HET Users Committee

Meeting Minutes 2019 November 18

Members Present: W. Cochran, W. Kollatschny, R. Ciardullo, S. Janowiecki, G. Hill, K. Gebhardt, H. Lee, U. Hopp, P. MacQueen. G. Zeimann

Reports on HET instruments and operatons:

* VIRUS: Now have 58 VIRUS units and 71 IFUs deployed. We should have a full complement of IFUs in early 2020. CCD deliveries are continuing. We may need to accept some CCDs that are less than optimal in order to fill out the array.
* LRS2 is working fine. Sensitivity calculations are being finalized.
* HPF: instrument is stable. Comb flux drop has been fixed. Comb relocked to previous location.
* Operations: Aiming for better feedback to PIs on IQ, S/N etc. [See discussion below on the modified priority system.] A challenge now is that PIs are submitting new targets in mid-afternoon that must be observed that night. People need to get things in early!
* Software: advancement of LRS2 pipeline continuing. VIRUS: new code (remedy) is close to wrap up. Can run on parallel observations. Still working on quick-look scripts for HPF.

Hanshin Lee gave a presentation on **HET image quality**. Two relevant pages from that are attached. Cold season (T1) gives the worst IQ. The spec is 1.2” on axis and 1.4” off axis (11 arcmin). What are we willing to settle on? The wind driven component is not an issue for shaking structure. The next step is measuring the actual seeing along HET optical path with a calibration wavefront sensor, perhaps a secondary DIMM on top of structure. We need for users to give guidance for the desired target achieved seeing. Karl and Suvrath will draft statement for Board report.

The **HRS** project has been inactive due to lack of available people and resources. In ~6 months we hope it to be active again. A phased deployment may help it go faster. Many capabilities are already designed and built, e.g. cross dispersers mechanism finished, slits & slitmasks, I2 cells etc. The project needs guidance on fiber sizes. Matthew Shetrone had asked for “as large as possible” fibers for various extra-galactic work. However, image slicing large fibers (R=30k, 2.8” fibers) is difficult. Should we abandon this? 1.8” round and octagonal 1.5” octagonal will be there. The calibration system still open. The facility calibration unit performance for HRS is uncertain. An instrument calibration unit has been designed. Should this be deferred? A wide range of options for resolving powers is now in the design. Should we deploy all of them, or pick some subset for first deployment. We will have most of low resolving powers – those are “easy” slicers to build. Which high resolving powers? Perhaps those using 1.8” fibers as opposed to 1.5” fibers, to simplify the image slicers?

There was significant discussion of the current priority modification system. Users have complained that time critical P0 observations sometimes did not get done. It appears that the priority modification system downgraded their priority because the software was not accounting for time blocked by HETDEX. Subsequent to the meeting, Steven Janowiecki looked at this problem in detail, and sent the report below to the Users Committee:

As requested in our meeting on Monday, I have some details to share about the modified priority algorithm (having finished my slides for the board meeting rehearsal, I'm catching up with this now).

Firstly, this is the current algorithm in use: <https://hydra.as.utexas.edu/?a=help&h=67>

It is complex and dated 2006, so it is worth re-considering whether it still meets our needs in the era of HETDEX and HPF. This policy was put in place originally by the HET Users' Committee to reflect the desires of the users (at that time, presumably), so it is definitely worth reviewing it to verify that it still meets those desires. We want to make sure the users get the most scientifically useful data possible, corresponding to the TAC's priority allocations.

OK, so, looking at that webpage summary, each component can add or subtract from the original priority - note that adding means going to a less important priority (i.e., 3 is "lower" than 2).

The P0 and P4 modifiers are simple and straightforward weightings designed to stretch the dynamic range a little wider.

The "Object availability" modifier looks to see how many possible visits remain in the trimester, and down-weights targets with more chances to observe. This modifier may need improvement since it does not know about sky brightness or conflicts with HETDEX.

The "Max sky brightness" modifier prioritizes targets just near the current sky brightness (I think this could be replaced by a model sky-brightness-sensitive version of "object availability" which would consider how many acceptable visits remain for this target).

The "Completeness" modifier prioritizes targets with multiple visits that have at least some visits completed rather than targets with multiple visits and none completed so far.

The "Filling factor" modifier prioritizes targets near their optimal times so that they have the greatest mirror pupil possible. (NB This seems like it would require real-time mPri calculation, and I know that we only calculate it once a day for each target. I'll need to look in to this one more to understand.)

The "Partner share" modifier prioritizes partners with lower shares.

The "Past due modifier" considers targets with [SYNFREQ](https://hydra.as.utexas.edu/?a=help&h=80#synfreq) settings which are over-due for another observation.

I can see the merits of these modifiers to meet a variety of complex goals.   To me it seems like the primary modifier should be some kind of Comprehensive Object Availability (that is, taking into account sky brightness and HETDEX conflicts). That calculation is not easy to make, but if the Users' Committee thinks it is necessary, we can work towards that. Some of the other existing modifiers are probably worth keeping as well ("partner share" at least), and some thought should be given to how best to prioritize all of the synoptic targets we observe with HPF (both transits and sources we monitor repeatedly).

Also as promised, I wanted to give two examples of current situations where the current mPri algorithm is not ideal:

**1. LRS2 target requesting grey time which is conflicted with HETDEX**

(3C454 in Gary's HET19-3-201 is a great example, unfortunately) Using "grey" time is an excellent way to alleviate a conflict with HETDEX, if your science permits it. HETDEX strictly requires moon-down, so if your target is conflicted with the HETDEX field there will be probably 1 or 2 nights per lunation when the moon is <50% illuminated and has just risen (or is just about to set) and HETDEX (just barely!) cannot be observed but your target is available in grey time. Once the moon is >50% illuminated, we don't get much grey time with the moon up. So Gary's program has a P1 LRS2B+R grey-time target requiring 20min+20min exposures.  Given HETDEX and the sky model, there are probably 6-8 nights in the whole trimester when this target is able to be observed, and (if you ask me) it should win out over almost any other P1 target (except maybe a highly constrained transit observation).

3C454 (Gary's target) has Pri=1.0 and mPri=2.23. The modifiers are:

object availability: +0.63

max sky brightness: +0.0

completeness: +0.6   (0/1 visits done)

filling factor: +0.0

partner share: +0.0

past-due modifier: +0.0

Given it only has a few nights of actual availability, this target is unlikely to be successfully observed.

**2. Non-synoptic P0 targets during HETDEX:**

It is the board's intention to allow up to 10% of HETDEX time to be interrupted for other Priority 0 observations. The modified priority algorithm does not currently incorporate this since it is blind to HETDEX.

Tonight in the observing queue there is an HPF target at P0 with SYNDATE=20191123 (today only!). It has mPri=-0.06 and clearly dominates the HETDEX shots which have mPri=Pri=0.1, 0.5, or 0.7 (depending on the value of PIPRI, which is added to Pri and mPri).

By contrast, a P0 LRS2-B target about a month ago (#2661) required sky =20.5 m/as2 and was conflicted with HETDEX. It had mPri=0.72 and would appear to be lower priority than HETDEX:

P0 modifier: -1.0

object availability: +1.12 (!!!)

max sky brightness: +0.0

completeness: +0.6   (0/1 visits done)

filling factor: +0.0

partner share: +0.0

past-due modifier: +0.0

Clearly when a P0 dark-time target is conflicted with HETDEX it should not be dropped by 1.12 priorities because there are plenty of chances to observe it.

/Users/wdc/HETUC/201911/IQ_p3.pdf/Users/wdc/HETUC/201911/IQ_p4.pdf