



# TOHOKU FORUM for CREATIVITY

Tohoku Forum for Creativity Thematic Program 2015

Fundamental Problems in Quantum Physics: Strings, Black Holes and Quantum Information

**International Workshop on Strings, Black Holes and Quantum Information**

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## The fall of the black hole firewall

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Schedule:

Friday, September 11, 11:00-12:00

Place:

TOKYO ELECTRON House of Creativity 3F, Lecture Theater

Katahira Campus, Tohoku University

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Abstract:

The black hole firewall conjecture is based on the Page curve hypothesis, which claims that entanglement between a black hole and Hawking radiation is almost maximum. The hypothesis is inspired by the Lubkin-Lloyd-Pagels-Page theorem for degenerate systems with zero Hamiltonian. Adopting canonical typicality for nondegenerate systems with nonvanishing Hamiltonians, the entanglement becomes nonmaximal, and energetic singularities (firewalls) do not emerge for general systems. For static thermal pure states of a black hole and Hawking radiation, the entanglement entropy equals the thermal entropy of the smaller system.