53rd RAP Seminar

The 53rd Seminar on RIKEN Center for Advanced Photonics

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Location: **W319, 3F, Cooperation Center, Wako Campus, RIKEN**

(理研 和光キャンパス 研究交流棟 3階会議室 W319)

Title: **Nanofiber cavity quantum electrodynamics system for scalable optical quantum computation**

スケーラブルな光学的量子計算のためのナノファイバー共振器量子電気力学系

Speaker: **Prof. Takao AOKI**

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Cavity quantum electrodynamics (QED) systems, in which atoms strongly interact with cavity photons, enable realization of crucial elements for optical quantum computation. For example, deterministic single-photon sources and universal two-qubit gates have been demonstrated with cavity QED systems using laser-cooled atoms and free-space Fabry-Perot cavities. However, none of these demonstrations have exceeded the threshold for fault-tolerant quantum computation. Furthermore, conventional free-space cavities are not suitable for scaling to large numbers; even connecting two cavity QED systems with low loss is a challenge. We have developed novel all-fiber cavity QED systems using optical nanofibers. In this seminar, I will describe our recent work on demonstration of the setting of coupled-cavities QED, where two nanofiber cavity QED systems are coherently connected by a meter-long low-loss channel in an all-fiber fashion, and will talk about the prospect for scalable optical quantum computation using nanofiber cavities.

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