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Development of a low dead time dark matter detector using a superheated liquid

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The PICO dark matter search is an experiment which is based on superheated perfluorocarbons such as C₄F₁₀, C₃F₈ and CF₃I. The PICO detectors are used for spin-dependant dark matter searches using C₄F₁₀ and C₃F₈ and spin-independent dark matter searches using CF₃I in the mass range from 10-10,000 GeV.

A prototype of a low dead time particle detector, using a condensation chamber or “geyser” has been constructed and operated. The geyser technology is a variant of the bubble chamber using superheated liquid with a very simple design and no moving parts.

The design of geyser chambers, experience with the operation, and the results of the data taken with the prototype will be presented. The data analysis focuses on the acoustic discrimination of alpha or background events from neutron events in the geyser.

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