again. The entire string of words seems to state "Kavli IPMU Director." Note that in Japanese "Kavli" is written as カブリ and it is pronounced as *kaburi*. So, the translation machine must have interpreted the "*kabu*" in "*kaburi*" as 蕪(カブ—*kabu*) the "turnip." But, what I don't understand is why "リ—*ri*" has been translated into "re-Mr." Does the string of words actually mean to say "turnip re: Mr. IPMU mechanism length (Hitoshi Murayama)"?

(Contributed by Kenzo Nakamura)