

# Cadence observations on Keck

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Cadence programs are directed at objects for which short (<1 night) repeated observations during a semester are scientifically necessary. The Cadence observing program is only intended for observations that can be anticipated in advance and will be scheduled in the semester allocation process. They are not intended for transients and short turn-around observations (a.k.a., Target of Opportunity observations).

Implementation of Cadence observing at Keck encompasses three distinct aspects, all of which are addressed by this document:

1. **Partial night scheduling:** Keck partners are making fractional time allocations as small as  $\frac{1}{4}$  nights. Guidelines are needed to schedule these allocations in an effective manner.
2. **“Snapshot” observations:** some science programs require very short (~1 hour) observations, a capability which does not formally exist yet across partners.
3. **Twilight Cadence observations:** observations to take advantage of otherwise unused twilight time

We anticipate a 2year trial period for this Cadence policy, with a review after the first year. Updates may be needed when the Keck1 deployable tertiary becomes available.

1a. Caltech, NASA, UC, and UH researchers can propose to their respective TACs for time intervals in units of whole,  $\frac{3}{4}$ ,  $\frac{1}{2}$ , or  $\frac{1}{4}$  nights. Requests for quarter nights must be intrinsic to the science program. Proposers should be aware that it might be infeasible for WMKO to schedule all partial night allocations.

1b. In addition, PIs can propose for Partnership Snapshot cadence observations of  $\leq 1$  hour in duration each. These should be requested for the start or the end of the night, unless essential for the science program. Proposers should be aware that it might be infeasible for WMKO to schedule all Partnership Snapshot allocations. TACs should award Partnership Snapshots only for highly ranked programs.

2. Each TAC will judge their respective community’s proposals and inform WMKO of the resulting allocations. TACs do not have to agglomerate partial night proposals into whole nights, but doing so will make it more likely that such programs will be scheduled. Each TAC can award a total of six Partnership Snapshot observations each semester, up to one hour each.

3. To construct the telescope schedules including partial night allocations, WMKO can use two methods.

(1) The Observatory can fractionally redistribute the requested allocations within and across partners, while striving to maintain a net zero sum for each institution. For instance, a 2night program may be scheduled as a 1 full night + 2 half nights in order to enable half night programs. Such fractional redistribution will be applied to  $\sim 10\%$  of the allocated whole nights.

(2) If necessary for Snapshot scheduling, the Observatory can reduce time allocations by up to one hour for any programs that are at least one full night in duration. When reducing allocations, the Observatory will consult with the partner institutions as part of the scheduling process.

4. It is the responsibility of the Cadence team to carry out the observations. If remote observing, the team is responsible for making appropriate arrangements with the Remote Observing Room, including reservations and testing in advance. Alternatively, the Cadence team may ask the regularly scheduled PI

to carry out the observations, which will include an offer of co-authorship; the Observing PI is not obligated to do the observing.

5. LGSAO snapshot cadence observations will only be scheduled on LGSAO nights. LGSAO snapshot observations will receive up to one hour of science time, not including LGSAO checkout.

6. Individual TACs may designate a few nights (partial or whole) as exempt from snapshot cadence blocks. This designation must be scientifically motivated, namely that such interruptions would seriously compromise the scientific return of the entire observing time. Proposers should make any such requests to their individual TACs as part of their observing proposal. Use of these exemptions is expected to be rare occurrences.

7. Each institution may allocate one twilight cadence observing program per telescope per semester, which will be voluntarily executed by either the classically scheduled PI or Observing Assistant on nights with extra time, at their discretion. Preference will be given to longer term (1-2 year) programs. Twilight observing PIs are responsible for development of target and observation managers as well as development and testing of instrument scripts so that the observations can be carried out autonomously. Observations should use simple instrument configurations and have short (<5 min) sequences. PIs should be aware that there is no guarantee that any data will be collected in a particular semester, as this is a voluntary program. In 2020B, OSIRIS-NGS (imager use only) will be available on Keck 1 and NIRC2-NGS on Keck 2 will be available for use in this program.

8. Time imbalances between partners will normally be corrected through each partner's semester allocations and/or WMKO's giveback science time. Each snapshot cadence allocation will be charged at a rate of 1 hour of observing time.