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Low energy neutrino reactions induced by supernova neutrinos with some artificial neutrino sources

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In this talk, we discuss some feasible low energy neutrino sources and possible physics by the neutrinos emitted from them. One of them is the search for the existence of the fourth neutrino, we propose two experimental methods for short baseline electron antineutrino disappearance study.

One is a source from 8Li generator under non-accelerator system. For 8Li production, we suggest to use 252Cf source which is an intense neutron emitter and thus produces 8Li isotope through 7Li(n,g)8Li reaction, effectively. Using the 8Li generator, one does not need any accelerator or reactor facilities because the generator can be placed on existing and/or planned any neutrino detectors as closely as possible.

The other is a method using 13C beams and a 9Be target. The production of secondary unstable isotopes which can emit neutrinos from the 13C + 9Be reaction is calculated with three different nucleus-nucleus (AA) reaction models. Different isotope yields are obtained using these models, but the results of the neutrino flux are found to have unanimous similarities. This feature gives an opportunity to study neutrino oscillation through shape analysis.

For the effect of possible sterile neutrinos, by using the two methods, we obtain the results of expected neutrino flux and event rates, and show neutrino disappearance features and possible reaction rate changes by the sterile neutrino using the spectral shape analysis.

Finally, we discuss possible low energy neutrino-induced reactions from the neutrino sources and give a short introduction of the neutrino window concept which can be useful for the neutrino-induced reactions in the supernova explosion.

Primary author: Prof. CHEOUN, Myung-Ki (Soongsil University)

Co-author: Dr SHIN, Jaewon (Soongsil University)

Presenter: Prof. CHEOUN, Myung-Ki (Soongsil University)

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