Parallels Post-SM4

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Parallels

- Parallel observations offer a chance to increase the science productivity of HST

- Operate one or more instruments in conjunction with the prime science instrument

  - "Coordinated" Parallels
    - Parallel is part of prime science investigation proposed and approved in Phase I
    - Parallel specification is given by GO as part of Phase II proposal
      - Parallel and prime exposures/visits are specified together

  - "Pure" Parallels
    - Parallel is proposed in Phase I as part of standalone parallel science program
    - Parallel specification / description is given by GO in Phase II
      - Parallel and (unrelated) prime visits are matched later by STScI

Parallel Opportunities

- Prior to ACS failure, we expected that ACS+WFC3 would be used in parallel frequently.

    - ACS repair would re-enable synergy with WFC3

- COS/STIS will probably account for ~30% of prime observing time (~1000 orbits per cycle)

    - For most COS observations, parallels could be scheduled without readout and buffer dump conflicts
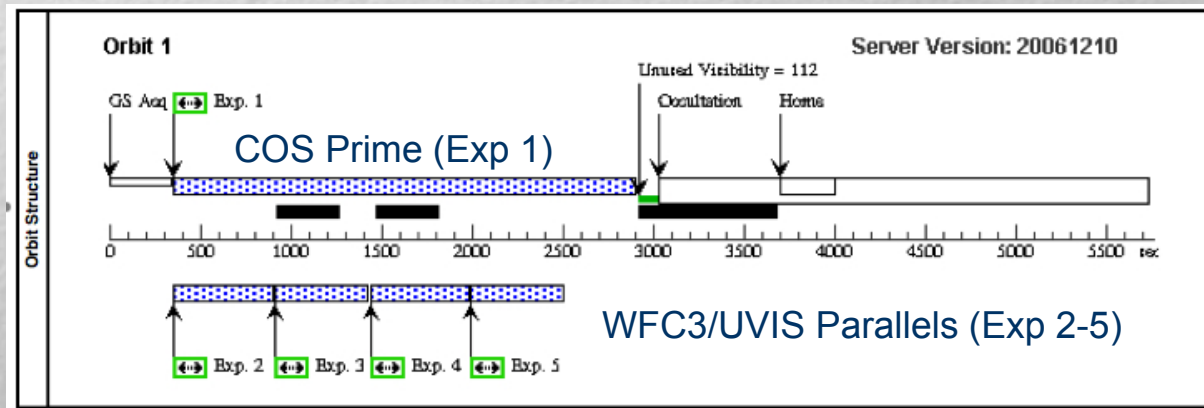
    - Parallels may also benefit from long STIS observations

    - If ACS is restored, using multiple instruments in parallel at the same time (e.g., WFC3+ACS) results in more buffer conflicts

A Few More Parallel Examples
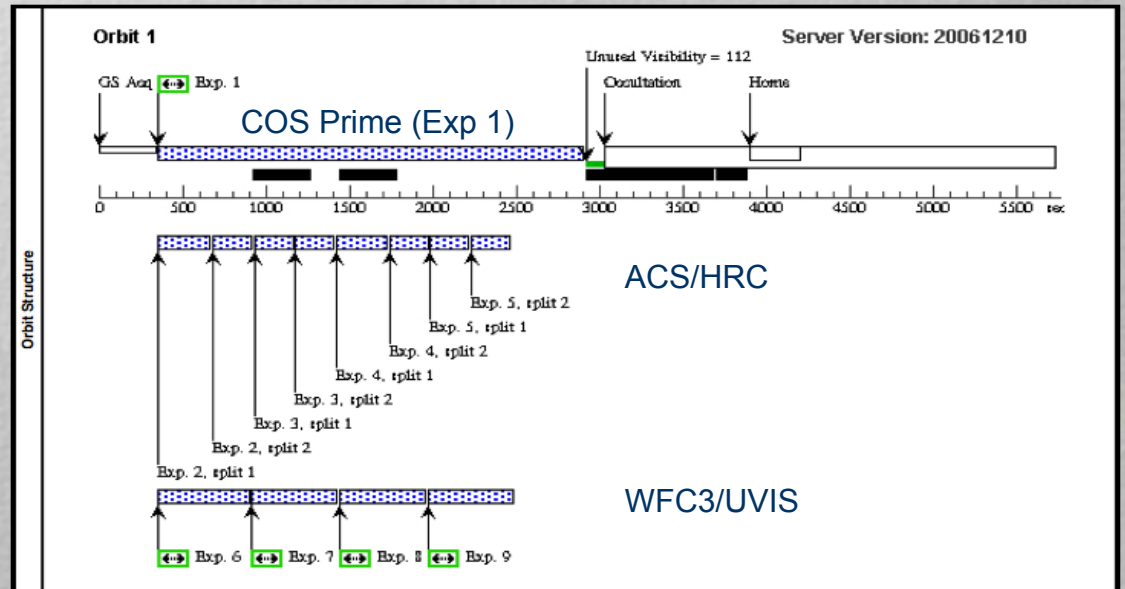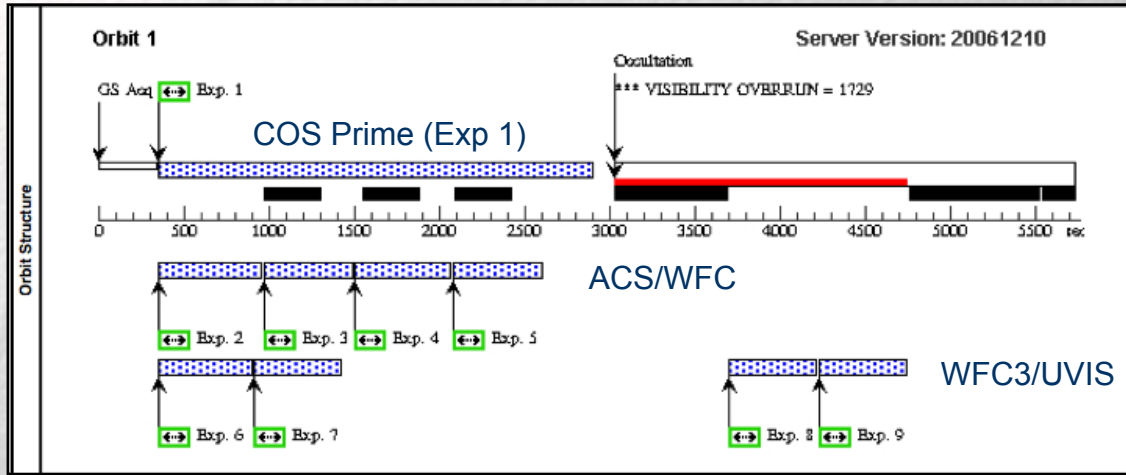
Maximizing Parallel Science

- Coordinated parallels will be allowed/encouraged as usual
  - Relationship of parallels to prime observation is responsibility of GO
  - Matching of exposures done within APT
  - Scheduling is simplified since any changes specified by GO are done with knowledge of impact to parallels (and vice versa)
- Pure parallel philosophy is being rethought
  - Existing implementation is less efficient than desired
    - Visits matched late in scheduling process (after primes are scheduled)
      - Doesn't always work
    - Rigid visit structure/specification limits scheduling opportunities
    - Long parallel opportunities are difficult to schedule
    - Prioritization and completion of parallel visits are not handled optimally
  - New implementation should improve parallel science return
    - Treat parallel observations more like primes in terms of completion
    - Match as many parallels to primes as possible
    - Possibly develop parallel LRP (long range plan) to help matching process

Examples of Possible Parallel Programs

- Searches for high-z supernovae with WFC3 grism
- Searches for z > 7 galaxies with WFC3 IR channel
- WFC3 deep UV fields
- Cosmic variance (ACS or WFC3)
- Cluster mosaics, weak lensing on small scales
- Magellanic cloud narrow band imaging survey
- Nearby galaxy stellar population studies
- and so on….

Parallels - Issues Under Study

- Specification
  - Should GOs specify complete visits (as now) or exposure sets?
  - How do GOs specify observation and program completion requirements?
  - How should GOs prioritize exposures/observations within a program?

- Implementation
  - How and when do we (STScI) best match parallels to primes?
  - What buffer management issues exist?
  - How do we satisfy observation and program completion requirements?

- Impact of parallels on primes
  - Starting position: primes will be unaffected by addition of parallels
  - But may want to do small dithers to improve parallel imaging data
    - Roll and POS-TARG dither options for COS primes are being studied
    - Possibly dither only between orbits, not within orbits

- Effort Required
  - We are scoping work in various areas
    - software development, scheduling, program coordination, APT, TRANS, etc.