Plans for the LST Gas System

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LST Review
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Overview

Goal: Supply gas mixture to a total chamber volume of ~9000 liters at the rate of one volume change per day

Examples: SLD gas 88% CO2; 9.5% Isobutane; 2.5% Argon; Zeus gas 89% CO2; 8% Isobutane; 3% Argon

Components

• Gas supply and storage
• Gas mixing
• Delivery to IR-2
• Distribution within IR-2
• Safety – assure that the mixture is non-flammable
Learn from Existing Systems: SLD gas system, RPC gas system serve as models

• Don’t reinvent the wheel
• Replicate techniques as needed
  – E.g., Isobutane supply panels to bring gas into the gas shack from the outside
  – Style of SLD and RPC mixing systems are sufficient to do the job
  – SLD and RPC designs are sufficient to make certain the output is not flammable
  – Existing gas shack safety system allows us to mix flammable gases in an enclosed environment
Gas Supply and Storage: Babar Gas Shack

• Outside the Gas Shack
  – Areas for gas storage; already have argon and isobutane supplies
  – Have located a suitable area to locate a large CO2 dewar

• Inside the Gas Shack
  – Safety system lets us bring flammable gases inside for mixing
  – Temperature Control; power
  – Access to monitoring
  – Space identified
Babar Gas Shack Plan View

Flammable Gas Area  Enclosed  Inert Gas Storage

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View inside the Babar gas shack.

The current RPC gas system is the green rack to the left. The LST system will go where the cabinet in background is located.
Gas Mixing – follow the SLD approach

• Mass flow controllers in line with a redundant mass flow meter

• Meters check the output of the controller, will shut off the gas flow if the mixture gets out of tolerance

• Use experience with RPC system to tell us what to monitor and what to watch out for
Mixing System Functionality

- CO2
- Argon
- Isobutane

Mass Flow Meters

CO2

Ar

Iso

Gas Interrupt Box (homemade)
Monitors gas flows; will shut off inputs if flows or ratios are not correct

Flow Control Box
One master flow; slaves set by a ratio to actual flow of master

Pressure Sensors

Manual Valves

Regulators

Solenoid Valves

Sample Port

Mixer

To LST

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Gas Interrupt Box Functionality

Inputs are the Readings from the Mass Flow Meters

Readings Out → To Monitor
Reading Out 0-5 Volts

Reading Out 0-5 Volts
Ratio Out

Reading In Range?

To Monitor

Reading In Range?

Reading In 0-5 Volts

To Monitor

Reading In Range?

Trip?

ShutOff Power

To Monitor

To Monitor

To Monitor

To Solenoids

DC Process Controllers With on/off control
IR-2 Distribution

• Utilize what we can of the RPC gas distribution system
  – Rack space
  – Portion of the gas tubing
  – Output bubblers will measure flow per layer
• Divide gas supply by sextants, then by layer
• We have checked pressure drops for nominal flows through typical lengths of our tubing and we should be okay
• In general, the SLD experience is an existence proof
Outline of the IR-2 Distribution
Summary

• SLD and RPC experience serve as suitable models

• Functionality of system is outlined

• Immediate task is to finalize the plans and put them down on paper; begin implementation, construction, and testing