



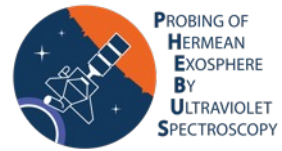
Summary of the operation plan



This presentation covers two topics

- **Observations done during the cruise (+ planning until orbit insertion)**
- **Inputs provided to ESAC for the Science Activity Plan of the nominal mission.**

Observations during Cruise



- **Activities performed during the cruise correspond to one of the following categories**
 - **Anomaly recovery**
 - EUV discharges
 - FUV dark counts
 - Pointing errors
 - **Calibration (on stars or on IP Background)**
 - EUV, FUV,
 - Visible Channels (FLIP observations)
 - Zodiacal Light + stellar background

- **Planetary Fly-Bys**

- Moon (FUV obs)
- Venus (FUV by request of guest investigator)
- Venus star occultation (failed, timing)
- Mercury Swing-By 1 (Vis + EUV)

We will keep the same pattern in 2022 and 2023

- Priority for EUV observations (calibration + IPH/He)
- Flip observations (stellar background and ZL)
- MSB3 = EUV + Vis

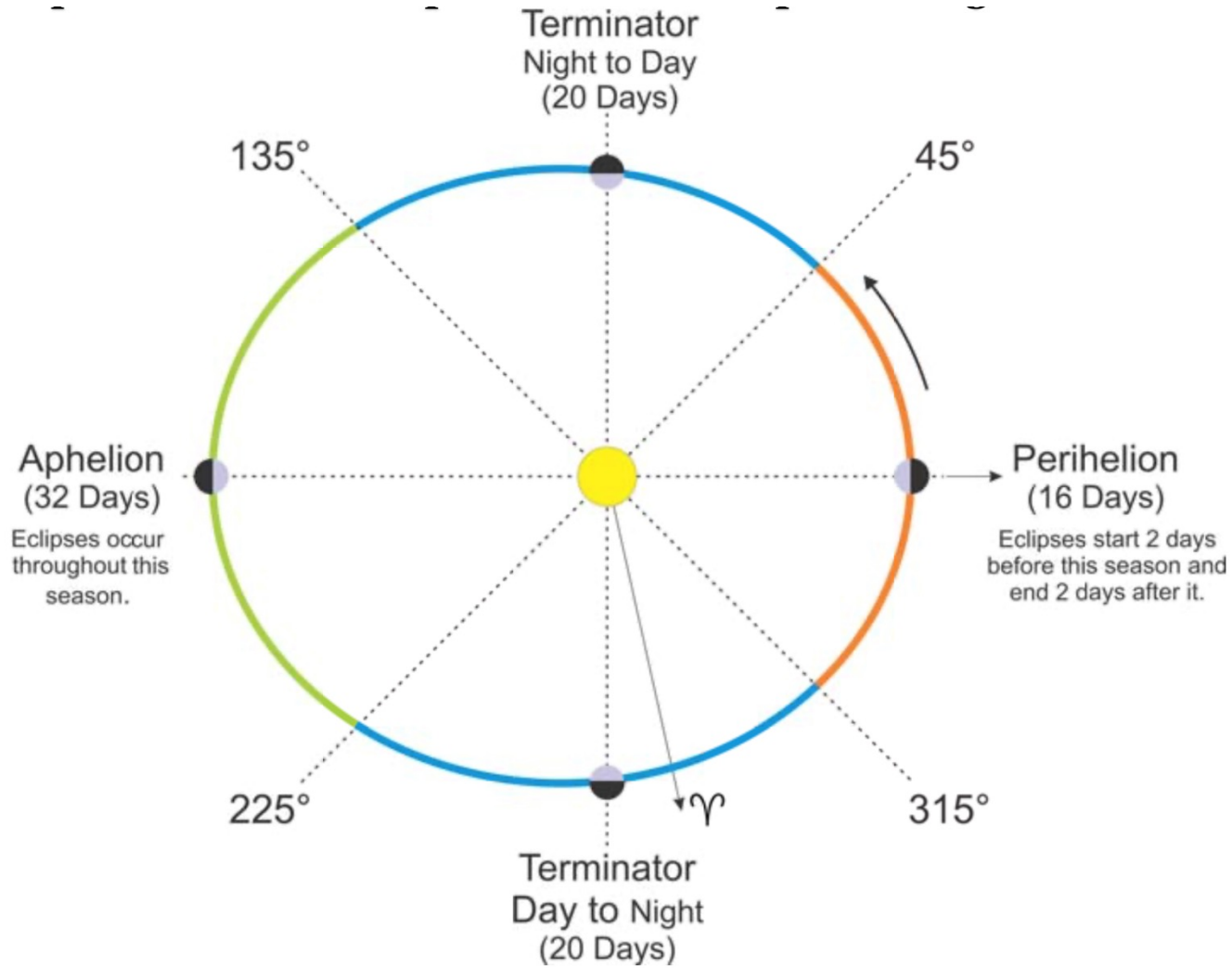
- **Star observations to be compared to EMUS/HOPE**

- (PHEBUS obs to be performed in 2023)
- Alp Leo
- Alp Gru
- Lam Lep
- Lam Tau

- **Opportunities in H1/2023**

- 2023-02-11=2023-042-17:59:59 - 35Lam Tau - Scan = 74.6 - angle LOS - STAR = 0.2 - CR EUV = 376
- 2023-02-15=2023-046-07:59:59 - 6Lam Lep - Scan = 90.8 - angle LOS - STAR = 0.1 - CR EUV = 704
- 2023-03-12=2023-071-05:59:59 - 35Lam Tau - Scan = 264.5 - angle LOS - STAR = 0.2 - CR EUV = 376
- 2023-03-15=2023-074-01:59:59 - 6Lam Lep - Scan = 251.2 - angle LOS - STAR = 0.2 - CR EUV = 704
- 2023-04-20=2023-110-01:59:59 - 32Alp Leo - Scan = 218.5 - angle LOS - STAR = 0.0 - CR EUV = 868
- 2023-04-24=2023-114-19:59:59 - Alp Gru - Scan = 71.4 - angle LOS - STAR = 0.2 - CR EUV = 1076
- 2023-06-10=2023-161-01:59:59 - 35Lam Tau - Scan = 196.6 - angle LOS - STAR = 0.1 - CR EUV = 376
- 2023-06-13=2023-164-17:59:59 - 6Lam Lep - Scan = 140.7 - angle LOS - STAR = 0.0 - CR EUV = 704
- 2023-06-26=2023-177-06:00:00 - 32Alp Leo - Scan = 271.9 - angle LOS - STAR = 0.1 - CR EUV = 868

On-going definition of the SAP

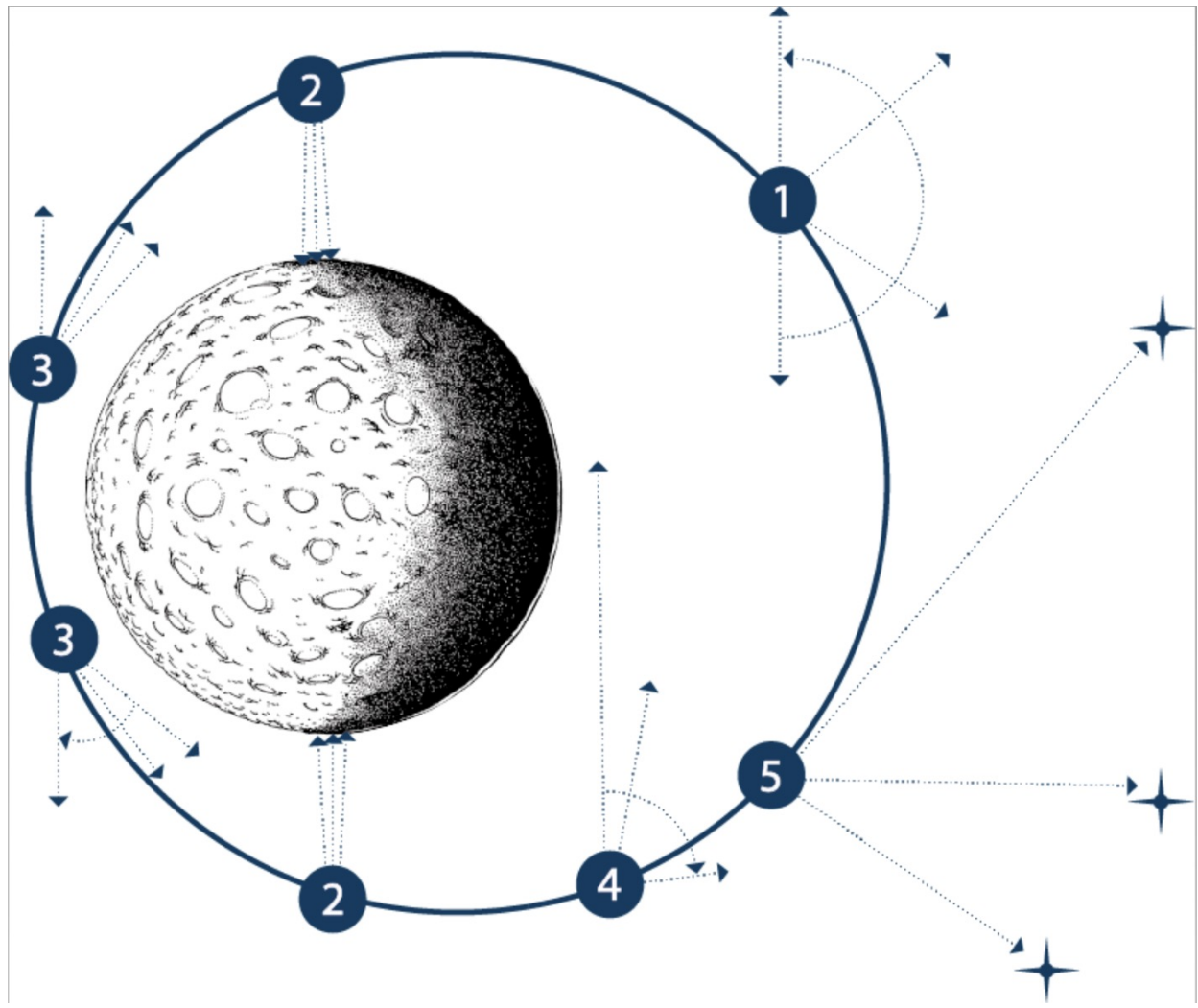


• PHEBUS baseline

- 1 observation (30 min) every orbit (10 orbits per day)
- Estimated data volume ~ 80 Gbit per year

<i>NAME (Identifier)</i>	<i>POWER</i>	<i>Data rate (bits/s)</i>	<i>Duration (min)</i>	<i>Frequency (orbits)</i>	<i>Pointing Mode</i>
C_DARK (6) (3 detectors, no scanner)	24	16384	30	1 every 10	<i>n/a</i>
NADIR_DRIFT (13)	22.5	16384	5	1 every 10	<i>nadir</i>
STAR_INERT (18)	22.5	16384	5	1 every 10	<i>Inertial</i>
EXO_TRACK (15)	22.5	16384	5	2 per orbit	<i>nadir</i>
EXODAY_SCAN (16)	22.5	16384	30	1 every 6	<i>nadir</i>
EXONIGHT_SCAN (17)	22.5	16384	30	1 every 6	<i>nadir</i>
EXODAY_DRIFT (11)	22.5	16384	30	1 every 12	<i>nadir</i>
EXONIGHT_DRIFT (12)	22.5	16384	30	1 every 12	<i>nadir</i>

Table 28 : Data budget vs PHEBUS activities



(1) Measurements of the interplanetary (IP) species background glow (H, He) in sky scanning mode.

(2) Water ice detection in polar craters always in the shade, by nadir pointing.

Composition and vertical structure of Mercury's exosphere by day (3) or night (4) observations at different altitudes above the surface.

(5) Star observations at MPO's apoherm for calibration and PHEBUS' performance monitoring.

Orbital Phase

- **For each type of observation, we are going to define the repetition scheme, feasibility and constraints.**
- **This will be used to create the initial version of SAP. Apart from the perihelion there should no limitation for power.**
- **The main issue is the data volume (periods with limited bandwidth will affect the delay between the time of observation and the time the data are transmitted to the ground).**
- **ESAC (R Hoofs) has suggested that PHEBUS performs more observations at the beginning of the mission (first two orbits). This is being assessed.**
- **We have not yet evaluated the impact of the detector anomalies on the PHEBUS observation plan.**