

PRELIMINARY DRAFT RECOMMENDATIONS

(from Consortium Time-Exercise activity)

SUMMARY

Given the Senior Review (SR) dictum for spending 80% of available astronomical hours on ALFA surveys, about 1000 hours of telescope time are available in principle to each consortium per year, before sidereal time requirements are factored in.

g-ALFA has a smaller time request of order 2500 hours or ~625 hours per year if over 4 years (or ~835 hours per year over 3 years).

p-ALFA also has a smaller annual time request of order 900 hours per year for time in the galactic window.

e-ALFA has many distributed requests for a total of >7400 hours, with competition existing between its 4 sub-consortia.

Hence g-ALFA and p-ALFA can and should be readily accommodated. The difficulty comes in working through e-ALFA's various requests.

The objective of this document is to suggest a practicable plan for providing access to the telescope for all of the competing surveys, consistent with the dictates of the SR, and the Observatory's response to the SR.

It is anticipated that this document, or its successor, will be reviewed by ASAP

After beginning this exercise, it soon became evident that we were attempting to schedule for the next 12-18 months. Moreover a number of contingencies were going to affect any exercise conducted at this time. In particular, these included the effective completion date of the painting contract for the telescope, and the practical dates for routine availability of the new e- & p-ALFA backends. A practical finding, therefore, is that a time exercise should (at least in the first instance) be a 6 month to 18 month look-ahead.

WORKING ASSUMPTIONS:

That the three consortia, and all of their sub-consortia, are likely to remain in good standing, and hence are to be allocated time.

The three consortia (e-ALFA, p-ALFA & g-ALFA) each have equal dibs on the available survey time at each and every RA, all other factors being equivalent.

In the absence of guidance from one of these consortia, each of its sub-consortia also has equal access to the time granted to that consortium. (e.g. ALFALFA, AGES, AUDES {and maybe ZoA} have equal and equivalent access to e-ALFA time.)

Programs are designated as either primary or commensal: both have equal status in terms of time allotted and telescope access. A commensal program is one that has adapted its requirements so that it can run in the background (or nearly so) simultaneously with the "primary" program. For the purpose of telescope scheduling, only the allocation of time to the primary survey is therefore pertinent, though heed should also be taken to satisfying commensal partners.

Moreover, following AUSAC's Report and recommendations:-

Follow-up observations (even when proposed in separate proposals by a subset of a consortium's participants) are deemed to be part of the time allocated to a consortium's survey, when identified as such in the proposal covering each follow-up request. This follow-up time will be justified and reported on in the annual report submitted for sceptical review by the consortium, together with the progress made on the survey and its results. The Observatory assumes that the internal organization of each consortium and/or sub-consortium will arrange its own consensus as to what is a follow-up observation drawing on its time allocation. All other proposals are deemed to be P.I. proposals.

Division of available astronomy telescope time between survey and P.I. science will be handled as flexibly as possible by the Observatory. In particular, targets of opportunity and VLBI time will not be counted as P.I. time, while at least 20% of all other astronomy time in every RA range is available for P.I. science.

To the greatest practicable extent, once the new p-ALFA & e-ALFA spectrometers are in service, Galactic plane time occurring during daylight hours will be available to p-ALFA as part of its allocation.

FURTHER concerning voiced questions:--

Treatment of Makeup Time:

How, should a telescope or equipment problem occur, such as an ALFA beam being down for GALFACTS, will this be treated in terms of a consortium's time allotment? This happenstance has generally been treated as a charge on the Observatory to provide make-up time to a project when the fault is on the Observatory's side, and not a charge against a consortium's time allocation. It has to be realized though that as most time is now allocated to consortia, and P.I. time is strictly limited, there is a zero sum game here, which is likely to affect every consortium from time to time, so it may even out without special provision for make-up time.

Amending Consortia Proposals:

This question was raised by AGES in particular, as they had not provided for follow-up time in their original proposal. Amendments to the original proposals of consortia or sub-consortia should be part of the annual report submitted for sceptical review, and will otherwise be handled as above.

The dark-time calculation comes from a widget programmed by Mike Nolan, using simple formulae, to determine sunrise and sunset. Its o/p is considered to be definitive for scheduling purposes.

FOCUS:

The biggest single crunch in time demands is for Galactic plane time between p-ALFA (P2030) and g-ALFA (I-GALFA {A2186}; GALFACTS {A2130}). This can in part be accommodated by running P2030 in daytime and twilight hours, which g-ALFA cannot use. AGES has not been granted time in the Galactic plane window at this point, so their fields will not be covered before g-ALFA's surveys there are complete.

AUDS & AGES have conflicting time requirements with ALFALFA, particularly within the 7-14 hr sidereal time range.

TENDERED CONSORTIA ADVICE:

p-ALFA:

p-ALFA can operate in daytime and twilight hours.

p-ALFA has opted to limit its consortium time allocation to the Galactic plane 18:00-21:00 window. They will tend to stockpile any observations they may make from the anticenter 04:30-07:30 window, (and may become commensal there with ZoA).

THIS ADVICE HAS IMPLICATIONS FOR ZoA: see Appendix.

g-ALFA:

- g-ALFA anticipates that A2060 will be 60% complete before this document is approved (remaining time ~130 hr)
- g-ALFA has the completion of GALFACTS (with its commensal partner TOGS2), and I-GALFA as its highest priorities. These will survey all the Arecibo-accessible sky.
- g-ALFA will be content if the initial installments of GALFACTS time falls outside of the Galactic plane window.
- GALFACTS is disadvantaged the moment any beam is kaput.
- GALFACTS would prefer to have its runs in 3 or 6 hr sessions, and to be the predominant survey when run, so if it is necessary to restore a beam by temperature cycling ALFA, no other survey is affected.
- GALFACTS needs a 2-hour block for 6 days for mapping calibrator sources twice a year in addition to its tiles.

e-ALFA:

AUDS has agreed to swap its second field for one centered at 17h RA, with less competition. LST constraints and the painting project push the initiation of AUDS back to Nov 07-April 08.

ALFALFA greatly prefers (and is most efficient) if its fields are uninterrupted.

ALFALFA needs to reobserve its fields after a time-interval of ~3 months so Earth rotation changes the sky frequency relative to rfi

AGES (following sceptical review comment) will swap at least one of its two wished-for "Galactic window" fields for one(s) elsewhere.

GENERALITIES:

The survey programs needing time with primary status are

p-ALFA:

P2030

e-ALFA:

A2010	ALFALFA
A2048	AGES
A2133	AUDS

g-ALFA:

A2130	GALFACTS
A2186	I-GALFA
A2060	Disk-Halo, etc

Disk-Halo A2222 - ~130 hr to complete

SETI is commensal with everyone. The others commensal projects are:--

A2144 for ZoA I & A2152 for ZoA II
A2059 for TOGS & A2124 for TOGS2
A2064 Radio Recombination Lines (RRL)

Note: A2130, A2133 & A2186 are effectively starting from scratch in the coming year, with the first two dependent on the new backends

TIME ALLOCATION EXPECTATIONS

(i) Galactic time window

Is defined as the $18 < \text{LST} < 21$ hr time range of sidereal transit.

p-ALFA has commensal partners in the ZoA, RRL projects. Both commensal projects will use the same I.F. to achieve their objectives, and both are disadvantaged by daytime.

Therefore, about 50% of available (to astronomy surveys) dark-time will be allocated to each of p-ALFA and g-ALFA.

p-ALFA will take up the rest of its time allocation in daylight and twilight hours, and will use these to the maximum extent possible for follow-up observations. Vice versa, to maximize the science throughput of the telescope, p-ALFA will carry out as much of its primary survey as possible in dark time, so that its commensal partners have the capacity to pursue their science.

GALFACTS defers its use of the Galactic time window for two years. I-GALFA will use the whole of g-ALFA's Galactic time allocation in the first two years. It needs ~350 hr in total, which should be completed in 2 yr.

GALFACTS will use the g-ALFA allocation of time in the Galactic window in year(s) 3, & (if necessary) 4. Access to the galactic window forces g-ALFA to anticipate that it will take at least three years for it to complete its GALFACTS survey.

(ii) As the discovery rate of new pulsars is far greater from the inner Galaxy, p-ALFA wants as much as possible of its time allocation to be in the Galactic window. It will accept anticenter time to stockpile reductions, as these are in part man-power and compute-power limited. p-ALFA has therefore opted to become commensal to ZoA/RRL in the anticenter: it provides its excess allocation for anticenter work.

(iii) GALFACTS (with its commensal partner TOGS2) will use the major portion of the time allocated to g-ALFA, (i.e. once A2060 is completed, everything except that allocated to I-GALFA). In the first two years this should be devoted to two (3 or 4) sidereal time ranges, one (or 2) being in the anticenter; e.g. GALFACTS could run from 00-03 h or 00-06h, as ease of scheduling suggests.

GALFACTS preferred scheduling in the first year:

1) A 6-hr slot centered on R.A. = 5hr30min for Dec. coverage NORTH of the zenith.. Allowing 30 days for full coverage, and 15 min per day at the start to set up, slew the scope, smart frequency switching for TOGS2, etc., this would require about 187.5 hr to complete. This region would be centered in R.A. on the Galactic plane

in the northern anticenter.

2) A 6-hr slot centered on R.A. = 6hr30min, for Dec. coverage SOUTH of the zenith. This region would be centered in R.A. on the Galactic plane in the southern anticenter. This would actually include our small pilot region, which would be a useful cross check. Time requirement is as for (1).

3) A 6-hr slot centered on R.A. = 14hr30min, with maximal Dec. coverage NORTH of the zenith. This would contain the outer shell gradient of the North Polar Spur. There is also a strip of blanker sky outside the NPS (north of it) that could be a useful comparison region in polarization. Time requirement is as for (1).

With allowance for the calibrations (see above) GALFACTS total observing time for the above request would be 586.5 hr.

Adding ~175 hr for I-GALFA, and 130 hr for completing the disk-halo observations of A2060, gives a g-ALFA total of 892 hr. The residue from this tally, which increases every year (in the first by dropping A2060, in the second by completion of I-GALFA), is available to RRL for use in the anticenter region.

The rest of this exercise is concerned with fitting the various e-ALFA requirements into the rest of the schedule. Given an expectation of about 1000 hr per year of dark-time, EACH e-ALFA subconsortium has a starting expectation of ~330 hr/yr.

AT THIS TIME (in order of long-term template schedulability)

AUDS will be preferentially scheduled in its two windows ahead of AGES and ALFALFA. AUDS will not be scheduled in the Galactic time window. Its 17 +/- 1 hr window is accessible from 27 March - 07 August; its 07:15 - 09:00 LST window from 06 Nov - 05 Apr. AUDS should expect to get of order 330 hr yearly.

ZoA is commensal with p-ALFA in the galactic window, and its time there follows from the normal 50% allocation of dark time there, as advised above for p-ALFA. ZoA is "nominally an equal tri-partite partner" with p-ALFA and g-ALFA (via RRL) in the anticenter. It will accrete time via its commensal partners in the anticenter, with minimal draw down on the tally of time allocated to e-ALFA (cf Appendix). [Following the Appendix, neither ZoA nor RRL needs to be sceptically reviewed for the sole purpose of becoming "primary" in the anticenter window. ZoA (representing p-ALFA and RRL) should be allocated anticenter time as possible - in the first year, after the GALFACTS allocation.]

The time requests for GALFACTS will move to different sidereal time ranges in years 2, 3 (& 4!), which will accordingly influence the time assignments available for AGES and ALFALFA. A fixed template for ALFALFA and AGES for even a small number of years would be disadvantageous to each of these sub-consortia. The allocation of time to both must therefore be handled year by year in close consultation with both of them. Special concerns, such as (i) completion of an area for a thesis or paper, or (ii) enabling an initial paper from a sub-consortium, will be accommodated whenever feasible,

ALFALFA has its efficiency maximized if given intact time segments. For its 7:15-16:45 hr window, it should be given preference over other e-ALFA surveys from 27th Feb to 6th April whenever that serves their needs and they request it: ALFALFA requested 33 of 39 days per year, or 84.6% of total telescope time in that window. That translates to 313.5 hr/yr, which just about accounts for ALFALFA's annual

allocation. It should be given this particular sidereal time interval ahead of any P.I. time (provided the P.I. programs are schedulable at dates around it).

AGES can operate in time segments of an hour, and needs to accrue time from telescope assignments that are longer than the basic 2.5 hr unit of a single AGES field. Given the greater flexibility for efficient use of telescope time possible for AGES, its allocations should be fitted in around the central considerations outlined for all of the consortia and sub-consortia here. Nevertheless existing mock schedules find some difficulty in according AGES its due allowance of time: this difficulty will be closely monitored to ensure their equity in time allocation.

AGES and ALFALFA have conflicting time requirements, which are acute in the 7 to 14 LST range. ALFALFA's need for reobserving its tiles with an offset in time should ensure the possibility of AGES reaching all of its fields with patience, as the detailed year by year program is likely to vary.

AGES vis a vis ALFALFA for the next 12 months

From Jan 1st 2006 until May 2007, ALFALFA accumulated 1348 hr, while AGES managed just 276 hr. In 2007, until the painting started, AGES accumulated 88 hr whereas ALFALFA managed 304 hr. 2007 is an unusual year with the telescope shut down for at least 12 weeks. But equal dibs at available time mandates putting AGES into the schedule for the rest of 2007 through June 2008 ahead of ALFALFA whenever that serves to further the completion of the AGES program (: even so, due allowance still needs to be accorded to factors such as the timely completion of ALFALFA tiles, thesis completion, etc.)

{time-tool presently at <http://www.naic.edu/~gomathi/aoschedulea.html>}

ONGOING COORDINATION

The production of this document took half a dozen meetings. It may in practice be difficult for any template of the kind currently envisaged to continue to have sufficient validity and guidance for the telescope scheduler over many years. The consortia time exercise meetings should be reconvened at the request of the scheduler, or any of the consortia P.I.s if this can aid the Observatory in expediting the conduct of the ALFA surveys.

Appendix: Joint Primary Programmes!

Within the framework suggested for accommodating the time requirements of the various sub-consortia, some potential questions of equity arise when part of a sub-consortium's time is granted as a commensal partner, while some is granted as a primary. These are artificial distinctions, but the equity questions need resolution. This appendix is concerned with presenting this resolution.

context:

ZoA (a part of e-ALFA) had expected to run its programme entirely commensally with p-ALFA. Further the RRL group (a part of g-ALFA) expect to run commensally with ZoA, as they share the same I.F. The decision by p-ALFA to concentrate their time request to the galactic plane window, if left to itself, requires ZoA to become primary in the anticenter for it to obtain access to time there. Yet p-ALFA then anticipates becoming a commensal partner of ZoA in the anticenter. Further, one result of driving ZoA into becoming primary is that e-ALFA then has four sub-consortia vying for time. How is ZoA to be

treated in time-allocation matters? How RRL?

resolution:

Stepping back for a moment, we know that p-ALFA under the most optimistic projection for its hours in the galactic window, can only expect to get 800 to 900 hours of time there in any year. This leaves them with 100-200 hours available to contribute to work in the anticenter. Likewise, after the disk-halo studies conclude in the next 12 months, g-ALFA will have a tally of hours well below the equity anticipated tally of ~1000 hours per year: RRL can draw on the residue of this time for their work in the anticenter.

With these considerations in mind, the granting of time to ZoA (part of e-ALFA) in the anticenter can be accommodated, in terms of equity, if at the very most a third of their tally of hours in the anticenter is allocated from the e-ALFA tally. However in most years the surplus of otherwise unexpended p-ALFA and g-ALFA hours suffices to provide for the needs of ZoA, without ZoA drawing down on the tally of hours allocated to e-ALFA.

The overriding objective of the Observatory is to secure the throughput of hours to the consortia, to enable their science goals to be achieved. It has been a convenience for conceptualizing how to achieve this, to assign surveys primary or commensal labels: this artifice is not intended to dominate or overwhelm the time allocation process, or to engender a legalistic environment. Conceptually all three primary consortia have an interest in the anticenter that can be accommodated without an actual need for ZoA or RRL to formally become primary: this work can be accomplished by deeming their activity there to be as joint-primary participants with p-ALFA (or alternately, by considering that all three consortia have objectives that are satisfied there simultaneously, without any need for a primary/commensal label for their surveys there).

Galactic time window -- p-ALFA time

assuming 80% of dark-time is for astronomy

from Hector's sheet:

18-21 hours transits in dark time on 128 days a year

I-GALFA requires that definition for its operation

hence if no galactic dark time is assigned to PI projects, (these to maximum extent possible being run during other parts of the year), with I-GALFA needing 350/2 hours in a year to complete in 2 years implies $175 / (3 \times 0.8) = 74$ of the 128 days to accomplish

For p-ALFA there is the possibility of looking into the window from the RA range on either side. Since AUDS is using the 17-18 hour window as possible, the dark-time window is restricted to being looked into from 21-22 hours, for ~16 extra days.

The p-ALFA dark-time-available calculation approximates
 $(128 - 74 + 16 \sim 70 \text{ days}) \times 4 \times 0.8 = 224 \text{ hours}$

From the rest of the year, a maximum time availability from non-dark time is of order:--

$(364 - 128 - 16) \times 5 \times 0.64 = 700 \text{ hours}$

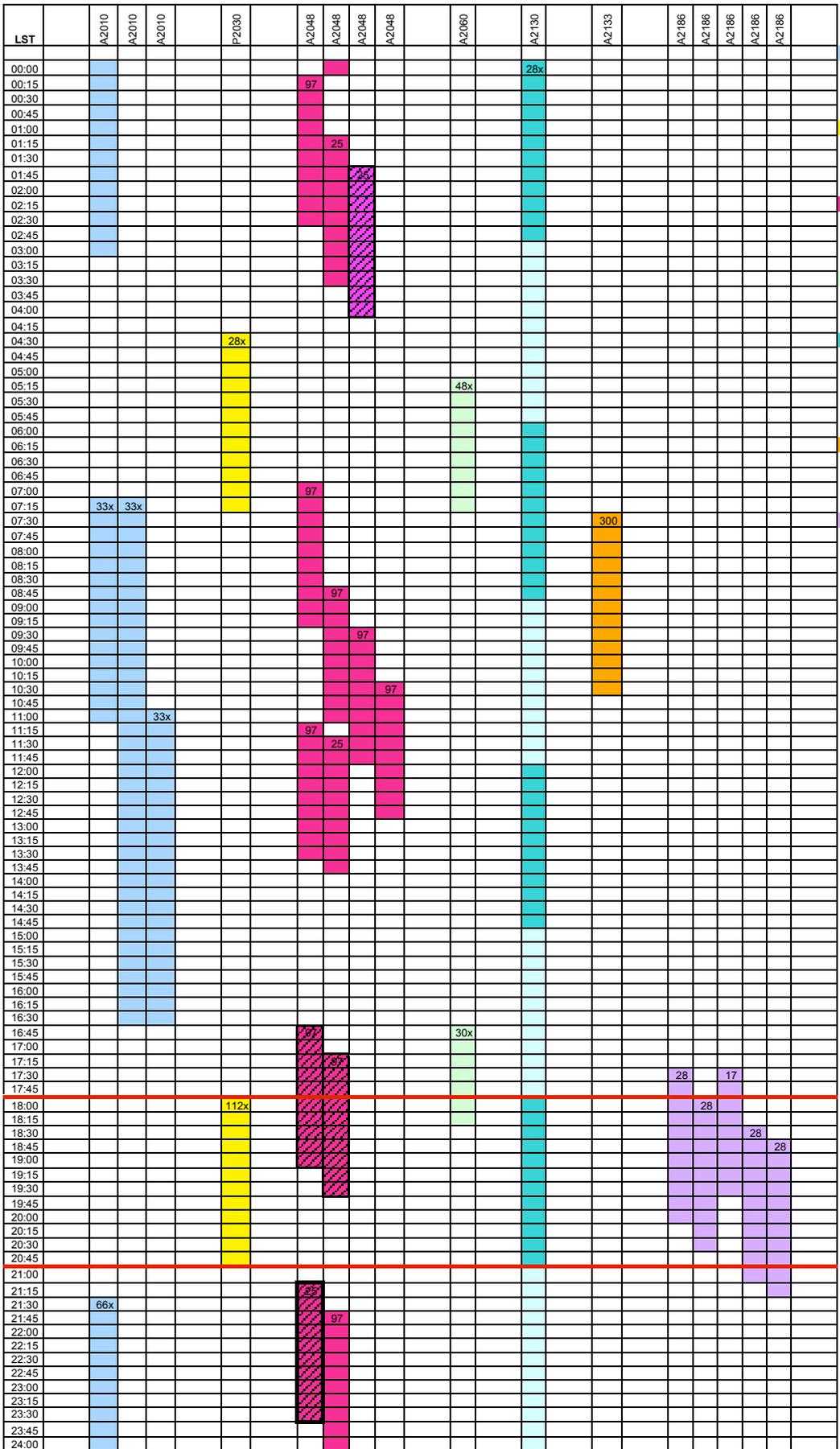
the maximum p-ALFA time on the telescope would then be ~924 hours/yr

For p-ALFA's commensals, the dark time calculation is a minimum, as part of the 18-21 hour range will be in dark time for a couple of months, even if the whole range is not.

$0.64 == 0.8 * 0.8$

allowed 80% of time available to astronomy

allowed 80% of astronomy time available for surveys



A2010 - ALFALFA
Runs to be repeated for 6-7 yrs

P2030 - PALFA
Survey at galactic plane for 4- yrs
Runs to be repeated for 4 yrs.

A2048 - AGES
11 different fields

A2060 - Disk Halo Interface
Runs to be repeated for 2 yrs.

A2130 - GALFACTS
Runs to be repeated for 5 yrs
(blocks of 3-hr LST ranges in night-time)

A2133 - AUDES
300 runs in 3-4 yrs
(i.e. 100 runs per year in 3- yrs
or 75 runs per year in 4- yrs)

A2186 - I-GALFA
Inner Galaxy at low latitudes
(5 different fields)