Engineering Change Request/Notice		Number	E	038-0008
Number of attached pages	1			
Project	MACS	Affected Release Number(s):		
Originator	Collin Broholm	I 038-xxxx	S 038-0009	R 038-xxxx
Date	February 3, 2005	I 038-xxxx	S 038-xxxx	R 038-xxxx

Scope

Collimators for detection system

Purpose

Change of detector system collimator specification in response to tests of DXAL on SPINS

Description

The post sample collimator settings are to be changed from 75', 50', and 30' to 90', 60', and 36' respectively. This change is accomplished by changing the open channel blade spacing specification from 1.32 mm to 1.57 mm. The modified section of the top level specification is attached.

Impact (add more sheets if necessary)

Performance	Schedule	Budget
In tests of the DXAL system on SPINS it was found that the intensity loss from 75' collimation is more than a factor two. There is a need for a coarse collimation option in the detector system to help suppress background with a limited effect on resolution and intensity. This is what the new set of collimation options will accomplish.	No impact on schedule as collimator procurement is only just starting.	Limited savings because there will be less blades in the collimators.

Change Board (from Release)		Disposition	☒approved ☐disapproved	
1	Tim Pike	6	Don Pierce	E
2	Collin Broholm	7	Charlie Glinka	038-0008
3		8		
4		9		
5		10		

4.2.2 Four different collimation options shall be available by introducing segments of parallel beam collimators into the scattered beam path. All channels of the detection system shall have common collimation settings at all times. Each channel shall have two collimator segments, A and B, with active lengths 60 mm and 90 mm respectively and ordered in that sequence away from the sample.

The open collimating channel width between blades shall be 1.57 mm. The blade thickness shall be minimized and shall not exceed 0.075 mm. It shall be possible to introduce A, B, A+B, or no collimator into the detection channels, corresponding to 90', 60', 36', and 120' FWHM beam divergence respectively. Clearance space between collimators A and B, before collimator A, and after collimator B shall be minimized with a target of less than 5 mm. When both collimators are engaged, the blades of the collimators for a single detection channel shall be parallel to within $\pm 0.05^{o}$ and shall be in transverse alignment to within ± 0.04 mm.

The collimator frame shall be made from non-magnetic steel or ^{10}B:Aluminum. The volume between collimators shall be filled with material with similar B/H ratio as 30% boron-loaded polyethylene. The collimator opening shall be minimized while allowing view of a 20 mm wide by 40 mm tall sample with a horizontal divergence of 1.5^{o} and a vertical divergence of 8^{o}. When a collimator is disengaged, the transverse dimensions of the open channel segment at beam height shall be minimized while allowing view of a 20 mm wide by 40 mm tall sample with a horizontal divergence of 2^{o} and a vertical divergence of 8^{o}.

4.2.3 Double crystal PG(002) analyzer system covering the range of scattering angles from 40^{o} to 140^{o}. The width of the blades shall be 60 mm. **The mosaic of the crystals making up the analyzer blades shall be 1.4 times greater than for the monochromator and the thickness shall be 2 mm. The analyzer crystal that is in direct view of the sample shall deflect neutrons towards the right as viewed along the direction of travel. This is the opposite sense of scattering compared to the monochromator.** Both analyzers shall have fixed vertical focusing with a radius of curvature of 500 mm and their height shall be 180 mm. The axis of rotation for each analyzer shall pass through the center of mass of the crystals to within 1 mm. The direction of translation for the first analyzer crystal shall coincide with the nominal centerline for the corresponding detection channel to within 0.03^{o} and 0.5 mm. The detailed specification for the double crystal analyzer system shall be provided separately.

4.2.4 There shall be two cylindrical ^{3}He detectors associated with each channel. One detector shall immediately follow the first crystal and view the sample through the collimator, and one detector shall follow the second crystal. Both detectors shall have a partial ^{3}He pressure and thickness to achieve 90% detection efficiency for 15 meV neutrons over the full width of the detection channel. The height of the detectors shall be minimized under the constraint that they shall be