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Calorimetric system for high-precision determination of activity of the 51Cr neutrino source in experiment BEST

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Experimental studies of neutrino nonstandard properties using high-intensity artificial neutrino sources require a high accuracy of the source activity determination. The calorimetric method using mass flow calorimeter was chosen in the BEST project for measuring the activity of intense neutrino source based on 51Cr with activity of about 3MCi. The performed calibration of a prototype of the calorimetric system demonstrated that the uncertainty of the measurement of heat release was less than 0.25% in the interval of source heat power 270-700 W. The results obtained in the calibration taking into account the uncertainty of the energy release in the 51Cr decay (0.23%) showed that the activity of the neutrino source based on 51Cr can be determined with an accuracy of about 0.5%. On the basis of the results the calorimetric system was designed and manufactured for measuring the activity of the artificial neutrino source in experiment BEST.

Primary author(s) : Dr. VERETENKIN, E. (P.)

Co-author(s) : Dr. KOZLOVA, J. (P.); Dr. DANSHIN, S. (N.); Dr. IBRAGIMOVA, T. (V.); Prof. GAVRIN, V. (N.)

Presenter(s) : Dr. KOZLOVA, J. (P.)

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