Workshop on Instrumentation for Muon Cooling Studies

Cooling-channel engineering

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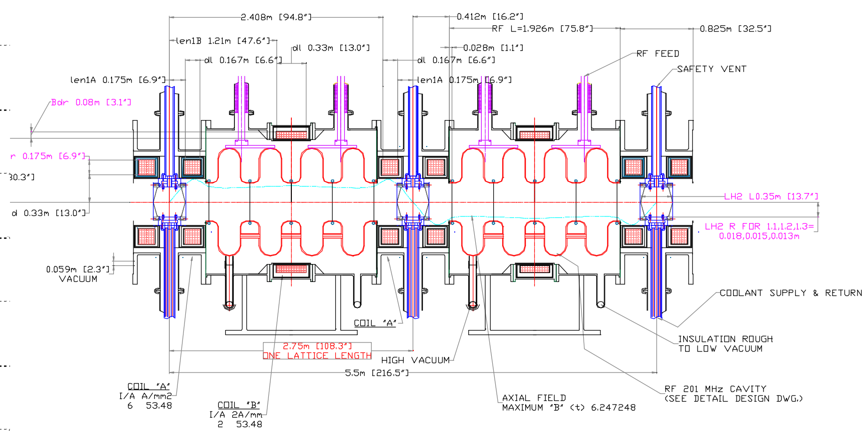
I.I.T.

Lattice 1 Cooling Channel Layout



Lattices

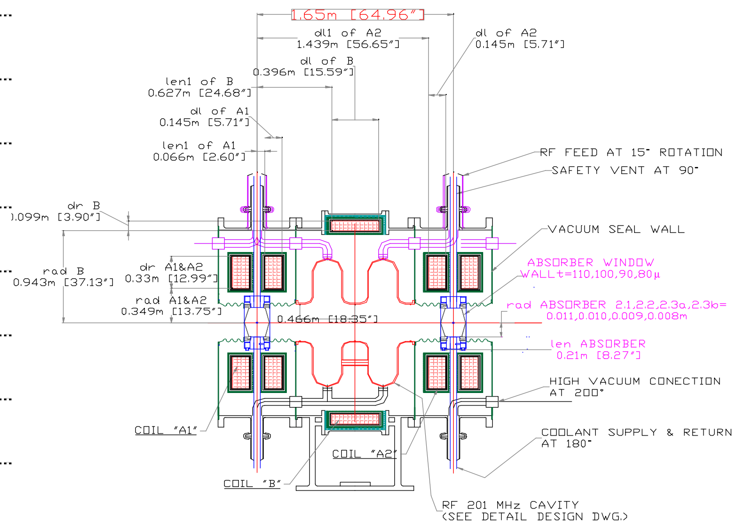
Name	Quantity
Cool 1,1	**6**
Cool 1,2	**6**
Cool 1,3	**6**

Lattices 1 Total 36

Upstream cooling **Super FOFO Section configuration, composed Of two Lattices 2.75m each**

The components parameters, are described in the "INITIAL PARAMETERS FOR ESTUDY 2, DESIGN A, DRAFT 4" 8/25/00

Lattice 2 Cooling Channel Layout



Downstream cooling Super FOFO configuration, Lattices 1.65m long

Lattices

Name	Quantity
Cool 2,1	**14**
Cool 2,2	**10**
Cool 2,3a	**16**
Cool 2,3a	**16**

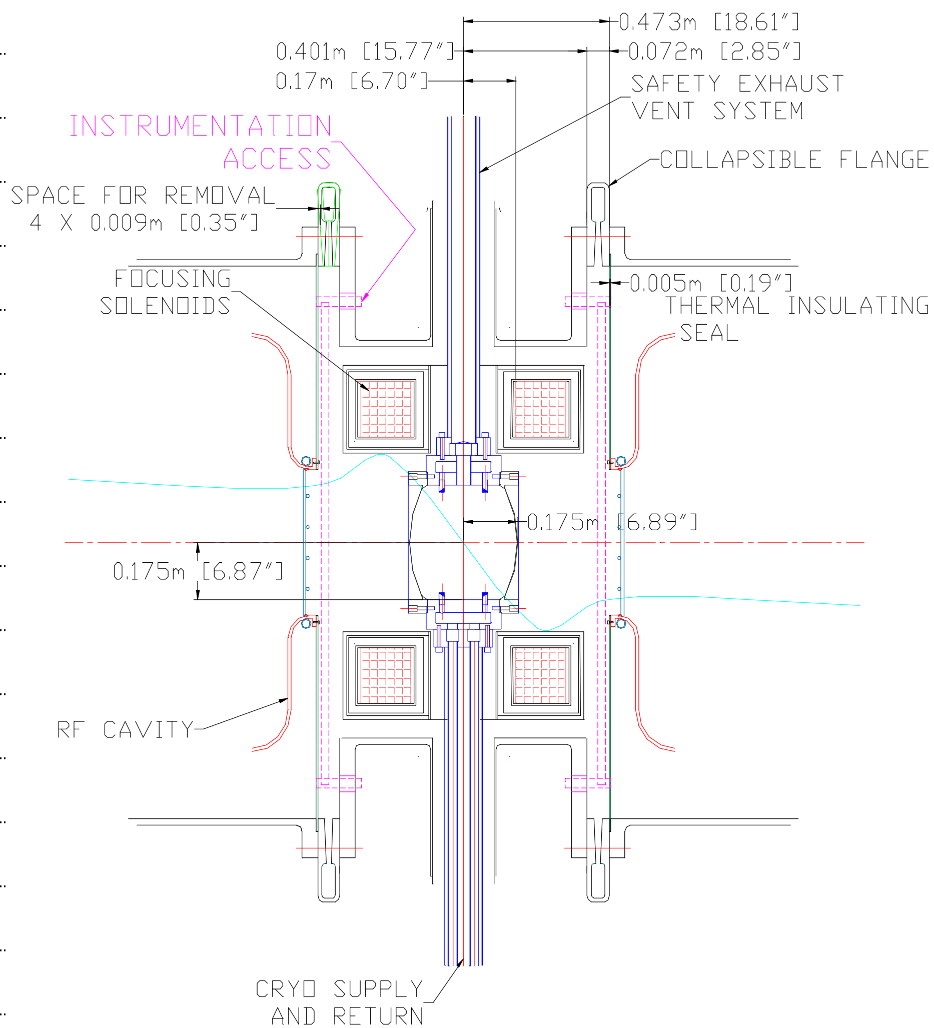
- Lattices 2 Total 56

Design considerations

Physical space allocations for instrumentation are to be studied considering:

- The type & geometry of instrument sensing device,
- Location of the the devices within the lattice &
- The mutual environmental effect on both the sensing device and the lattice components.
- Access to the instrumentation devices located inside the lattice this in turn requires:
  - Modification of the current designed lattice, inter space of components and/or components parameters
  - Farther physics beam simulations and analysis based on the modified parameters.

Lattice 1 cool 1,1. Partial layout of the Liquid hydrogen absorber, focusing solenoids, vacuum vessel and end sections of RF cavities



This layout illustrates the special flange mechanism by which the channel modules will be allowed to slide in and out from the installed channel.

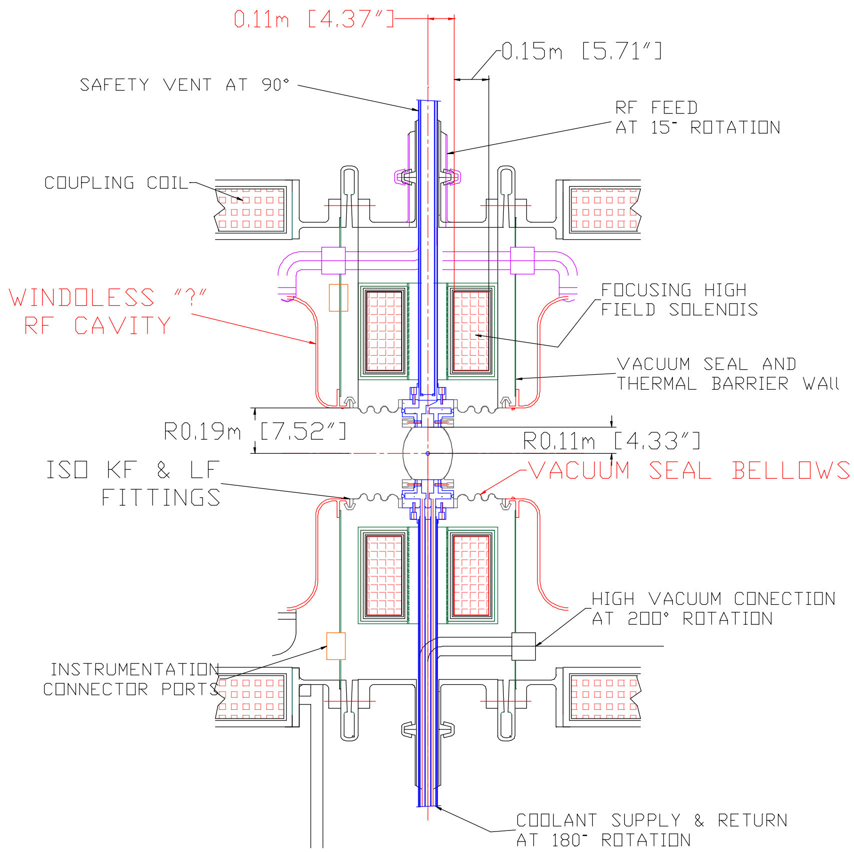
The generated requirement by the presence of this mechanism is that:

a) No objects shall permanently occupy the space of separation between this modules

b) Objects like instrumentation probes or sensors shall be removable to permit the removal of the modules.

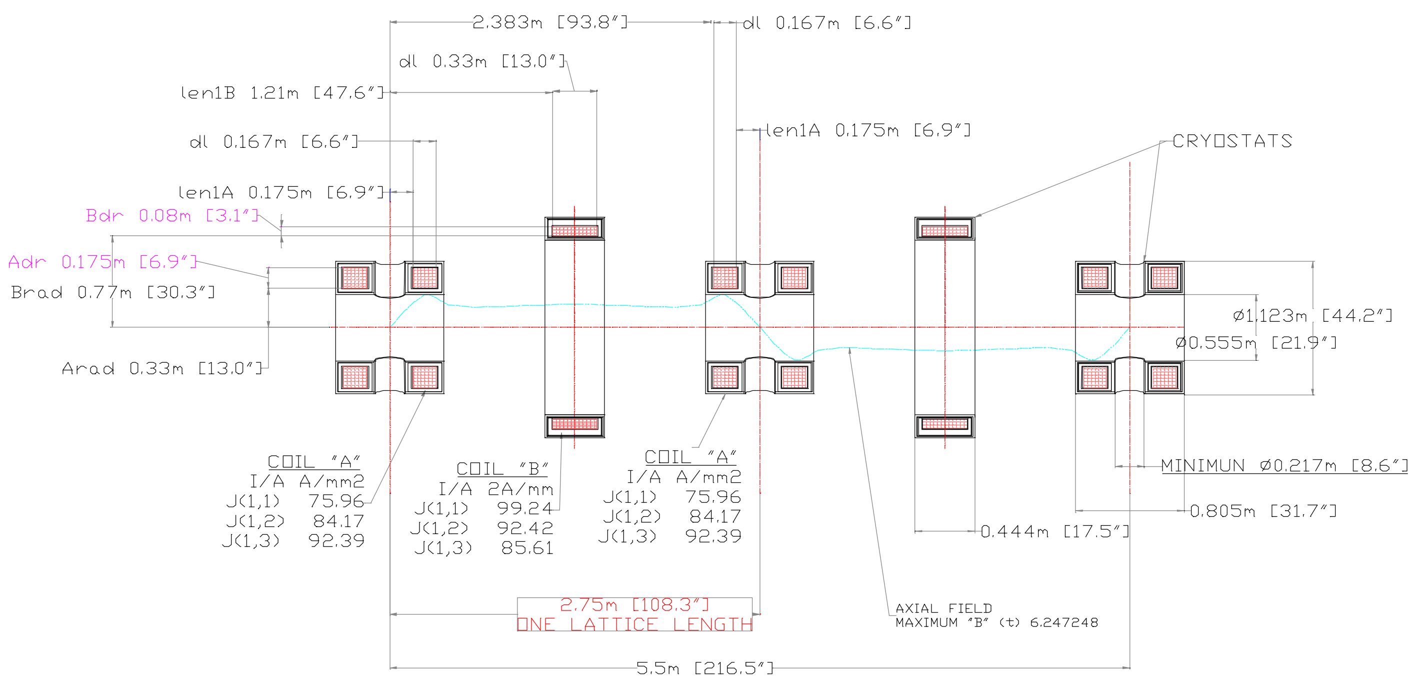
c) The RF cavity shall be reduced by 0.122m [4.8"] on the overall length to produce the clearance necessary for the extraction of the module from the channel.

Lattice 2 cool 2,1. Partial layout of the Liquid hydrogen absorber, focusing solenoids, vacuum vessel and end sections of RF cavities



- The half space between focusing solenoids was increase from 0.066m to 0.11m to facilitate cryogenic connections to the lh2 absorber.
- Windowless cavity is reliant on vacuum seal connection to the absorber body (although it is shown in this illustration for clarity). The access to make the vacuum tight assembly between the bellows, the RF and the absorber is not evidently feasible at this time.
- The presence of bellows do not allows access for a non intrusive beam instrument sensor, as recently proposed.
- Note the modification to the RF flanged connection to the bellows.

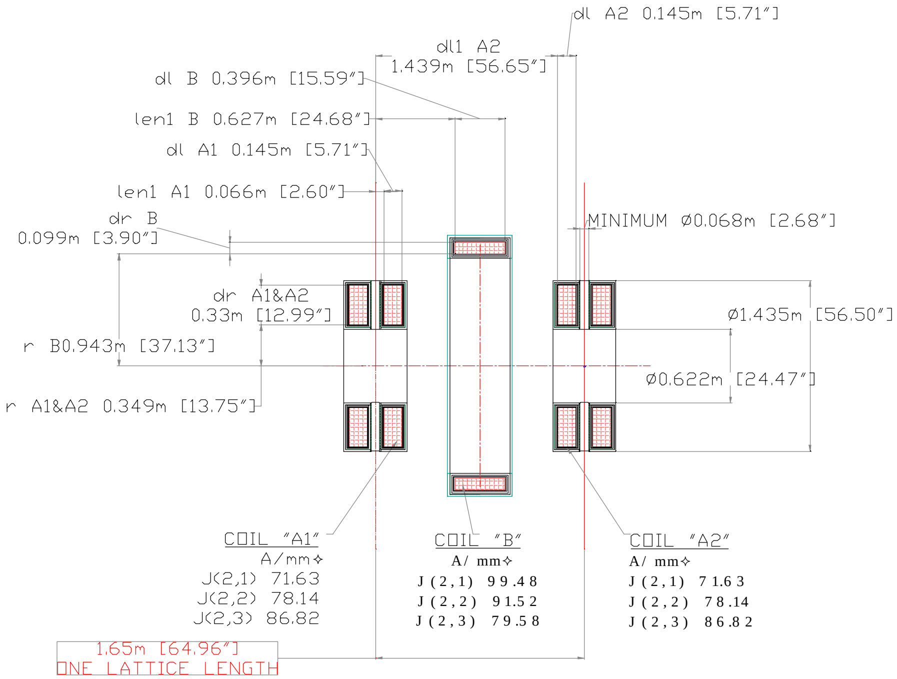
SFOFO 1-solenoids and cryostats with parameters for relative positions on a section of 2 lattices



Location of instrument sensors, control devises, solenoid cryogenic connections, and electrical power supply are in development of design requirements.

This drawing have not being upgraded to the version 5

SFOFO 2-solenoids and cryostats parameters of relative positions for a section of 1 lattice (space between adjacent focusing solenoids need to be increased)



SEE NEW DIMENSN ON SLIDE 6

Cryogenic instrumentation

- Cryogenic engineering requires the measurement of both extensive and intensive properties of cryogenic liquids.
- Transducers are required for liquid level (quantity), both point and continuous systems,and mass rate systems.
- In addition, there must be transducers of pressure, temperature, density, and, occasionally, quality.
- Cryogenic instrumentation shall be regarded as a especial field of measurement requiring new techniques development.
- It should be considered as a separate field of effort because of the high accuracy demand by:
  - **All aspects of safety**
  - **The peculiarities of the cryogenic fluids**
  - **The inherent remoteness of the measurements**