エクストリームフォトニクスセミナー
Extreme Photonics Seminar

Language: ***Japanese***

Date : June 22(Fri), 2012, 15:00 ～ 17:00

Location : Cooperation Center, 5F Meeting Room, W524
（研究交流棟５階会議室 W524 ）

Title : Vacuum-Induced Transparency: Towards separation of photon-number states

Speaker : Dr. Haruka Tanji

(Photon Science Center, The University of Tokyo)

Control of light with light is enabled by optical nonlinearity, but usually requires a strong light field. In recent years, there has been increasing interest in strong optical nonlinearity at a few-photon level in contexts ranging from quantum information processing to simulation of condensed matter systems. By strongly coupling a cold ensemble of cesium atoms to an optical cavity and by employing the technique of electromagnetically induced transparency, we demonstrate that the transmission of light through a resonant medium may be controlled with few photons and even with the electromagnetic vacuum field.

The enhanced transmission induced by the vacuum field is accompanied by a group delay of the input optical pulse. The delay is predicted to depend upon the photon number in the input pulse. Such photon-number-dependent delay opens possibilities for advanced quantum devices such as a photon Fock state filter, which is expected to play a crucial role in quantum information processing.

Title : Development of a laser system for KAGRA

Speaker : Prof. Norikatsu Mio

(Photon Science Center, The University of Tokyo)

We are now developing a laser system for KAGRA that is the Japanese interferometric gravitational wave detector being built in Kamioka mine. KAGRA requites the laser source that has 180-W CW, single-transverse mode and single-frequency output at 1064 nm. In order to realize the system, we adopted the injection-locked scheme and succeeded to operate the laser of 100-W output. However, since the injection-locked system was rather complex and critical, it was not so easy to keep its best performance for a long-term operation. Thus, we are now trying to build a laser system using fiber amplifiers and solid-state laser amplifiers. The history of the laser development and the current status of R&D for the KAGRA laser system will be reported with an introduction concerning a gravitational wave and its detection.

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