

Proposal to double new gas input to STAR TOF System

April 14, 2010

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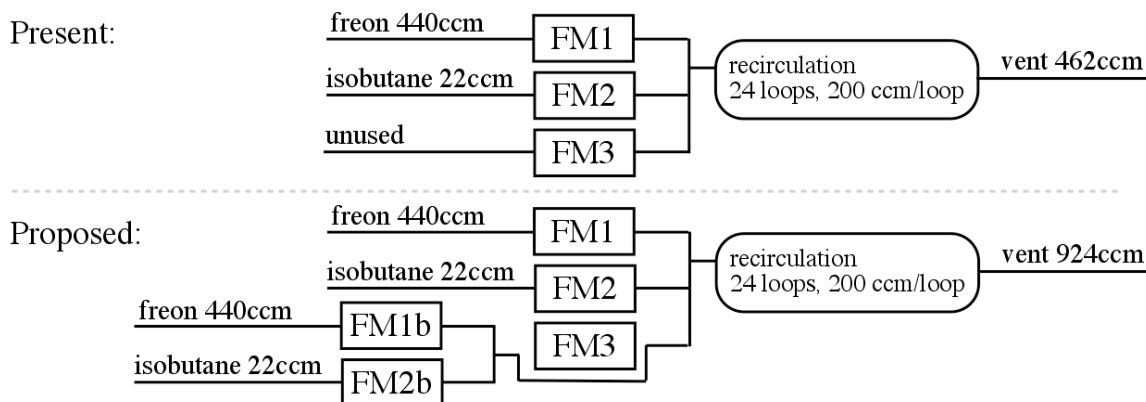
In the STAR TOF system, the gas input to the system is 460 ccm of Freon R-134A and 22 ccm isobutane. The isobutane to freon ratio of 5% is insured by “slaving” the isobutane flowmeter to the Freon flowmeter. The individual flow rates and ratio are archived in STAR Slow Controls and alarmed. There have been no alarms on this ratio this run or last.

We have noticed over the course of this run that the TOF noise rates have increased by a factor of ~5. At the beginning of the run, they were approximately 12 Hz per pad, which agreed with the expectations from previous runs. This noise rate has steadily climbed to ~60 Hz/pad in the most recent data.

We are concerned that irreversible damage to the MRPC detectors might be occurring.

In normal operation of MRPCs, avalanches are caused by particles traversing the detectors, and these produce ions from the gas molecules. These ions recombine and can produce particularly nasty chemicals such as hydrofluoric acid (HF). This would etch the glass permanently, causing local spikes on the glass surface and thus increasing the noise rates via the thermionic emission of electrons from these spikes. The future successful use of the TOF system as a trigger detector is thus in doubt.

We propose to double the rate of new gas input into the (recirculating) TOF gas system. The unused SF6 input to the present system would be changed into an input for an additional 440+22 ccm of Freon and isobutane. This plan has been reviewed by Leonid Kotchenda, and he has advised us on what to watch as this new path is turned on in order to insure the correct operation of the system.



After this change, the exhaust rates would be 880 ccm Freon R-134A and 44 ccm isobutane.

The two additional flowmeters are precisely the same as the ones presently in use, and again the 2nd isobutane flowmeter would be slaved to the 2nd Freon flowmeter. The STAR shift crews would check the flow rates twice/shift by walking to the gas room and inspecting the 2nd set of flowmeters. We ran in Runs 3, 4, 5, and 8 with a system that consisted of FM1b and FM2b and no recirculation with no electronic monitoring and thus no automatic TOF gas alarms in the control room.

All hardware needed to make this revision are in hand. If no improvement to the noise rates are observed after making this change, we would change from recirculation mode to purge mode including all four flowmeters.