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The flux of electron antineutrinos from supernova SN1987A data

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The neutrinos from the core collapse SN1987A are the first extrasolar neutrinos to be ever detected and have been widely studied to infer the thermodynamical and temporal features of a supernova; however their interpretation in terms of the astrophysical properties of the explosion has been giving rise to heated debates since ever. At date, models are still under construction and simulations do not always depict same things, thus the significance of the data at our disposal must be assessed as accurately as possible.
By adopting a state-of-the-art parameterized model of electron antineutrino emission, we have made some steps forward in the analysis of the available data from core collapse SN1987A taking into account the times, energies and angles of arrival of all detected events in a reliable framework which includes a finite ramp in the initial stage of the neutrino emission.
We determine the parameters of the accretion and cooling emissions and discuss their durations. The results compare well with theoretical expectations and overcome some tensions found in previous similar analyses. We estimate the delay times between the first antineutrino and the first event in the detectors. We test the agreement of the best-fit flux with the empirical temporal, energy and angular distributions, eventually finding a good compatibility with the observed data.

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