Contribution ID : **328** Type : **Plenary/section talk**

The first observation of effect of oscillation in Neutrino-4 experiment on search for sterile neutrino

Tuesday, 23 October 2018 16:45 (25)

We report Neutrino-4 experiment results of measurements of reactor antineutrinos flux and spectrum dependence on the distance in range 6-12 meters from the center of the reactor core. The fit of experimental dependence with the law $1/L^2$, where L is the distance from the reactor center, gave satisfactory result with goodness of fit 81%. However, we discovered that the experimental neutrino spectrum is different from the calculated one. Using experimental spectrum we performed the model independent analysis of restrictions on oscillation parameters Δm^2_{14} and $sin^2 2\Theta_{14}$. The results of this analysis exclude area of reactor and gallium anomaly at C.L more than 99.7% ($> 3\sigma$) for values $\Delta m^2_{14} \leq 4\ eV^2$ and $sin^2 2\Theta_{14} > 0.1$. However, we observed an oscillation effect at C.L. 99.7% (3σ) in vicinity of $\Delta m^2_{14} \approx 7\ eV^2$ and $sin^2 2\Theta_{14} \approx 0.35$. The method of coherent addition of results of measurements, which allows us to directly observe the effect of oscillations, is proposed. The analysis of that effect is presented. In general, it seems that the effect predicted in gallium and reactor experiments is confirmed but at sufficiently large value of Δm^2_{14}. Future prospects of the experiment are discussed.

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Session Classification : Particle Physics: Neutrino Physics

Track Classification : Particle physics: neutrino physics