

Report:

As a JSPS summer fellow, I was kindly hosted by Prof. Hiroshi Kunitomo at the Yukawa Institute for Theoretical Physics of Kyoto University. Together with Dr. Hirotaka Irie, from whom I received crucial guidance, I had the opportunity to enjoy an intense two-month research period, contributing substantial results to the doctoral dissertation project I began at home. Our work concerned so-called “matrix models”, which are statistical systems in which the dynamical variables are Hermitian matrices. These toy models successfully unify quantum theory and gravity in a simplified setting. This allows for exact computations, which to this day are impossible in the full complexity of the physically realistic setting. During my stay, Dr. Irie and I investigated the behaviour of Schroedinger’s cat-like superpositions of the toy-model universes described by such matrix models. We were able to show that particular superpositions are governed by a generalization of what mathematicians call a “Wronskian”, and found a surprising one-to-one correspondence between such configurations and the quantum states of a particular so-called conformal field theory. We have remained in contact since and intend to publish our results in the near future.

Yukawa Institute is a lively workplace with a strong track record, frequently hosting seminars, workshops and conferences on a broad range of topics in contemporary theoretical physics, attracting renowned scientists worldwide. I experienced both researchers and staff as very welcoming and always willing to provide assistance where needed.

Besides a very productive research process, I much enjoyed the summer months in Kyoto, a sight-seeing Eldorado with rich cultural heritage. Particularly memorable events include the Gion Matsuri and Obon festivals, which, along with weekend trips to other parts of Japan, guaranteed a memorable experience. Also the introduction week organised by JSPS prior to my stay in Kyoto, including language lessons and a homestay with a Japanese family, was immensely valuable.

My recommendation regarding this summer fellowship, from personal experience, is that if you are unsure whether to apply, you should apply.