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Temperature dependent study of NaI(Tl) scintillator and PMT

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The COSINE-100 experiment is searching for the direct detection of weakly interacting massive particles (WIMP) using an array of ultra-low background NaI(Tl) scintillation crystals attached with the PMTs. The next phase of the experiment, COSINE-200, requires crystal background levels that are well below, and light yields are well above, the DAMA/LIBRA detector. Thus, the study of temperature dependent NaI(Tl) light yield and photomultiplier tube(PMT) noise are called to improve confidential level of WIMP detection. The light output of the scintillator and the PMT properties have investigated in the temperature range of -25 C to 30 C. Single photoelectron (SPE) was measured by using LED light source which is independent from the refrigerator. The results of temperature dependent properties of this detector will be presented.

Primary authors: Mr KIM, Gwangsoo (Kyungpook National University); Dr KIM, Namyoung (Institute for Basic Science)

Co-authors: Mr LEE, jooyoung (Kyungpook National University); Prof. KIM, Hongjoo (Kyungpook National University); HA, Chang Hyon (IBS); KIM, Yeongduk (Sejong University); Prof. KIM, Hyunsoo (Sejong University (KR))

Presenter: Mr KIM, Gwangsoo (Kyungpook National University)

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