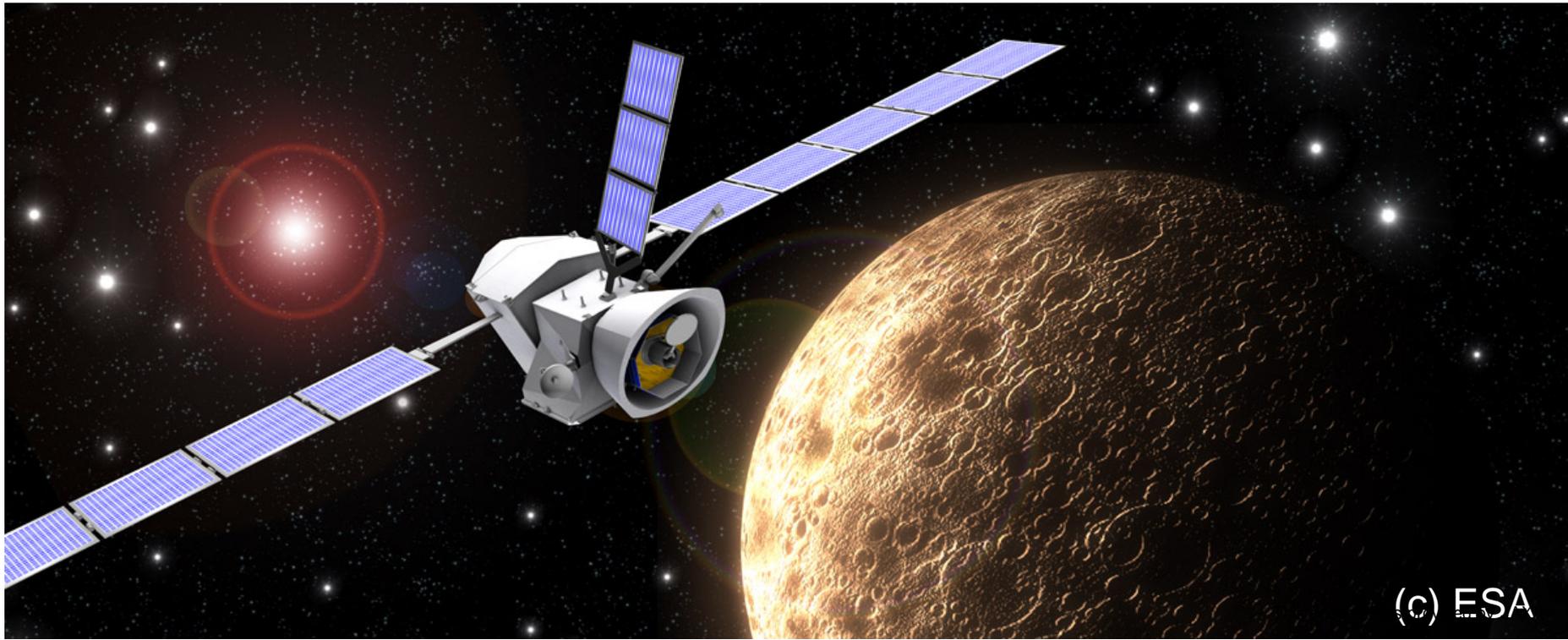


BepiColombo MMO status update

H. Hayakawa¹ and H. Maejima¹
BepiColombo MMO Project Team

1: ISAS/JAXA



BepiColombo: Two Orbiters

MPO (Mercury Planetary Orbiter)

3-axial



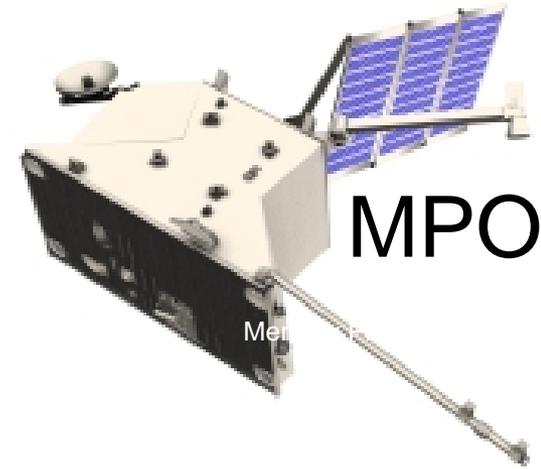
~Low-altitude polar orbit: for Surface & Interior observations~
Study of the planetary formation near the Sun

Camera: Surface geology

IR/UV/X/Gamma/neutron spectrometer: Composition

Magnetometer: Internal & Magnetospheric magnetic field

Precise orbit determination: Gravitational field, Relativity etc.



MPO

MMO (Mercury Magnetospheric Orbiter) Spin



~Elliptical polar orbit: for Magnetosphere & Exosphere~
First comparative study of the planetary magnetic field and Magnetosphere

Magnetometer: Internal & Magnetospheric magnetic field

Plasma particle, Electric field, Plasma waves:

Magnetosphere - Structure, Dynamics, energetic processes

Energetic neutrals: Sputtered particles from Surface

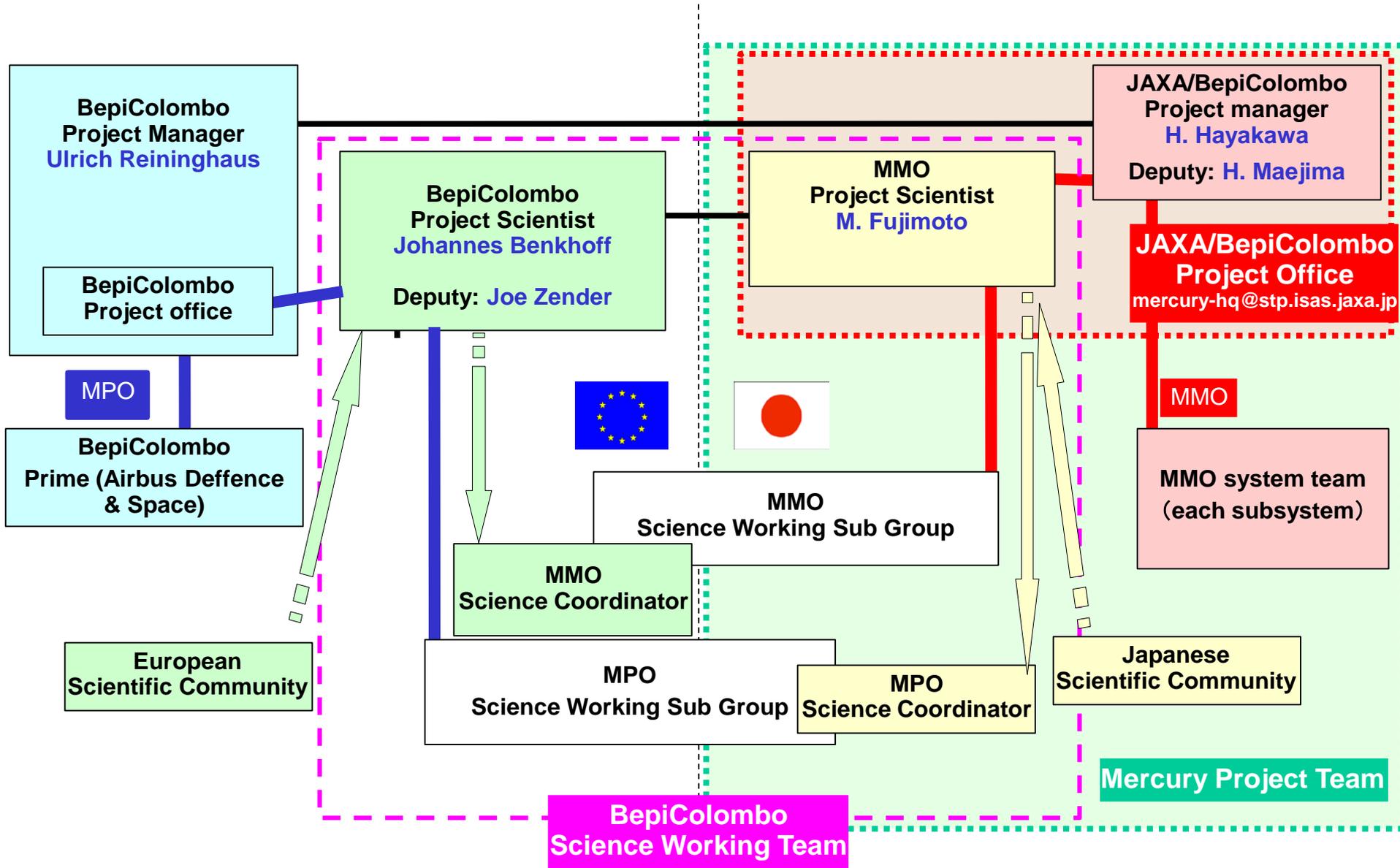
Na imager: Exosphere – Structure & Variation

Dust: Interplanetary dust in the inner solar system



MMO

BepiColombo: Project Management Plan



Mission Scenario

Launch: Oct. 2018

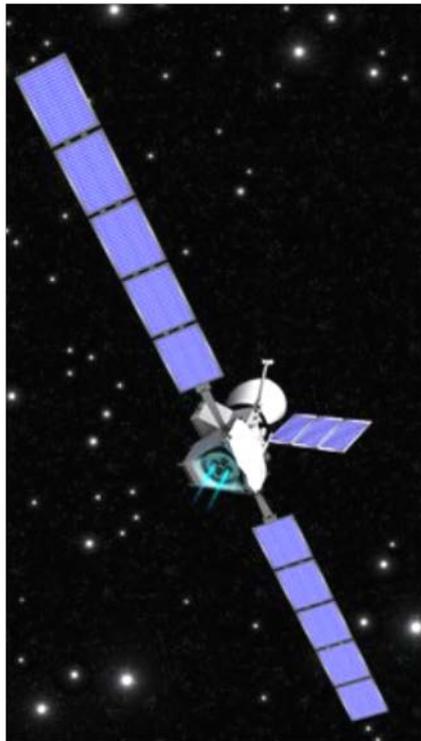
Earth swing-by x 1
Venus swing-by x 2
Mercury swing-by x 6

Arrival: Dec. 2025

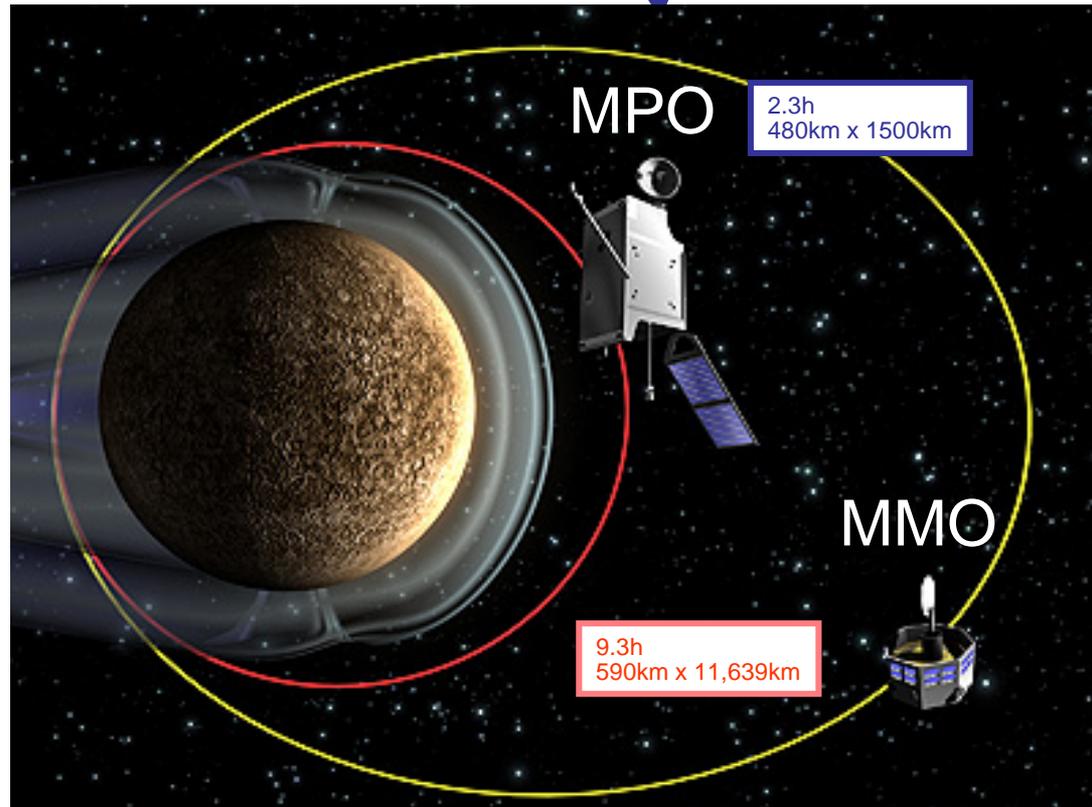
Interplanetary Cruising

Electric Propulsion
[MTM]

Mercury Orbit Insertion
Gravitational Capture



Ariane-5:
MPO+MMO

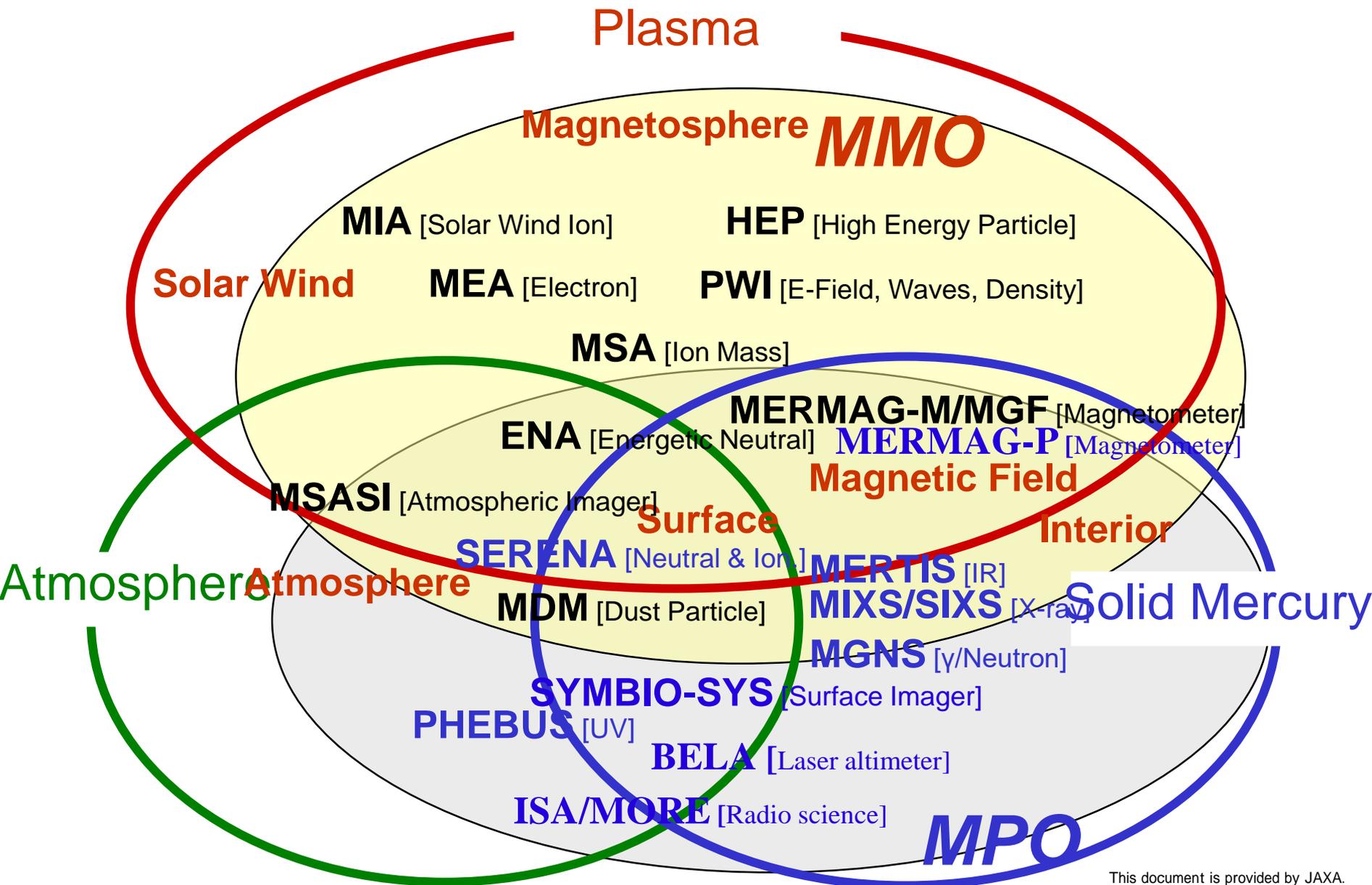


Red:
Blue:



Observation: 1 Earth year (+Extension)

BepiColombo: Science



MMO Payload: Selected

5 teams – MPPE, MGF, PWI, MSASI, MDM

MPPE

MEA *low-energy e⁻*
MSA *low-energy ion*
MIA *solar wind ion*

HEP-e *high energy e⁻*
HEP-i *high energy ion*

ENA *energetic neutral atom*

MGF *magnetic field*

PWI *radio/plasma wave/
electric field*

MDM *dust*

MSASI *atmosphere (& surface)
image*

Internal magnetic field
 Structure & Distribution
 Origin & Internal structure

Magnetosphere
 Structure, Kinetics, Processes
 Scaling law
 Effect of “boundary conditions”
 no-ionosphere, small-scale,
 fast-process, & different SW

Atmosphere (Exosphere)
 Structure, Variation
 Production from surface
 Loss to solar wind &
 magnetosphere

Surface/Crust
 Present structure & Evolution

Interplanetary Plasma & Dust

**Space physics
at Mercury**

**Environment
of Mercury**

**History
of Mercury**

BepiColombo MMO status (1/3)

- ◆ MMO standalone AIV@ESA/ESTEC is completed in Dec. 2015
- ◆ MMO handover closeout meeting was held on 15 Apr. 2016
- ◆ First battery maintenance check was performed in July 2016
- ◆ MMO-MPO mechanical/electrical interface check (PFM IST) was performed in July 2016
 - Problem found. The problem will be fixed in Sep.
- ◆ N2 gas for instrument purging is supplied continuously.
- ◆ Ground system test for MMO operation is ongoing.
- ◆ One JAXA employee is at ESTEC for baby-sitting MMO.

BepiColombo MMO status (2/3)



Coming activities

- ◆ Periodical maintenance (once in approx. 6 months) work for EM battery. Second maintenance work is expected in 4Q 2016.
- ◆ Next ETB IST Friedrichshafen is scheduled in 1Q 2017.
- ◆ MCS PFM AIT is expected to start from 2Q 2017.

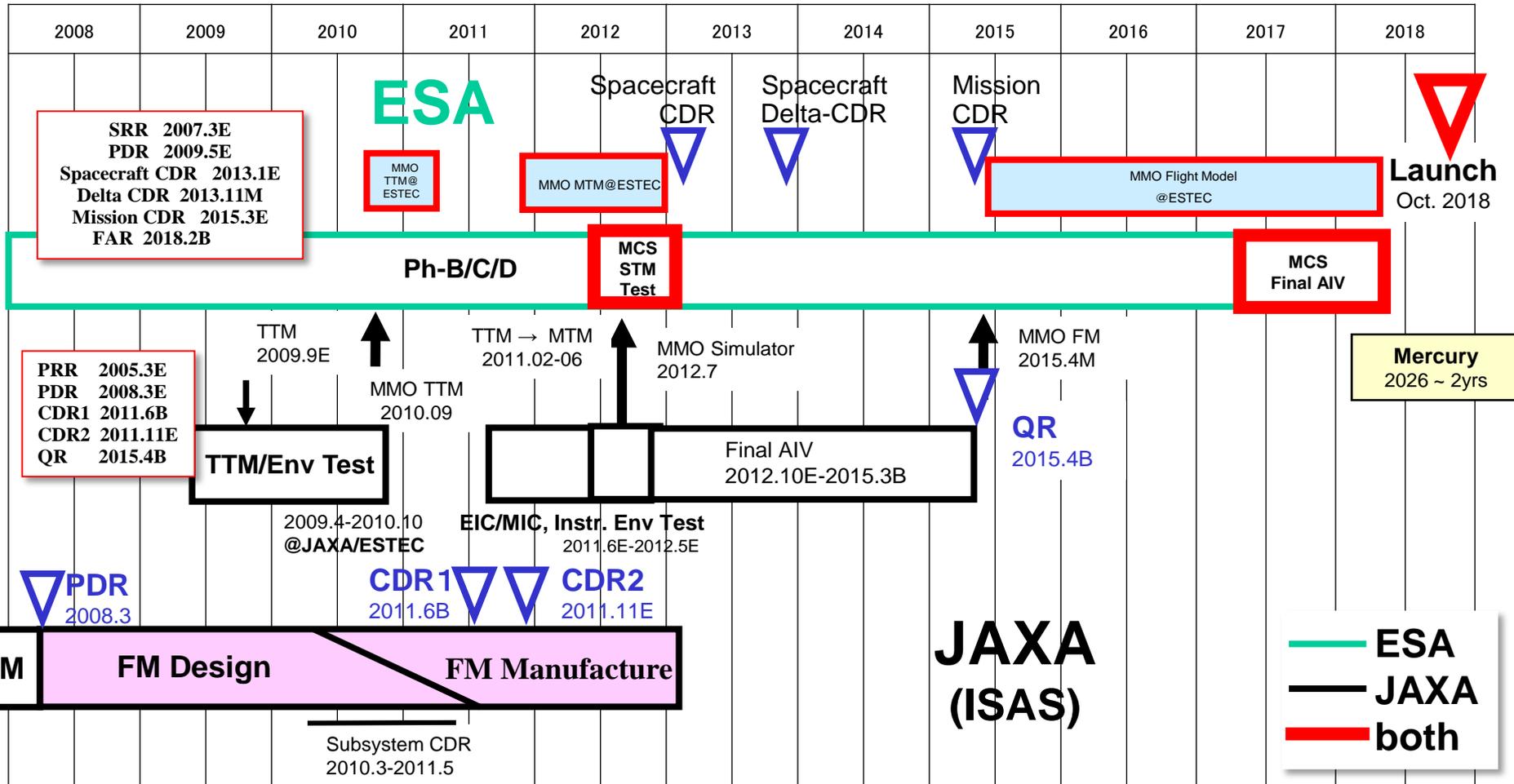
BepiColombo MMO status (3/3)



Science related activities

- ◆ Planning for MPO/MMO Near Earth Commissioning operation.
- ◆ Possibility of science observation during cruise. (Feasibility study is ongoing for 1st Venus Flyby.)
- ◆ Science observation plan at Mercury.

BepiColombo MMO Schedule (Jan. 2017)



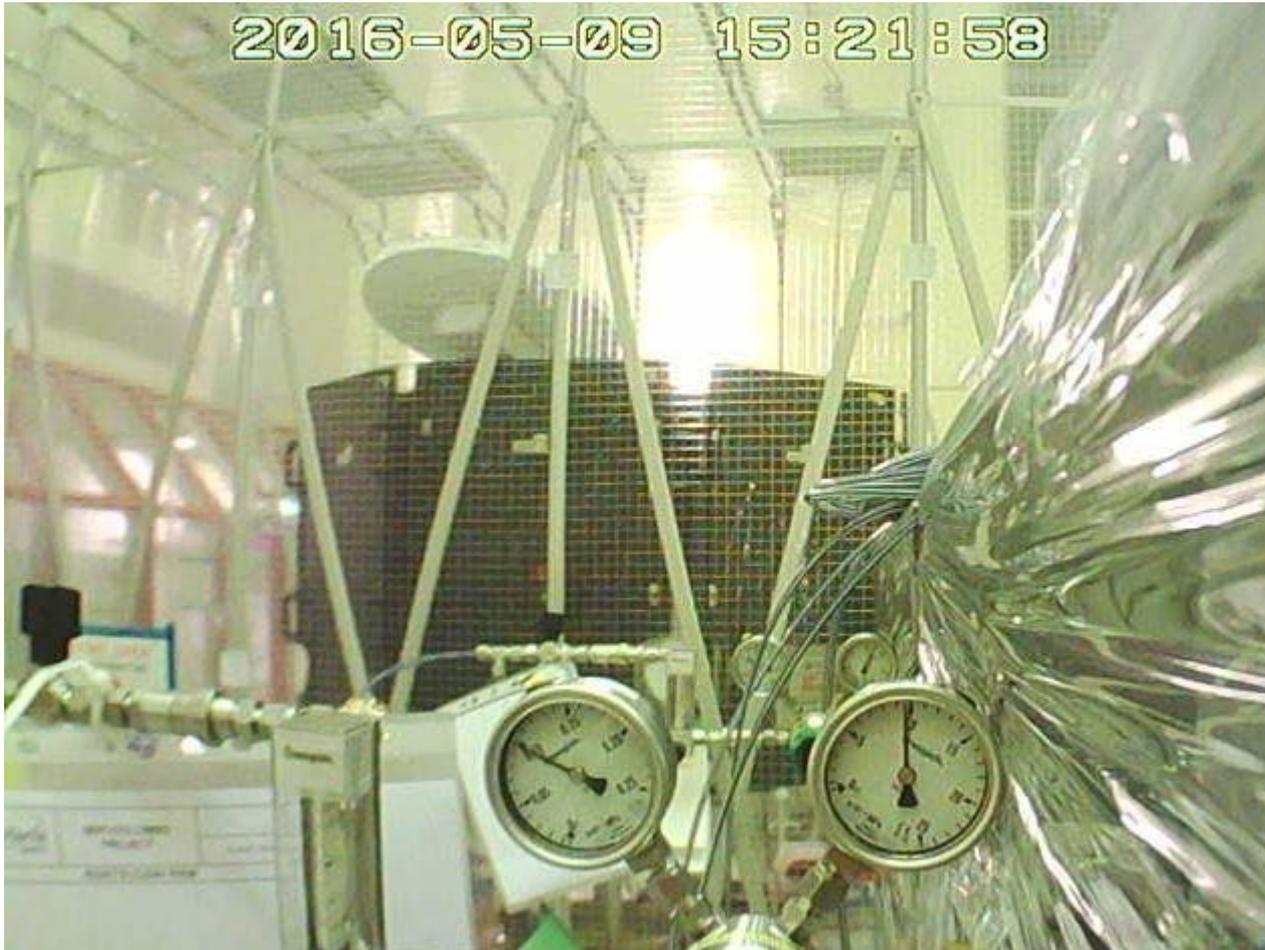
PRR=Preliminary requirements Rev.
 PDR=Preliminary Definition Rev.
 CDR=Critical Design Rev.
 QR=Qualification Rev.

(Calendar year)



2015 03 15

MMO at ROSETTA Clean Room



Thank you!

