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Bubbles: A Model And Formation Process Within Superheated Liquid Bubble Chambers

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The PICO experiment uses superheated liquid bubble chambers with different freons, presently C_3F_8, as the active fluid to search directly for dark matter. When a particle deposits energy in the active fluid, within a certain critical length, a local phase transition might occur if this energy is greater than a certain critical energy. This phase transition is explosive in nature and will be followed by an emission of an acoustic signal. This signal carries enough information that allows for the discrimination the main background particles, alphas and neutrons. A more complete model of the formation of the bubble, the explosive bubble growth and the generation of the acoustic signal can help to improve the background discrimination techniques. This work summarizes the progress we have made in the understanding of those issues.

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