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A two level trigger system for the ICARUS LAr-TPC

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The ICARUS-T600 detector at LNGS laboratory is the largest Liquid Argon TPC (LAr-TPC) operating in an underground laboratory. Its calorimetric resolution and topology reconstruction capabilities permit a wide physics program, which goes from nucleon decay to the study of the oscillation on CNGS neutrino beam. Atmospheric as well as solar neutrinos are also a case of study. The events collected differ both for energy deposition (ranging from tens of MeV to tens of GeV) and for topology. To get a fully-efficient detection of the interesting events it is thus necessary to exploit all available sources in the trigger system: the scintillation light, the charge signal on wires and the timing information (for CNGS-related events). The scintillation light is used both as global trigger signal and time of origin of the event, to get a complete 3D reconstruction of the event. The charge signal is used to select regions of interest (RoI), and to generate local triggers for low energy events. Finally the timing information is used to generate a trigger at each CNGS extraction; the events triggered this way are then selected by a second level software trigger, that searches for any charge deposition in the event. A full efficiency and a rejection factor better than one per mil have been reached with this kind of trigger.

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