

## 2.6 Bubble Chamber Normal Operations Procedure

*Written Procedure*

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This procedure covers the normal operations of the COUPP 2L Bubble Chamber once it has been pressurized with  $\text{CF}_3\text{I}$ . Once you turn it on it needs to be maintained until it is decommissioned and drained. There are two states.

#### **Idle. “Safe” state:**

- 1) The issue here is thermal expansion. In principle, the temperature is constant and regulated, but if that stops the chamber will cool, the bellows will extend and could over-extend causing damage.
- 2) “Safe” consists of the hydraulic cart set to regulate in the compressed mode and regulating to a pressure that is slightly above that generated by pneumatic pressure. In this mode, the hydraulic cart will compensate any thermal expansion or contraction. If we lose power, the fast piston will be at its upper stop allowing for maximum tolerance to cooling. The system is intrinsically safe against warming.
- 3) I’ve given some consideration to using the “idle” state of the normal DAQ as the “safe” state, but have not yet implemented this. You’ll need to do it “by hand” if the chamber is not taking data.

#### **Normal Data Taking:**

- 1) Again the issue is thermal expansion. Nominally there shouldn’t be any, but if there is the cart will need to compensate. When we’re taking data, this happens automatically. The thermal expansion compensation is hidden in the normal pressure regulation during expansions.
- 2) Keep running all the time in a “normal” data taking mode, or put the chamber in “safe” state.
- 3) *An alternative to “safe” might be “normal” data taking with the pressure set point set above the alpha threshold...*