Binocular Pointing Arbitration

Pointing Control Subsystem (PCS)

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PCS Terminology

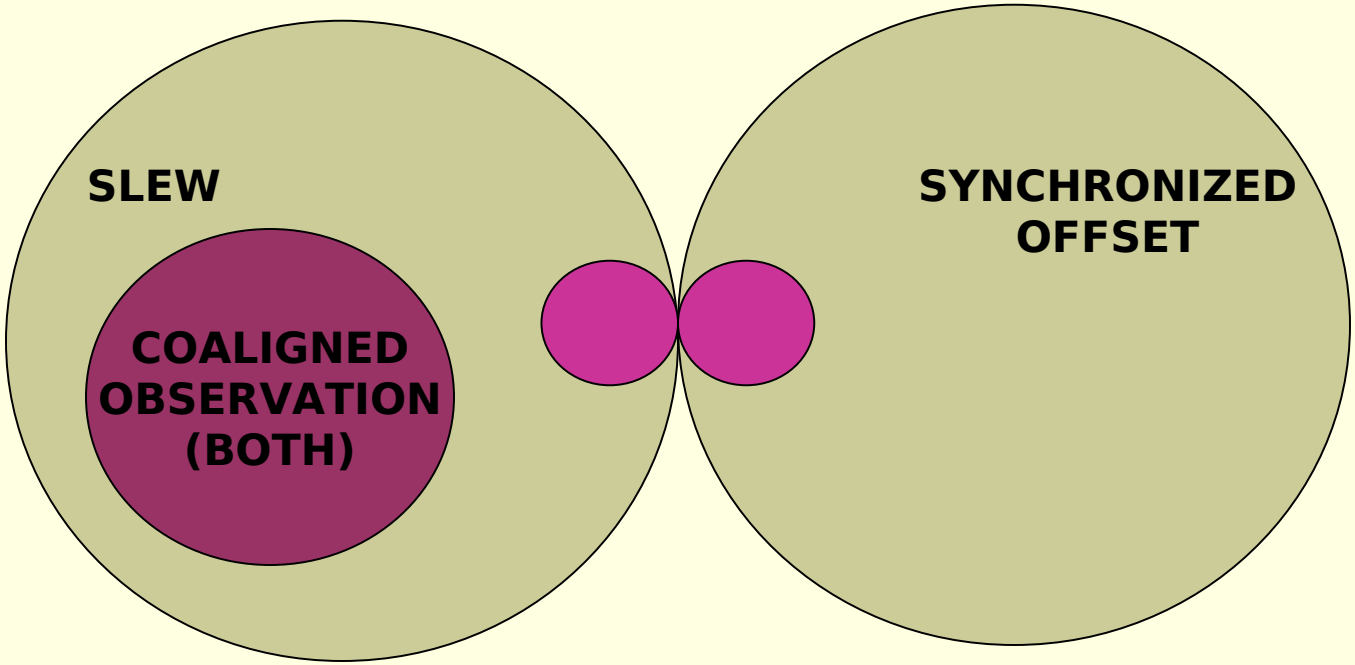
- COALIGNED OBSERVATION ➔ Both sides of the telescope are directed to acquire the same coordinates on the sky.

- MISALIGNED OBSERVATION ➔ The left and right sides of the telescope are directed to acquire different coordinates on the sky.

PCS Terminology

- SLEW ➔ Pointing commands are interpreted as **coaligned** observations.
  - These commands are *typically* issued as both side.
- SYNCHRONIZED OFFSET ➔ Pointing commands are interpreted as **misaligned** observations.
  - These commands are issued as left or right side.

PCS Terminology



= MISALIGNED OBSERVATION (LEFT or RIGHT)

PCS Functionality

- PCS runs continuously.
- An instrument can send “sided” preset commands (IIF PresetTelescope) which
  - contain independent information (e.g., different targets, rotator angles, hotspots, etc.) within the telescope pointing limitations, and
  - can be issued at any time (i.e., left- or right-side presets are *not* pairs) once the instrument is authorized.

PCS Functionality

- Correct: PCS applies the proper motion, epoch, and equinox updates
- Vet: PCS checks for
  - below the horizon (-1˚) violation, and
  - maximum left-/right-side separation

SEPARATION	STATE	TELESCOPE ACTION
< 10”	ok	execute
>= 10” and <= 40”	warning	execute
> 40”	error	none

PCS Functionality

- Once PCS *corrects* and *vets* given coordinate data from a “sided” command, PCS updates the pointing kernel threads, and then either
  - signals the MCS to compute the slew trajectories with PCS generating the tracking polynomials for the new position ➔

    ACTION = SLEW, or

PCS Functionality

- PCS generates synchronized, in time and frequency, tracking polynomials and tip/tilt corrections to keep the science target stationary on the detector on the busy side ➔

  ACTION = SYNCHRONIZED OFFSET.

PCS Functionality

PCS action depends upon instrument side

Authorization, specification of *command*

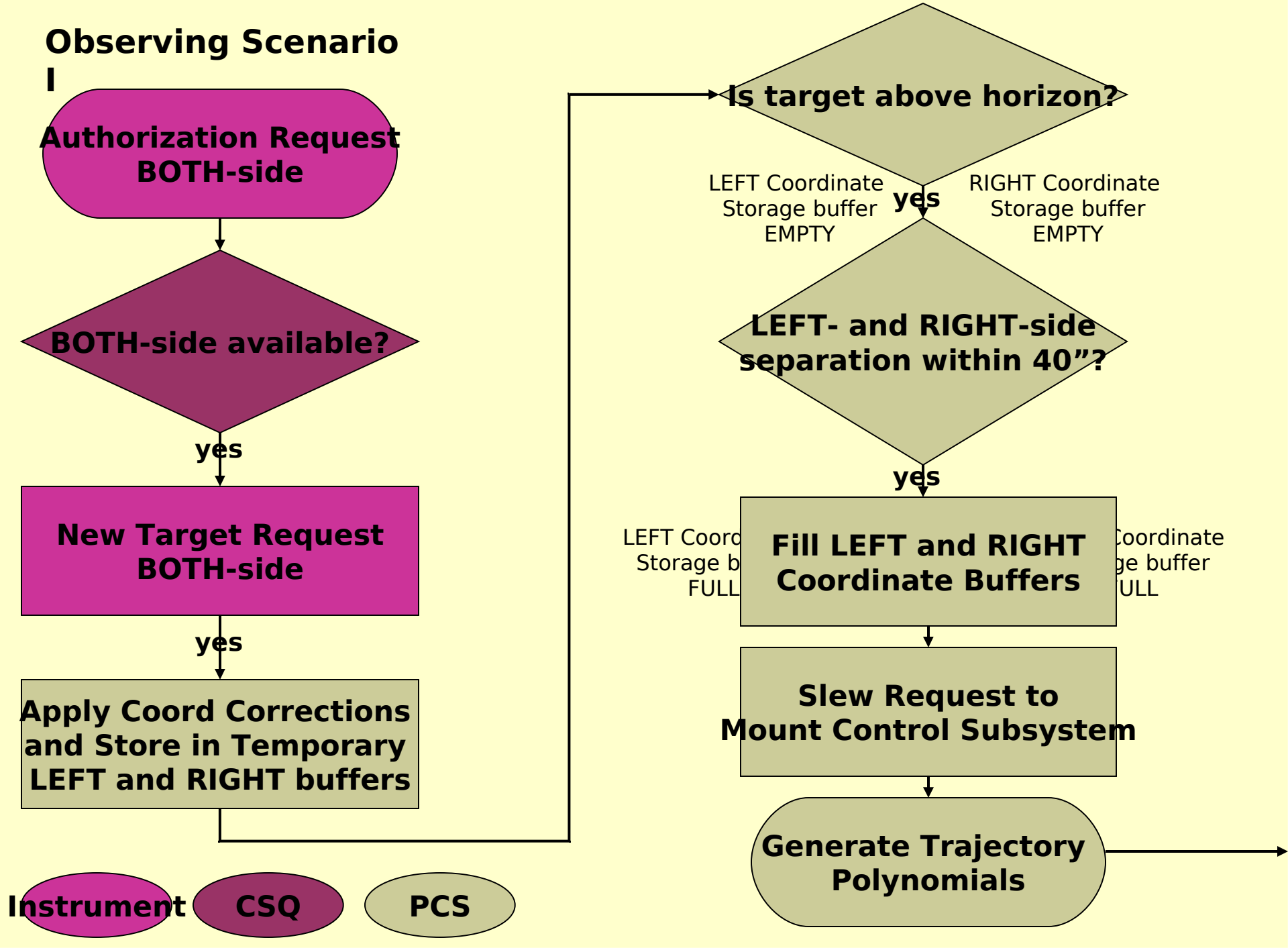
side, and data stored in the coordinate

buffers.

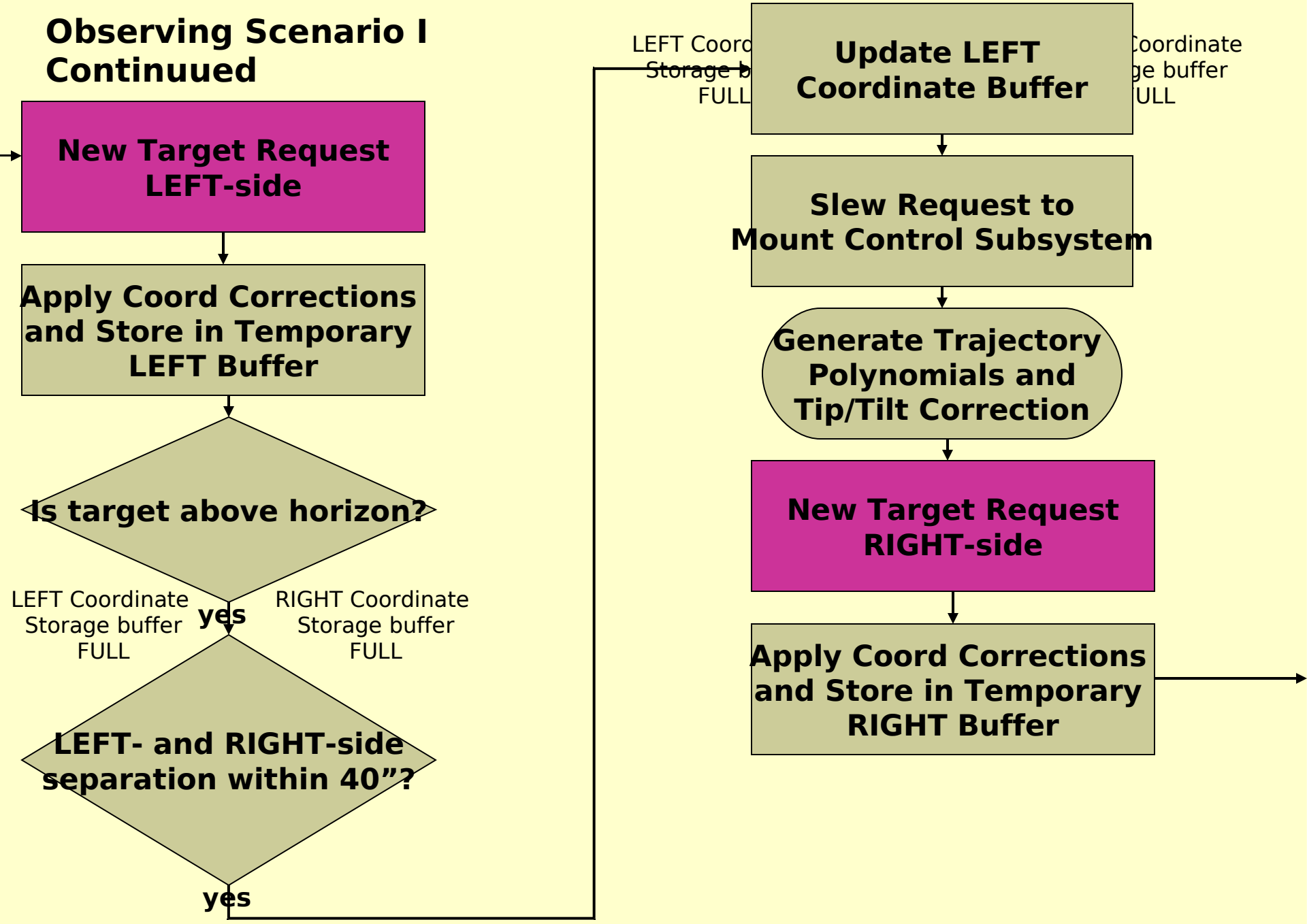
Authorization

Sided Command

	BOTH	LEFT	RIGHT
BOTH	**Coaligned Observation** ↓ **Prepare for slew to target.**		
LEFT	**Misaligned Observation** ↓ **Use Right coordinate buffer data and prepare for synchronized offset.**	**If no authorized instrument on Right, proceed as Coaligned Observation.** **If authorized instrument on Right *and* data in Right coordinate buffer, prepare for Misaligned Observation.**	
RIGHT	**Misaligned Observation** ↓ **Use Left coordinate buffer data and prepare for synchronized offset.**		**If no authorized instrument on Left, proceed as Coaligned Observation.** **If authorized instrument on Left *and* data in Left coordinate buffer, prepare for**


Observing Scenario I
Authorization Request BOTH-side
BOTH-side available?
yes
New Target Request BOTH-side
yes
Apply Coord Corrections and Store in Temporary LEFT and RIGHT buffers
Is target above horizon?
LEFT Coordinate Storage buffer EMPTY
yes
RIGHT Coordinate Storage buffer EMPTY
LEFT- and RIGHT-side separation within 40”?
yes
LEFT Coord
Storage b
FULL
Fill LEFT and RIGHT Coordinate Buffers
Coordinate
ge buffer
ULL
Slew Request to Mount Control Subsystem
Generate Trajectory Polynomials
Instrument
CSQ
PCS

Observing Scenario I Continuued



Observing Scenario I Continued