NITheP cordially invites you to a seminar by:

**Dr. Changhyoup Lee**  
*Centre for Quantum Technology, National University of Singapore*

Date: Friday, 20\textsuperscript{th} June 2014  
Time: 11h15 – 12h15  
Venue: NITheP Seminar Room, H-Block, 3\textsuperscript{rd} Floor

**TITLE:** Probing the effect of interaction in Anderson localization using linear photonic lattices

**ABSTRACT:**

Anderson localization is one of the most famous manifestations of quantum destructive interference and has been probed in perhaps the most diverse range of physical systems. Interesting deviations in Anderson localization arise when the interactions between the particles become significant. I will show how two-dimensional waveguide arrays can be used to probe the effect of the on-site interaction on Anderson localization of two interacting bosons in one dimension. It will be seen that surprisingly classical light and linear elements are sufficient to experimentally probe the interplay between the interaction and disorder in this setting. For experimental relevance, I will show that by employing a commonly used set of initial states the effect of the interaction on Anderson localization is strongly dependent on the type of disorder and initial conditions, but independent of whether the interaction is repulsive or attractive. I will then discuss how this can all be naturally implemented in waveguide arrays and lay out the details of a 2D photonic lattice implementation. The ability to tune the particle interaction, the ease of preparing different initial states in optics, and the advantage of performing the experiment with classical light make our scheme ideal for studying the role of interactions in Anderson localization.

Speaker Bio: Dr Changhyoup Lee obtained his PhD in 2012 from Hanyang University in Seoul (South Korea). His doctoral work focused on quantum plasmonics and quantum information science. During his PhD he published several important works on the topic of engineered nanoplasmonic systems in the quantum regime. He is currently working in the group of Prof. Angelakis in the Centre for Quantum Technology at the National University of Singapore. Here he is exploring various topics in circuit quantum electrodynamics, quantum plasmonics and photonic waveguide arrays.

**Tea/coffee and biscuits will be served at 11h00**