



## MEMORANDUM

**TO:** QSO Team, Astronomers, OAs, Derrick Salmon  
**FROM:** Pierre Martin  
**DATE:** 01/11/2001  
**SUBJECT:** QSO Mode: Guidelines for the Observing Runs

*QSO-014/DRAFT*

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### *1. QSO Operational Model*

Starting on January 29, 2001, a large fraction of the observations for CFH12K will be obtained in the Queued Service Observing (QSO) mode. The QSO mode will be applied during 58 nights for the semester 2001A. Since the observations will be selected, carried out, evaluated and distributed by the CFHT staff, it will be a different way of gathering observations at our facilities. The QSO mode requires a particular operational model based on specific actions for the individuals involved in the observations.

This document presents some guidelines for this operational model. During a given QSO run, this model involves the following individuals:

- Queue Coordinator
- Service Observer
- QSO Software Support Person
- Observing Assistant
- CFHT Director and/or Senior resident Astronomer

The precise role played by these individuals during the QSO runs is described below. Please note that the activities described refer only to the QSO/Elixir modules; the specific actions required for DADS are not included.

### *2. Queue Coordinator*

#### 1) Role Description

The Queue Coordinator (QC) plays an essential role during a QSO run. The QC is assumed by one of the CFHT Resident Astronomers. During a QSO run, the coordinator plays the role of "support astronomer" for the service observer but his/her tasks do not stop there. It goes beyond the QSO run, for example, for assisting DADS in the distribution of the data taken under his supervision, or providing the relevant TOM reports. The QC also must work during the weekends... The general role of the QC is the following:

- General management of the QSO run: Problem assessment, efficiency evaluation, filter changes, partner shares, special requests, night reports, statistics.

- Evaluation of the data following the service observer's own recommendations.
- Management of the QSO database (validation of exposures, OBs and OGs)
- Preparing of the tentative queue lists for each individual nights, after reviewing the current content of the QSO database, and instructing the service observer.
- Acting as the contact point between the QSO Team and the investigators, if necessary, through the QSO helpdesk.
- Review the Target-of-Opportunity (TOO) requests with the CFHT Director and/or Senior Resident Astronomer.
- Supporting the service observer during the QSO nights, in case of problems with the programs.
- Supporting the Elixir/DADS Teams in their data assessment and distribution.

## 2) Specific Tasks

### i) QSO Run Management

*Programs.* For a QSO run, it is important to have a complete overview of all the programs stored in the database. In particular, programs requesting special conditions (i.e. time constraints, fast data delivery), non-standard filters (i.e. CN, TiO), specific target selection (i.e. target present during a very small fraction of the current semester), or TOO programs, must be *identified in advance of the QSO run*. If appropriate, these programs can then be integrated in the queues by the QC or the service observer. The key point here is to not miss programs that have to be undertaken under special circumstances and/or during specific time-constraints.

*Partner Shares.* The QC is responsible for following the progress of the programs of the different agencies during a QSO run and the semester. The tool provided in the queue scheduler can be used for this monitoring of the partner shares. Regarding the status for the programs, time left in the semester, grades and ranks, the QC has the authority to introduce programs in the queues to achieve the appropriate shares of observing time. The QS must instruct the service observer about this decision.

*Filter Changes.* By keeping a constant attention to the programs stored in the database and their progress during a semester, the QC must provide instructions on the filter changes required for certain periods of queue observing. As much as possible, these changes will be limited in number in order to facilitate the execution of the calibration plan. If possible, a set of filters should be mounted for about a minimum of 3 days. Under exceptional circumstances, if a filter change is required during an observing night, this needs the approval of the QC.

*TOO.* If target-of-opportunity programs must be informed the service observer of the availability of observations for this type of programs. For unpredictable TOO, the QC must review the current status of the QSO run and discuss with the CFH Director or Senior Resident Astronomer about the inclusion of this TOO in the queue database.

### ii) Queue Preparation

*Program Selection.* During the day prior to every observing night, the QC must prepare several queues with the assistance of the queue scheduler software. The program selection is done according to diverse criteria, based on the knowledge of the stored programs, e.g. completeness, target positions, grade and rank, constraints, partner shares, etc. *Several tentative* queues (~5) should be prepared in advance for different sky conditions so that no time is wasted in preparing the queue during an observing night. Of course, these queues can be revised and changed during the night by the service observer.

*Calibration Plan.* The QC is responsible for the selection and the inclusion of the appropriate calibrations in the queues (“detrends” and astronomical calibrations). *It is crucial that all the appropriate calibrations must be taken before the end of a QSO run.* If a filter change is requested, the QC must review the impact on the calibration plan. The standard star fields should be defined before the QSO run starts with the special programs in PH2 available to the QSO Team.

iii) Data Evaluation

*Individual Exposures.* Each individual exposure taken after a QSO night must be validated by the QC. In particular, the QC will review all the comments done by the service observer regarding individual exposures and confirm (or infirm) their quality control classes, as entered in the electronic logbook. For instance, *the frames should be evaluated according to the constraints requested during the Phase 2.* The QC will request the assistance of the Elixir team if he/she is uncertain about some specific data.

*OBs and OGs.* After validating the individual frames, the QC must ensure that the validation of the OBs and the OGs have been performed correctly.

iv) QSO Database Management

*Observation Validation.* The QC is the only person during a QSO run that can change the status of the individual observations, observation blocks or observation groups from “executed” to “validated”. When one OG is fully validated, it cannot be introduced in the queue again. This validation process is executed from the Electronic Logbook, following the data evaluation.

*Statistics.* The QC must regularly evaluate the statistics of the programs in the QSO database (i.e. partner’s shares, grade distributions, filters, program completeness, etc.) and makes the appropriate decisions regarding the programs included in the queues.

v) Contact Point

The QC is responsible for answering all the requests sent by the investigators during a QSO run. If a problem occurs with a particular program, the QC must contact the investigators (PI), describes the problem and requests that further instructions are sent within a reasonable period of time.

vi) TOO

The QC must review the target-of-opportunity programs requested during the semester. His role is to evaluate if it is technically feasible in the QSO mode and yes, if the constraints are realistic in the current context of the other stored QSO programs. If the program is accepted, the QC must prepare the appropriate OGs according to the specifications sent with the TOO form.

vii) Night Support

In case of problems with the programs included in the queue, technical problems with the QSO tools, or significant time lost, the QC must be informed and reacts as being the support astronomer for that night.

viii) Elixir/DADS

The QC will review the progress of the Elixir and DADS teams during and after a QSO run. He/she must be able to provide

the necessary information on the investigators and their date to these teams, if necessary.

### **3. Service Observer**

#### 1) Role Description

The service observer (SO) has one specific but crucial role to play in the QSO mode scheme: *To acquire the observations under the sky conditions and constraints requested by the investigators.* To accomplish this complex task, the SO is supported by the QC and by an ensemble of software tools. *The SO must be very familiar with the CFH12K camera, operation of all the QSO/Elixir Tools, and the science content of the diverse programs in the queue.*

#### 2) Specific Tasks

*Queue preparation.* The SO will review all the queues prepared by the QC during the day prior to the observing night. During the night, the SO will run the queue scheduler and modify or create queues by selecting observations adapted to the current conditions. Hence, *the service observer is the last authority on the content of the queues executed during the night.*

*Data Acquisition.* The service observer will execute the observations automatically through the Observing Tool and control all the data acquisition process. This include the diverse astronomical calibrations. For the detrend, the frames should be taken in the weekend as much as possible. The QC can help for their acquisition.

*Data Evaluation.* The SO will rapidly evaluate each individual exposure taken during the night. The evaluation is done in three steps: 1) Check if the image meets the constraints specified during the phase 2 ; 2) Verify for any irregularities (bad focus, satellite trace, saturation, etc) ; 3) Write comments in the electronic logbook (if relevant) and give a quality class (1-4) according to the following criteria: **1** - Perfect image, fulfilling all the constraints and specifications; **2** - Very good image, except one of the sky constraint might be outside the limits specified by about 20% ; **3** - Image with one or more characteristics clearly outside the constraints specified but might still be useful; **4** - Image with one or more problems, probably useless for the science program.

*Filter Changes.* The SO can be instructed by the QC that a filter changes is necessary and that he/she should change the filters in the wheel before a given night. The SO might instruct the QC about constraints encountered that can alter the selection of the filters mounted (i.e. if a filter change was planned for the next night but if some images with a given filter to be replaced could not be obtained during the current night).

*QSO Administrative Issues.* After each night, the SO must 1) Estimate how the time was spent during the night (i.e. time lost to weather); 2) save the electronic logbook; 3) print the logbook and file it in the relevant folder; 4) Write a short report to the QSO Team, including problems and suggestions; 5) Inform the OAs of planned filter changes or the intention of running calibrations in the morning or early in the evening.

### **4. Software Support**

#### 1) Role Description

On the technical side, the QSO project is essentially an ensemble of complex interacting softwares. It is important to avoid wasting telescope time due to bugs or crashes. During each QSO night, the QSO Team will provide support for all the software (and hardware) related to the QSO operations: Database, PH2, Queue Scheduler, Queue Preparation Tool, Observing Tool.

#### 2) Specific Tasks

*Night Support.* One (or more) member of the development and implementation of the software for QSO should be prepared to provide rapid support during the observing night, including the possibility to run the tools from their remote sites for debugging. In case of problems, the individual(s) involved must write a report to the QSO Team (not the observer!) describing what the problem was and how it was fixed.

*Software Modifications.* If an important modification must be done on one of the software components after an observing night, this must be done in agreement with the QC and as much as possible, be tested before the beginning of the observing night. Again, this must be documented.

## **5. Observing Assistant**

### 1) Role Description

As usual, the main task of the Observing Assistant (OA) is to operate the telescope and all its subsystems. In the QSO era, telescope slewing will be initiated by the service observer. However, the guide star acquisition remains entirely under the responsibility of the OA. Even if the observation system will be more automated, the OA should keep a eye on how things are going and what is planned for the rest of the night.

### 2) Specific QSO Tasks

*Pointing Accuracy.* The OA is responsible for evaluating the pointing accuracy of the telescope during an observing night. For instance, since the same fields might be observed several times during a night, if the pointing is changing, it should be notified and discussed with the SO. We are not promising better than 10" during the actual phase 2 but some programs might require a higher accuracy so centering on SAO stars nearby targets might be necessary.

*Weather Evaluation.* The OA is responsible for the evaluation of the weather conditions, especially if the sky is photometric or not. Any apparent change should be discussed with the observer.

## **6. CFHT Director and Senior Resident Astronomer**

### 1) Role Description

The CFHT Director and/or Senior Resident Astronomer have two roles during a QSO run: 1) Evaluate the merit of the TOO proposals and discuss their inclusion in the queue database with the QC, if the proposal is accepted. 2) Act as the final authority on any conflicts arising between the investigators and the Queue Coordinator.

## **7. Technical Issues**

### 1) Calibrations

An advantage of the QSO mode is the possibility to share the calibrations between several science programs. However, carrying out of the calibration plan, in particular for the "detrend" frames, introduces some operational constraints.

*Biases/Darks.* As much as possible, a minimal set of biases and darks should be obtained early in the observing run. However, the complete set of darks should be obtained during the weekends to avoid interfering with the daycrew activities. These calibration sequences should be planned by the QC/SO and executed during the day. To avoid having the lights turned on accidentally during these sequences, the OA should include a message in the Obslog. A note should be left by the SO in the control room and elevator. As much as possible, in case of bad weather, these sequences should be performed during those nights.

*Flatfields.* Twilight flats are a necessity with CFH12K observations. The flats to be undertaken will be selected by the QC/SO. Experience has shown that the sky should be devoid of cirrus for obtaining good flats. It is then requested that the OA and the SO are fully ready early at the beginning of the night to optimize the number of twilight flats obtained. If the conditions are good, morning twilights should also be performed. The OA/SO should remain at their station until these sequences are completed.

## 2) Filter Changes

If the QC decides that a filter change is necessary, this has to be done *before* the beginning of the twilight flat sequence, unless specified otherwise. The filter change must be performed by the SO or the OA so that means that they might have to come a bit earlier than usual in the afternoon. However, as much as possible, the QC will ask a member of the daycrew, familiar with the procedure, to do the filter change during the day.