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KAGRA: 2ND GENERATION OF GRAVITATIONAL WAVE (GW) EXPERIMENT & FIRST UNDERGROUND GW EXPERIMENT

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Deep under the mountain of the Kamioka mine in Kamioka-cho, Hida-city, Gifu-prefecture, in Japan, there are many leading edge facilities to answer questions about many physics, astronomical and cosmological subjects that haven't been answered, such as "Super Kamiokande", the successor of "Kamiokande".
In 2010, a new challenging science project, KAGRA (Kamioka Gravitational wave detector, Large-scale Cryogenic Gravitational wave Telescope) has started.
KAGRA aims to spot spacetime ripples by harnessing advanced technological twists: chilling key components to temperatures hovering just above absolute zero, and placing the ultrasensitive setup in an enormous underground cavern.
The new detector will join similar observatories in the search for the minute cosmic undulations, which are stirred up by violent events like collisions of black holes. The Laser Interferometer Gravitational-Wave Observatory, LIGO, in the USA and Virgo, located near Pisa, Italy. Those detectors sit above ground, and don't use the cooling technique, making KAGRA the first of its kind.

In this lecture, Professor Miyakawa explains some gravitational wave(GW) physics and main results of the GW detection achieved by LIGO and VIRGO with some historical development of the experimental side for the GW detectors. He will spend some time to explain principles of GW detection using Michelson interferometer and development for the optical configuration as Fabry Perot cavities, power recycling and signal recycling technics. In the second part, he introduces KAGRA that is a 3km scale interferometer currently being constructed underground. KAGRA has low temperature mirrors as test masses which will be cooled down to 16K to reduce thermal noise. Professor Miyakawa is working as a leader of commissioning task at KAGRA site, and he will show some interesting experiences and results obtained during KAGRA construction.

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