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JUNO

JIRAM Thermal Consideration

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The aim of this formal note is to clarify the behaviour of the JIRAM instrument, with the environment temperature, both in cruise and in routine.

The full science performances of the JIRAM detectors are guaranteed up to 95K. This does not mean that JIRAM can not operate with higher temperatures, where the science performances are not longer guaranteed.

The onboard compression algorithm doesn't work properly with temperature higher than 105/110K, in fact in such conditions the compression technique on science data are not recommended, also because the Signal-to-Noise ratio is too low to permit an adequate scientific investigation on the collected signals.

Beyond the temperature limits of full science performances, there are also others temperature limits to prevent the damage of the following JIRAM devices:

1. Calibration Lamps
2. Detectors
3. Mirror Motor
4. DPU

The above devices are protected by the onboard SW, disabling the usage, if the following thermal limits will be exceeded:

1. SP_MAX_LAMP_TEMP = 170 °K (Maximum allowed temperature for the Lamps)
2. SP_IR_SAFE_TEMP = 200 °K (Maximum temperature to operate the Detectors)
3. SP_MOTOR_SAFE_TEMP = 200 °K (Maximum temperature to operate the Mirror Motor)
4. SP_DPU_OFF = 373 °K (Max temperature for the Digital Processing Unit)

The only peculiarity is in the forth thermal control (SP_DPU_OFF). If the temperature exceed the limit of 373 °K a request of SAFE ME transaction will be sent to the SC, that means JIRAM Powered Off.

Concluding, the JIRAM instrument can be operated at any temperature, thanks to the onboard SW protections, that will automatically prevent operations outside the subsystems working limits.

Reference Documents:

JIRAM-GAF-RS-004_rev02(Instrument Functional Requirement Document)

JIRAM-GAF-MA-001 JIRAM USER MANUAL_rev2