

The 4th Kavli IPMU-Durham IPPP-KEK-KIAS Workshop: Beyond the BSM*

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The international workshop “4th Kavli IPMU-Durham IPPP-KEK-KIAS Workshop: Beyond the BSM” was held in Ikaho, Gunma Prefecture for four days from October 1 to 4, 2018. This workshop is co-organized by Kavli IPMU, Institute for Particle Physics Phenomenology of Durham University in the UK, KEK, and KIAS. The organizing committee consists of Michihisa Takeuchi (Kavli IPMU), Shigeki Matsumoto (Kavli IPMU), Mihoko Nojiri (KEK, Kavli IPMU), Satoshi Shirai (Kavli IPMU), Tom Melia (Kavli IPMU), Pyungwon Ko (KIAS), Michael Spannowsky (Durham), Frank Krauss (Durham), and Valya Khoze (Durham).

After the LHC experiment Run 2 (center of gravity energy 13 TeV), we have not yet found evidence of new physics. This workshop was held with the aim of setting up a place to discuss the possibility of new particles/physics discoveries in the near future, and the direction in which elementary particle physics should proceed by inviting both theoretical and experimental international experts from various research fields such as collider physics, flavor physics, low energy experiments, and astrophysical observations. Since currently we are at an important time to decide the future direction of particle physics, it was a very timely research workshop.

The workshop consisted mainly of sessions which included five long talks by invited speakers in the morning, and afternoon and after-dinner sessions (each consisting of five short talks). We had 15 presentations from abroad and 7 from domestic invited speakers, and 21 short talks. There were 51

participants in total from 8 countries (including 26 from Japan).

On the first day, Wolfgang Altmannshofer (Cincinnati) and Moto Endo (KEK) gave talks on B flavor physics, and Kazuya Yonekura (Kyushu) gave a talk on QCD phase transition. On the second day, Bryan Webber (Cambridge) gave a talk on Electroweak PDF, Michael Spannowsky on Higgs EFT, Osamu Jinnouchi (Tokyo Tech) on uncertainty at HL-LHC, and Tao Han (Pittsburgh) on Higgs couplings. There were many talks on collider physics that day. On the third day, talks on cosmic ray observation, dark matter theory, etc. were presented, including a talk by Joshua Ruderman (New York) on 21 cm line, Yu-Feng Zhou (ITP, Chinese Academy of Sciences) on cosmic ray spectral structure, and Shunsaku Horiuchi (Virginia Tech) on galaxy-centered gamma rays. On the fourth day, David Shih (Rutgers) talked about the application of machine learning to new physics searches, Hyun Min Lee (Chung-Ang) and Andreas Weiler (TU München) on dark matter models, Valya Khoze on Higgspllosion, and Pyungwon Ko on self-interacting dark matter (SIMP). In order to reveal physics beyond the standard model, a wide range of topics such as collider physics, flavor physics, dark matter, and cosmic ray observation were discussed and it turned out to be a wonderful research workshop.

* “Beyond the BSM” means (i) BSM (beyond the Standard Model) physics different from what has been considered so far, and (ii) search for new physics with precision measurements of the processes which have been considered to be consistent with the Standard Model predictions.