Date:	**Monday, 26 November 2018**
Time:	**16:30 – 17:50**
Speaker:	**Pertti HAKONEN**
Institution:	**Department of Applied Physics, Aalto University**

Title:

Quantum vacuum, noise, and entanglement

Abstract:

A fundamental theoretical result of modern quantum field theory is that the quantum vacuum is unstable under certain external perturbations that produce otherwise no consequences in a classical treatment. As a result of this instability, virtual fluctuations populating the quantum vacuum are converted into real particles by the energy provided by the perturbation. For example, the application of an intense electric fields extracts electron-positron pairs from vacuum (Schwinger effect), the bending of space-time in the intense gravitational field at event horizons is responsible for the evaporation of black holes (Hawking radiation), the acceleration of an observer in the Minkowski vacuum results in the detection of particles (Unruh effect), and sudden changes in the boundary conditions of electromagnetic field modes or in the speed of light (index of refraction) creates photons (dynamical Casimir effect). I will discuss recent analog experiments addressing these field-theoretic effects, as well as speculate on the possibility of observing space-like correlations among the photons created out of the quantum vacuum

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