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Status of R&D of the ANKOK project: Low mass WIMP search using double phase argon detector (12' + 3')

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Liquid argon is known as an excellent target material for WIMP dark
matter direct search experiment.
Use of its ionization and scintillation signals, and scintillation
pulse shape provides strong discrimination between
the electron and nuclear recoil events.
Relatively small atomic mass (A=40) gives higher
nuclear recoil energy for WIMP-Ar nuclear scattering,
thus it potentially has higher sensitivity for low mass WIMP (~10 GeV/c2).
On the other hand, the 128 nm VUV scintillation light of argon is
relatively hard to detect with nominal photo sensors, and use of
wavelength shifter lowers the light detection efficiency and likewise
the spatial resolution of the reconstructed event.
At present, there are no liquid argon detectors which prove their
sensitivities for the low mass WIMP.

The ANKOK project is a new dark matter search experiment in Japan
using the double phase liquid argon detector which is specialized
for the low mass WIMP detection. We are currently proceeding R&D efforts
to establish its physics sensitivity, such as understanding of
the liquid argon scintillation and ionization process for very low energy
deposition (~20 keV) and development of the new photo-sensor
which has direct sensitivity for the 128 nm VUV light.
In the next few years, we are targeting to construct a detector with
fiducial mass of several tens of kg, and to collect the underground
physics data to search for low mass WIMP.

In this presentation, we will report R&D status and future plan of the
ANKOK project.

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