FRMS PDR Summary

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Calibration Facility

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FRMS PDR Summary – 23/11/99

FRMS PDR Attendees:

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PDR Summary:

1. There are no apparent show-stoppers in the design as described in the PDR document.
2. Filter selection is crucial to the performance and stability of the instrument.
3. Filter angular attenuation and acceptance angles should be specified.
4. Stray light effects should be considered, especially in the following areas:
   i) Filter reflections artificially increasing radiance levels.
   ii) Reflections within the input tube; input tube baffle design.
   iii) Stray light around the filter wheel and chopper blade.
5. Do not directly illuminate the input tube.
6. System thermal stability is critical.
7. Non-reflective coating selection somewhat critical.
8. Measurement and elimination of system aging by calibration.
9. Is detector saturation a problem?

Discussion

1. None.
2. Filter design, substrate material, fabrication, and sealing all contribute to filter performance. Filter requirements must be better defined for optimal filter selection.
3. Filters are mounted and rotated on a plane perpendicular to the input tube axis. The angular relationship with the axis will not change. Angular attenuation and acceptance angles are non-critical parameters.
4. Stray light effects will be reduced or eliminated, as appropriate.
   i) Filter reflection effects need to be modeled and analyzed.
   ii) Input tube reflection effects and baffle designs need to be modeled, analyzed and optimized.
   iii) A light-tight seal will be implemented to eliminate stray light around the filter wheel. A tortuous path will be implemented to minimize stray light around the filter wheel
5. Existing sphere source baffles and mount positioning should be adequate to eliminate direct illumination of the input tubes. A Spectralon (teflon) plate will be mounted in front of the input tubes to reduce the effective port area.
6. Heaters will be mounted within the FRMS support structure to set and stabilize system temperature.
7. Martin Black, an aluminum anodization process, was suggested as the non-reflective coating. An additional suggestion was Nickel Phosphide. Any

coating which absorbs sufficient energy in the wavelength region of interest, and which is sufficiently durable, may be used.

8. A calibration process and schedule must be defined. The NIST Irradiance Standard Lamp was suggested as the calibration reference.
9. Radiometry calculations need to be made to determine if the detector will saturate. These calculations will also determine whether or not filter throughput is adequate.

Action Items

- Analyze filter throughput, detector saturation, and stray light contributions.
- Model baffles and reflection effects.
- Determine environmental thermal rise.
- Add heaters and system temperature control to design.
- Investigate and select non-reflective coating.
- Define calibration process and schedule.
- Define and investigate filter parameters and select filters.

Comments

The FRMS design is not complex, and presents no roadblocks. Certain aspects of the design must be examined carefully, with the goal of optimizing short- and long-term stability, filter selection being most critical.

The FRMS Engineering Model will be designed, fabricated, and tested to ensure the design is truly stable. After proving the FRMS design, the FRMS Engineering Model will be relegated to the Source Aperture Mapper detector head role. This way, the investment in the Engineering Model will not be lost.

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