

# IUE SCIENCE OPERATIONS NEWS

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## CHANGES TO THE OBC HEATING RESTRICTIONS

The IUE Project has recently implemented new on-board computer (OBC) heating restrictions. This new directive permits longer observations when the OBC is hot (55.8 C) and thus gives GOs somewhat more flexibility in planning their observations. However, after a prolonged heating period, the spacecraft must be slewed to a low beta to cool the OBC. This extra overhead should be absorbed by the program that heats the spacecraft. In addition, some revisions have been made in the expected "hot" beta ranges, based on engineering data. A copy of the policy is included in the "IUE Project Policies and Procedures" handbook, which was mailed to all twelfth-episode GOs and is reprinted in this newsletter.

The IUE engineers and spacecraft analysts have found that the use of the OBC "halt" instruction has reduced the OBC temperature by perhaps half a degree. It is premature to draw solid conclusions, but the new policy and the halt instruction seem to have relieved the impact of hot OBC restrictions on science observations to a moderate but significant degree. The real test of the new policy will come during this winter's observing season, when OBC heating is the greatest.

## SOLAR PROTON STORMS AFFECT IUE

The extreme activity maximum which the Sun is currently approaching has been felt by IUE. On a few occasions in the last few months, solar proton storms have produced anomalous radiation conditions which have affected IUE's cameras. When this happens, a significant radiation background is experienced during the normally low radiation VILSPA and US1 shifts. The radiation background during the US2 shifts is also increased.

Thus far the proton storms have been infrequent, but they appear to have the following characteristics. The IUE Observatory receives a notice from the U.S. Space Environment Laboratory Service Center that a proton storm is expected or in progress, based on weather satellite data. The Flux Particle Monitor (FPM) reading reaches values as high as 1.5 volts. However the exposure level on the cameras is significantly higher than the FPM reading would indicate. Under normal circumstances, FPM = 1.5 volt would indicate a radiation background of about 30 DN/hr. During a proton storm, the background might be 230 DN/hr for the SWP and 800 DN/hr (for some reason the LWP is especially affected by the protons.) The FPM and the radiation background gradually decrease, returning to normal in 2 to 3 days.

For GOs, observing during a proton storm is complicated by the fact that the FPM does not give a correct indication of the true radiation background affecting the cameras. This is thought to be due to the FPM's sensitivity cutoff of 15 Mev for protons. Most of the protons in the storm are likely to have lesser energies and are thus not detected by the FPM. However they can and do affect the cameras. Two effects are seen. First, protons hitting the camera target appear as discrete "hits" and "comets". These are normally seen in long exposures, but during the proton storm they are much more numerous. The second effect is a general radiation background all over the camera, similar to what is normally seen due to electrons in the Van Allen belts during US2 shifts. The general background is thought to be due to Cerenkov radiation as the protons pass through the camera's MgF faceplate.

IUE Guest Observers may wish to be prepared in case a proton storm affects their observing runs. A backup program of targets with relatively short exposure times would help insure that some good use is made of the observing time. The anomolous radiation from a proton storm can clearly compromise a program requiring a low radiation background. GOs whose programs have been severely affected may request observing time compensation from the IUE Project Scientist.

#### FES REFERENCE POINT SHIFTS

Reference points shifts continue to occur after use of the aperture mechanism. The shifts that have been experienced over the last year have often been sizeable, up to 5 arcsec. This problem can have a serious impact on subsequent observations obtained during the next observing shift, especially for observations of faint targets which must be acquired by blind offset. Consequently we now require Guest Observers who wish to cycle the aperture mechanism to seek approval from the IUE Project.

Please note that the aperture is used not only when the star field is crowded or in performing small aperture observations of extended sources, but also when wavelength calibration spectra are obtained. The frequency of the wavelength calibration spectra obtained by the Observatory has been reduced because of the reference point shifts. In addition, the standard wavelength calibration observations are explicitly listed in the observing schedule so that they may be taken into account in the construction of the schedule.

The reference point shifts are thought to be due to electronic interference between the aperture mechanism and the FES. The problem occured during IUE's early years, but went away for a period of time. The shifts started occuring again in late 1986 and quickly became noticeably large. The IUE staff will continue to monitor these shifts.

## AUGUST 1989 SHADOW SEASON

IUE successfully completed its 24th shadow season. It was considered likely that this time it would be necessary to turn off additional equipment to conserve power during the deepest shadows. Extensive preparations were made for this eventuality. Discussions were held with IUE engineering staff concerning the order in which systems would be powered off and the procedures that would be used to turn them off and on again. Ground-system software changes were made and tested. As it turned out, the batteries performed very well and it was not necessary to turn off additional equipment beyond what has been done during prior shadow seasons. However, in some future shadow season additional power conservation measures will be needed.

## TWELFTH-EPISODE SCHEDULING

The IUE schedule continues to be very tight. There was heavy demand for time during the summer when the beta constraints are least restrictive. The month of August was complicated by four targets-of-opportunity, simultaneous IUE observations during the Voyager encounter at Neptune, and shadow season. October shifts were oversubscribed by over 2 times the available observing time. As usual, the OBC heating constraint is expected to be a problem during the winter months, even with the new OBC heating guidelines.

## DEVELOPMENT OF THE ONE-GYRO/FSS SYSTEM

The RAs are conducting testing of the one-gyro plus FSS mode using the ground computer simulator. Tests of the two FES mode of operations have recently begun. A primary goal is to work out the operational procedures to perform target acquisitions, which will be more complex on this system than on the two-gyro/FSS mode.

The RAs are working on mapping out all the holes and slots in the aperture plate. This is necessary because the FES will be used to control pointing in the one-gyro mode. If the star falls into a slot, accurate pointing control would be lost. The locations of the various hazards will be incorporated into software used to assist in performing acquisitions.

Currently the one-gyro mode could be used to control the spacecraft in the event of a gyro failure, but some further testing would be needed before science operations could begin. Contingency plans are being made to deal with a gyro failure, including implementation plans, notification of staff members and GOs, rescheduling science programs, and so forth. Additional information on the one-gyro mode may be found in the article "Ask Dr. Gyro" in this newsletter.

## THIRTEENTH EPISODE FOR IUE

The thirteenth episode announcement and proposal instruction packages have been sent out. Proposals should be received by December 15. No major changes to the proposal instructions from last year have been made. However the Observatory encourages electronic submission of target lists this year to aid in reducing the staff workload in typing in all the target lists. Proposers contemplating difficult observations are encouraged to discuss them with the IUE Resident Astronomers before the proposal is submitted, so that the program is not unnecessarily downgraded during the peer review due to feasibility concerns. The IUE peer review is scheduled for the first week in March.

## REMOTE AND SERVICE OBSERVING

Remote and service observing continue to be popular with GOs. In the last year, about 15 percent of all shifts were conducted remotely and 5 percent by service observing. If you are interested in having your observations performed through service observing, please study the guidelines which are published in this newsletter. Your request should be sent to the IUE Observatory at least a month before your shifts are scheduled.

## NEW FES REFERENCE POINT

The Resident Astronomers are currently working to implement a new FES reference point (RP). The RP is the location in the FES field of view at which a target is centered before it is placed accurately into the center of the aperture prior to an exposure. The difficulty encountered with the current RP at FES  $x = -16$ , FES  $y = -208$  is that, due to eleven years of use, the sensitivity has decreased significantly. The result is a localized spot of degraded sensitivity. This spot produces two problems. First, the FES counts measured for a star can be influenced by how well centered the star is within the spot. If the FES counts are obtained when the star is a few arcsec off center, the photometric conversion of counts to magnitudes is incorrect. In addition, the sensitivity degradation makes it harder to acquire a faint target. An object which previously was just bright enough to acquire directly with the FES may now require acquisition by blind offset.

There will be little or no impact to our Guest Observers' programs due to this change. However the new RP will require a new photometric calibration. Previously published calibrations relating FES counts to magnitudes apply only to the older RP (see for instance the FES articles in this newsletter). The revised FES calibration under development by the IUE Project will likewise apply only to the older reference point. The new RP will be implemented sometime in the next six months or so.

## ENHANCED GUEST OBSERVER SUPPORT CAPABILITIES

IUE observers may now dial in by telephone or log in via SPAN to the IUESOC MicroVAX computer to use our GO support software. You can check the latest IUE schedules, compute betas, review observing constraints, and read an IUE bulletin board. Remote observers can generate scripts and print them out in the observing room. Please contact an IUE Resident Astronomer for the account and password name.

## MOTEL CHANGES NAME, CONFUSES GOS

Recent visitors to Goddard may already know that the Royal Pine Motel, on Route 1 in College Park, has changed its name to Econo Lodge. This has caused some consternation among recent visitors, since the sign in front of the motel has been changed. From what our Guest Observers tell us, the fact that the motel is no longer a Best Western may be significant.

## WEATHER FORECAST

Solar proton storms are expected for the duration of the solar activity maximum. Guest Observers are advised to bring lead-lined umbrellas and galoshes.