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Supernova neutrino distribution: data and their approximation approach

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To obtain the neutrino parameters in core-collapse supernova we use the results of a one-dimensional simulation of neutrino propagation, performed self-consistently with hydrodynamics in Prometheus-Vertex code. As in most modern model of neutrino propagation in supernova, in this numerical code the moments approach is applied for calculation of neutrino transport. This method is based on the separation of neutrino energy range to bins and allows to get us only the integral value of neutrino specific intensity in them. In this case, the simplest way to find the neutrino radiation parameters is to use total integral energy moments. But this approach does not allow to obtain neutrino radiation parameters for some analytical models, for example, for a popular Fermi-like approximation of the neutrino energy spectrum. Because of that, we use method based on the minimization of the functional, which determinates the deviation of integral value of the model spectrum from the data performed with Prometheus-Vertex code. This approach of finding of neutrino radiation parameters allows us to more accurately approximate the data, and it can be used in case when the approach of energy moments are not applicable.

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