Search for Life on Mars

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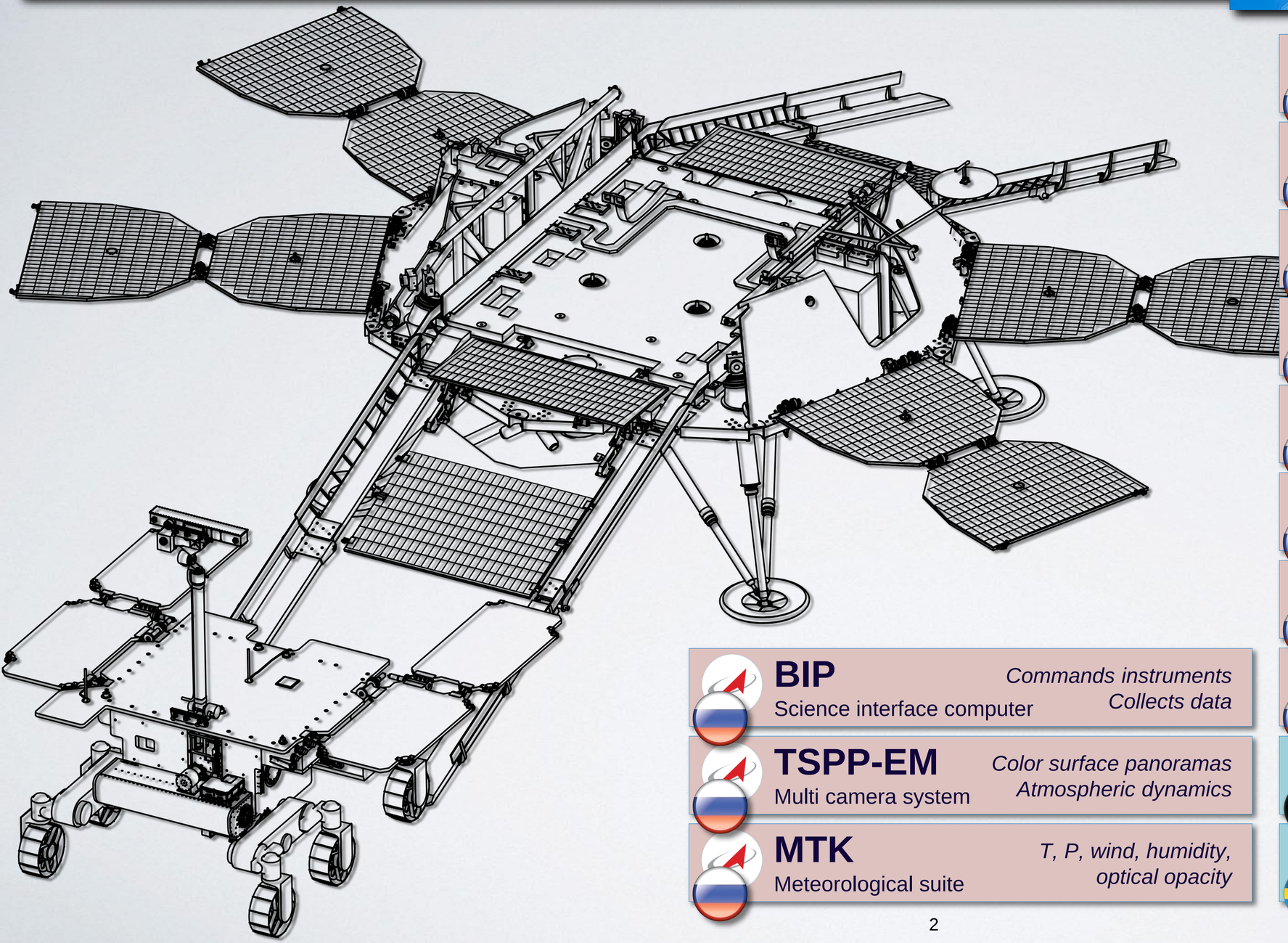
A. Haldemann, ExoMars science working teams and project team

MEPAG
26 July 2019, Pasadena (USA)

Surface Platform



BIP — Science interface computer
Commands instruments
Collects data

TSPP-EM — Multi camera system
Color surface panoramas
Atmospheric dynamics

MTK — Meteorological suite
T, P, wind, humidity, optical opacity

PK — Dust suite
Dust properties and E field monitoring

FAST — IR Fourier spectrometer
Trace gases, T, and aerosol monitoring

RAT-M — Microwave radiometer
Surface and atmospheric T monitoring

ADRON-EM — Neutron detector
Subsurface water content
Radiation dosimetry

MAIGRET — Magnetometer
Magnetic field measurements

MGAK — GCMS
Atmospheric Analysis

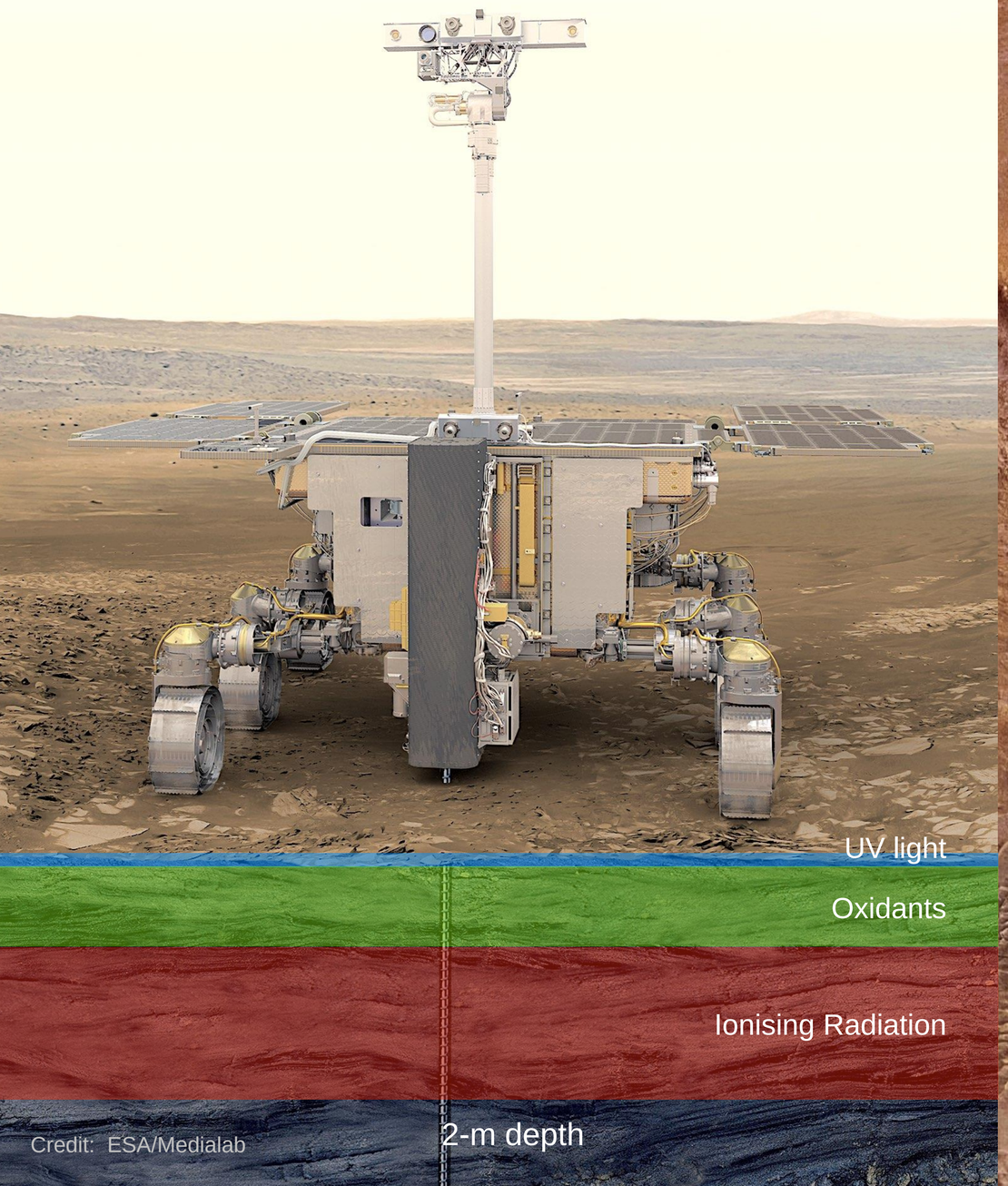
SEM — Seismometer
Internal Mars structure investigations

M-DLS — Diode laser spectrometer
Atmospheric chemical and isotopic composition

LaRa — Coherent transponder
Radio science for internal structure investigations

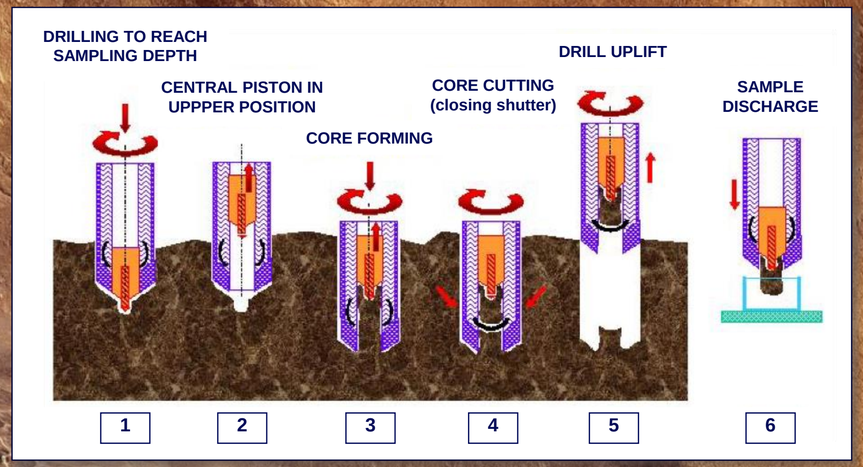
HABIT — Habitability studies
T, UV dose, humidity, salt deliquescence

Mobility + Subsurface Access



Credit: ESA/Medialab

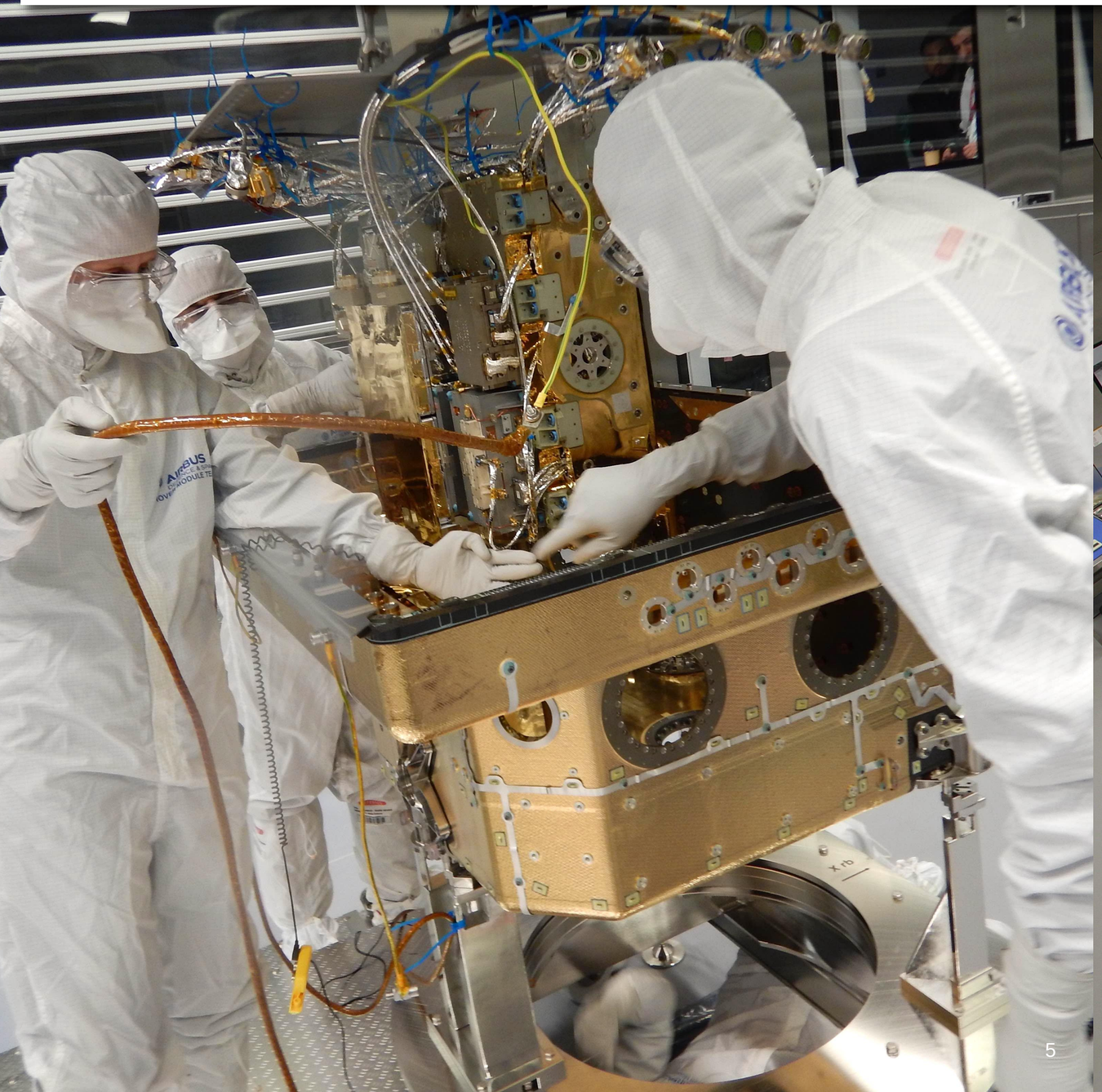
Nominal mission :	218 sols
Nominal science :	6 Experiment Cycles + 2 Vertical Surveys
EC length :	16–20 sols
Rover mass :	300-kg class
Mobility range :	Several km



Argyre, MEX / HRSC

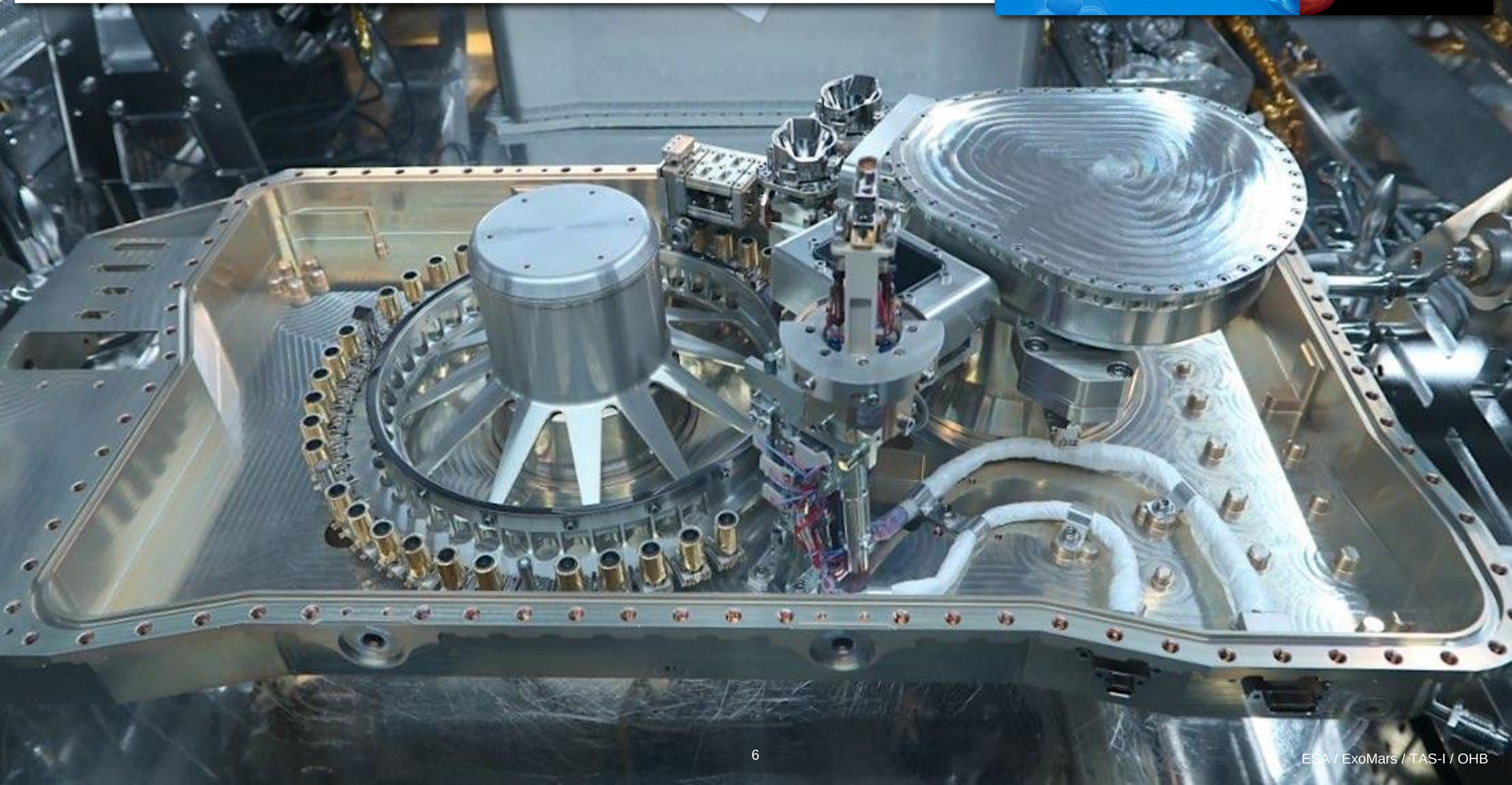
Mobility + Subsurface Access

Rover Service Module FM

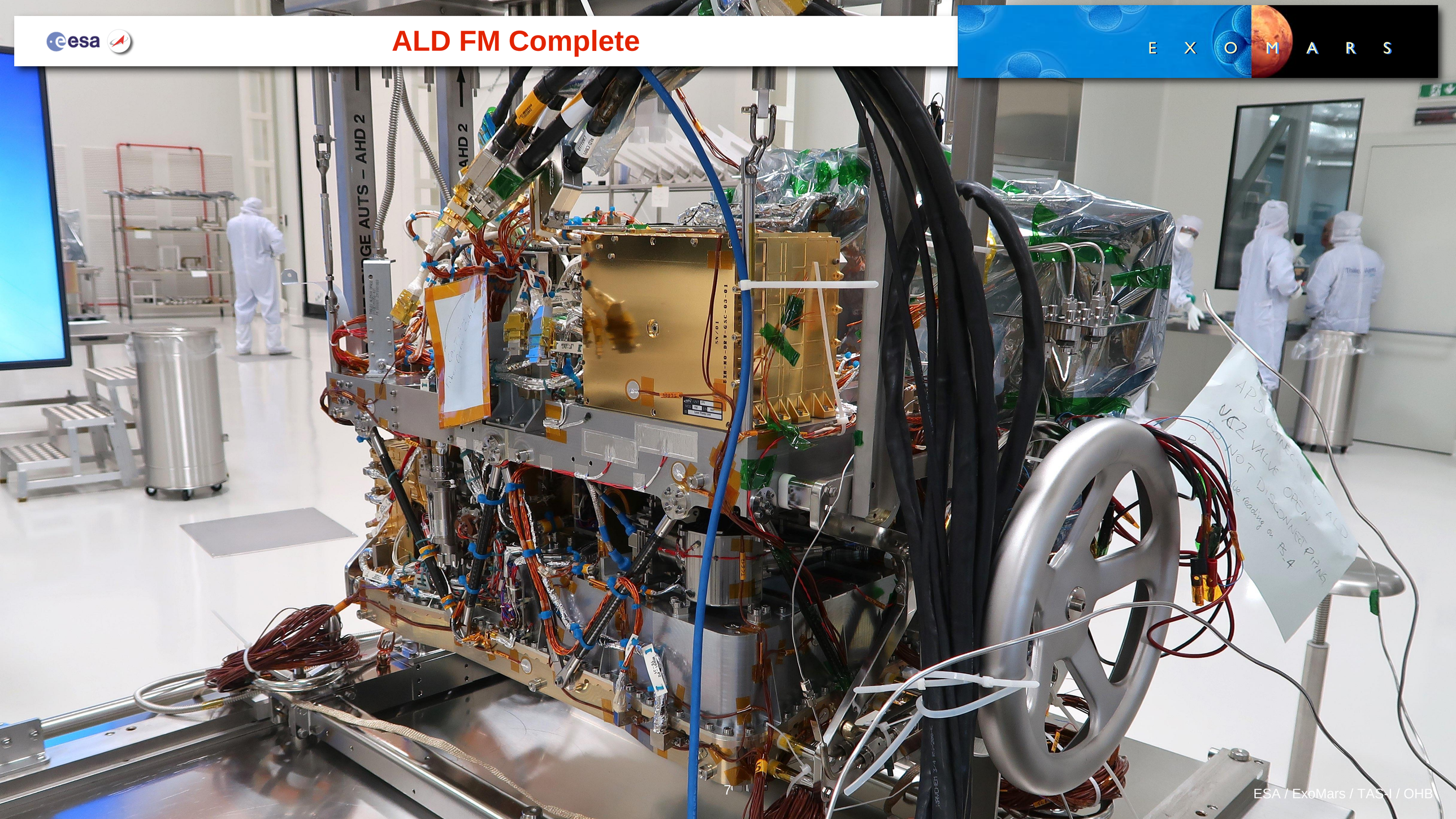


ESA / ExoMars / TAS-I / ADS

ALD FM Ultra Clean Zone

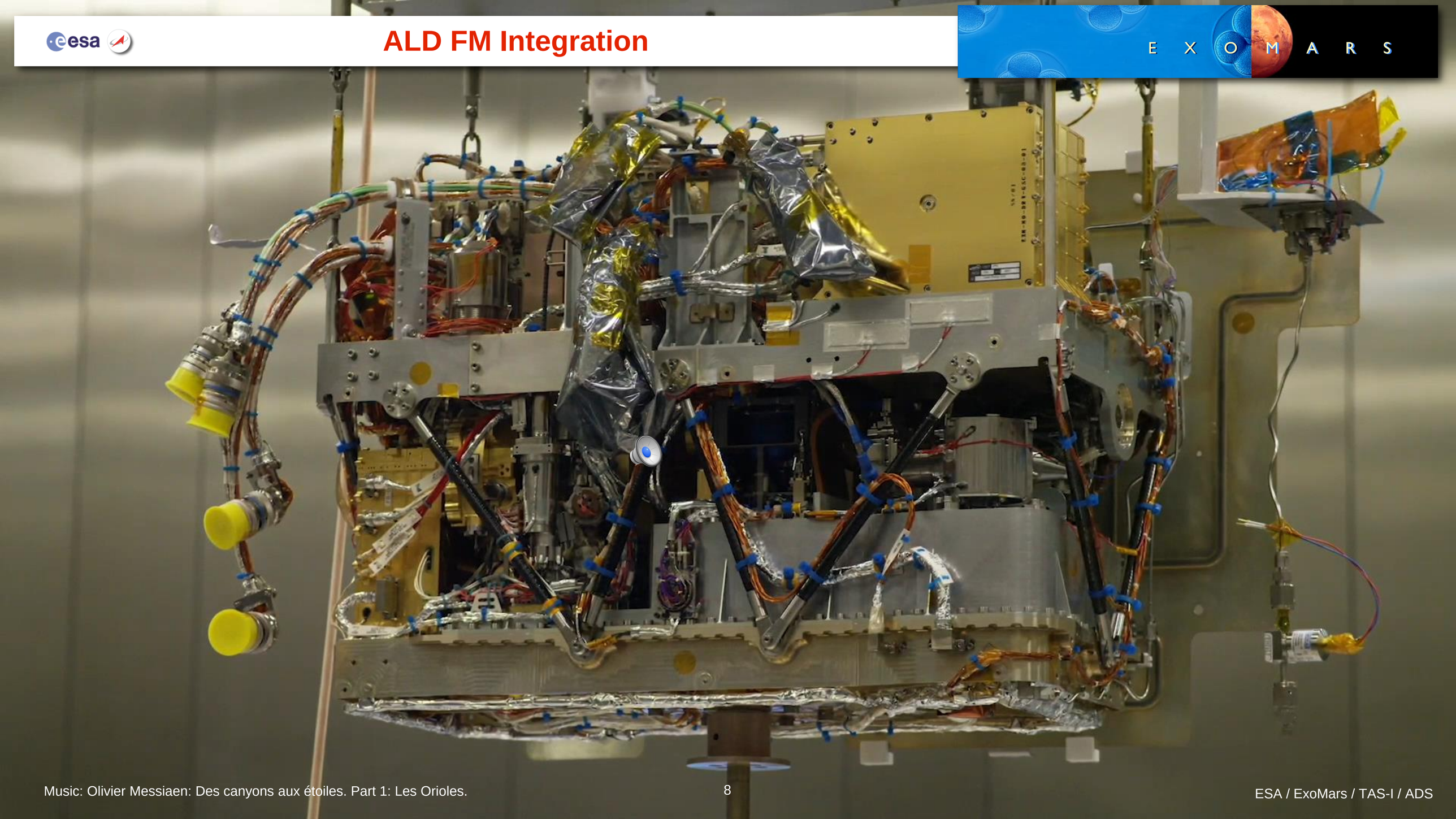


ALD FM Complete



ESA / ExoMars / TASI / OHB

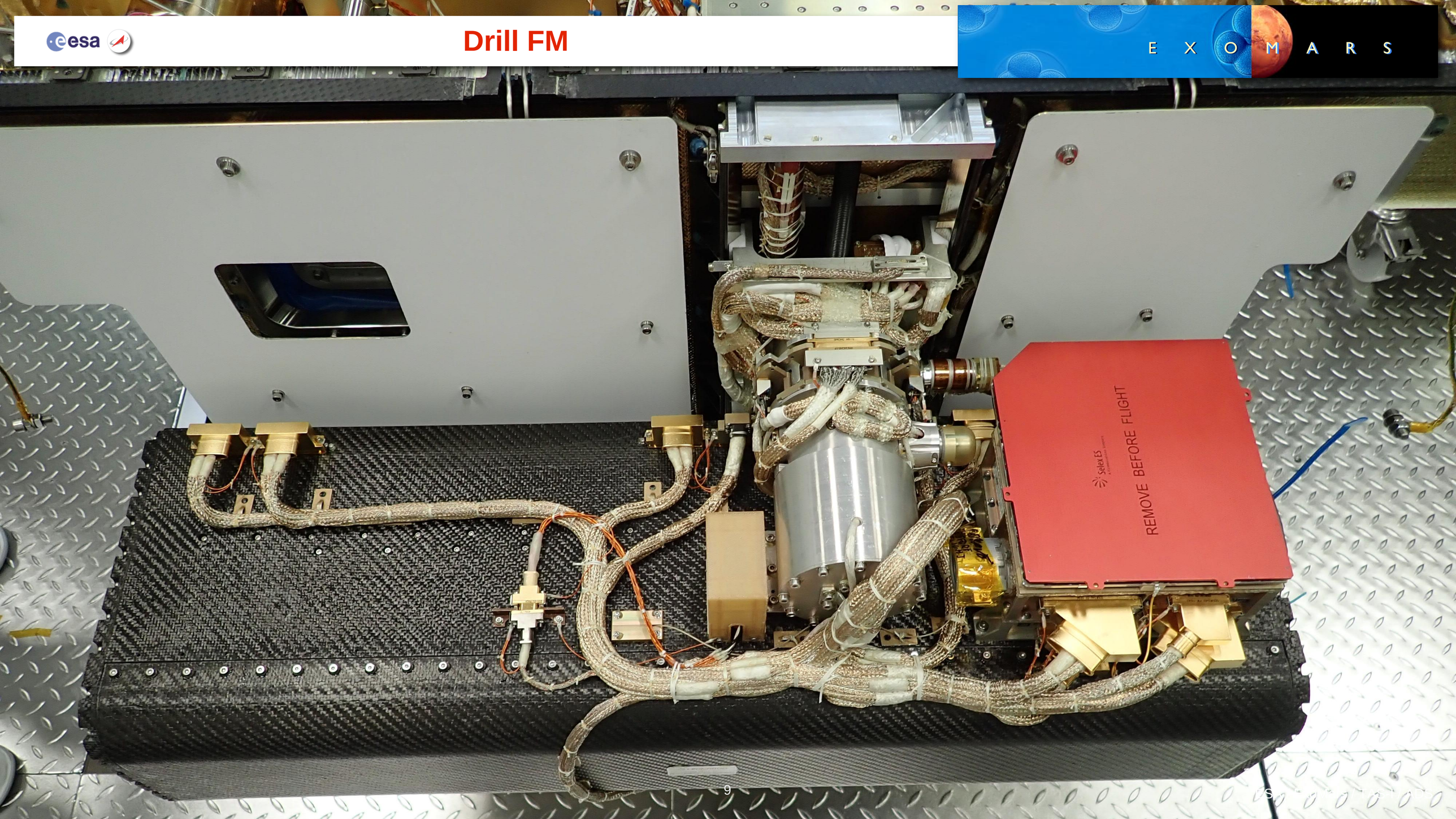
ALD FM Integration



Music: Olivier Messiaen: Des canyons aux étoiles. Part 1: Les Orioles.

ESA / ExoMars / TAS-I / ADS

Drill FM



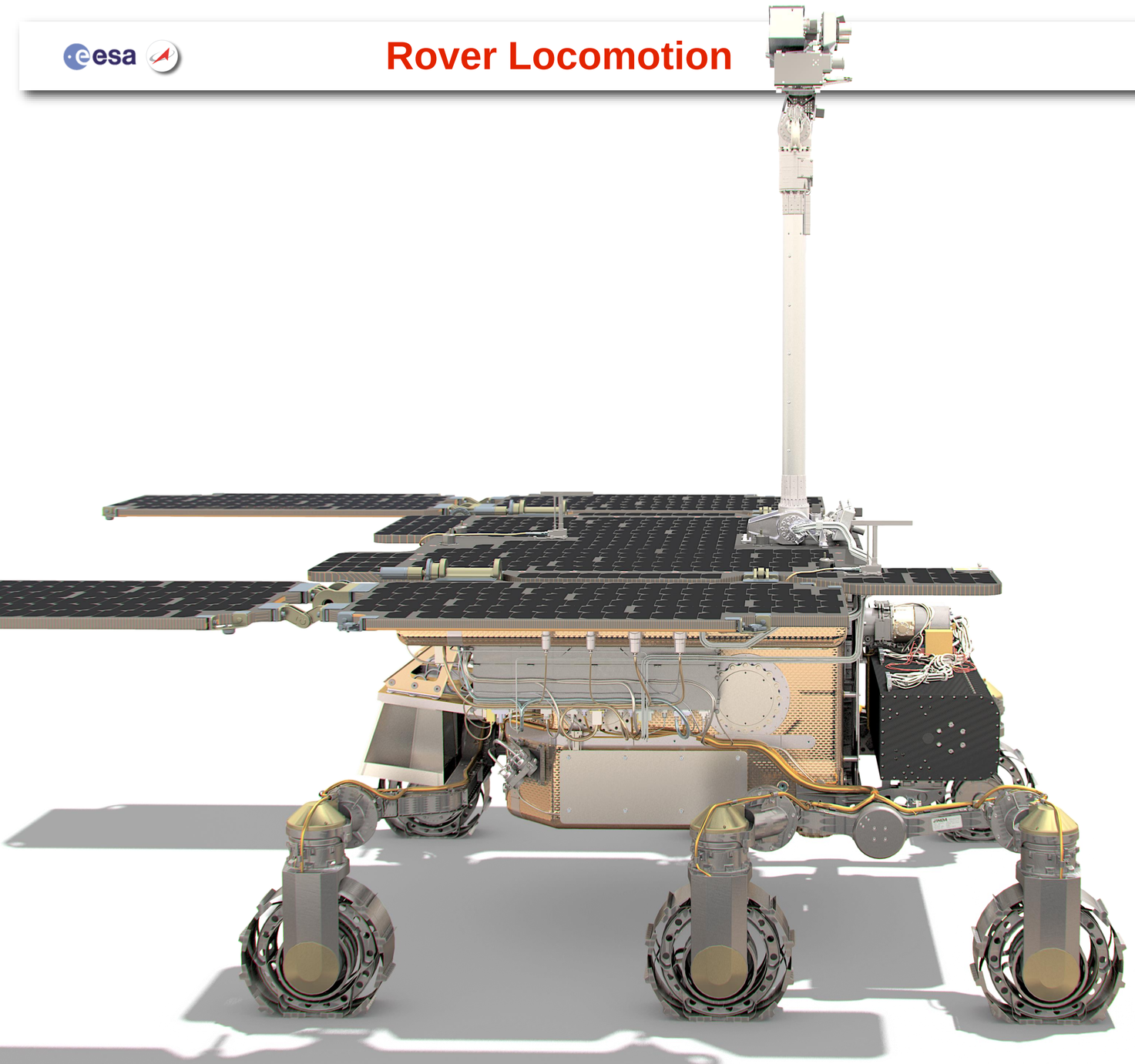
Pasteur Payload

ExoMars Rover Issue

- Astrobiology, June–July 2017
- Introduction paper describing the ExoMars rover science and mission.
- A dedicated paper for each of the nine instruments.

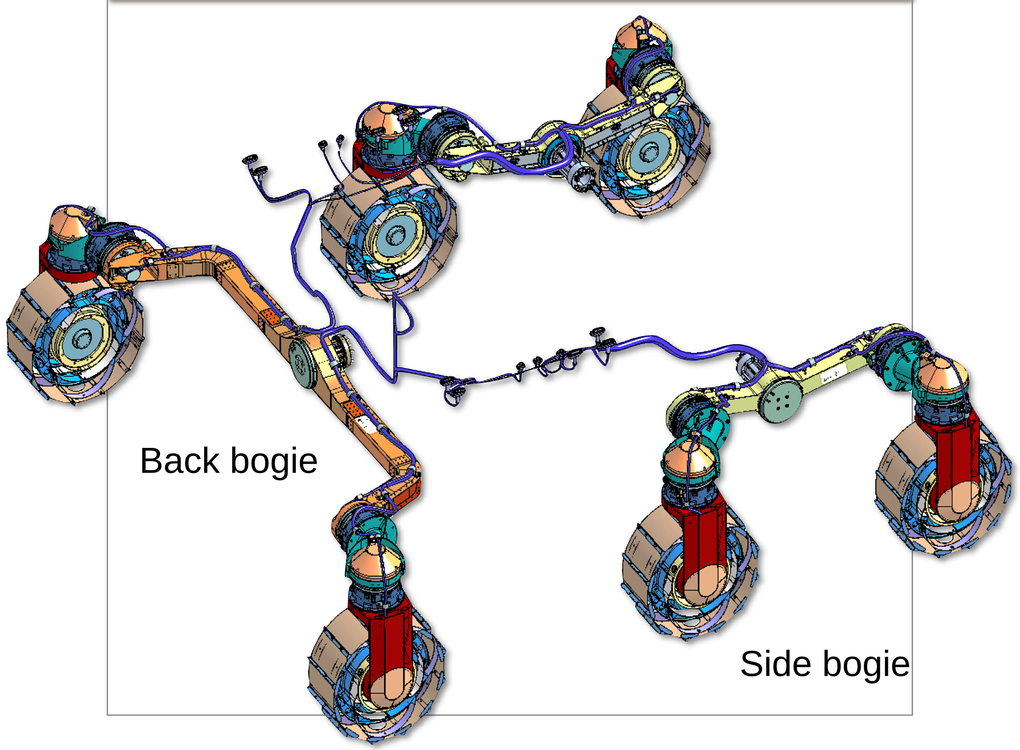
Sand dunes near the north pole, MRO / HiRISE

Rover Locomotion



Locomotion formula: 6 x 6 x 6 + 6

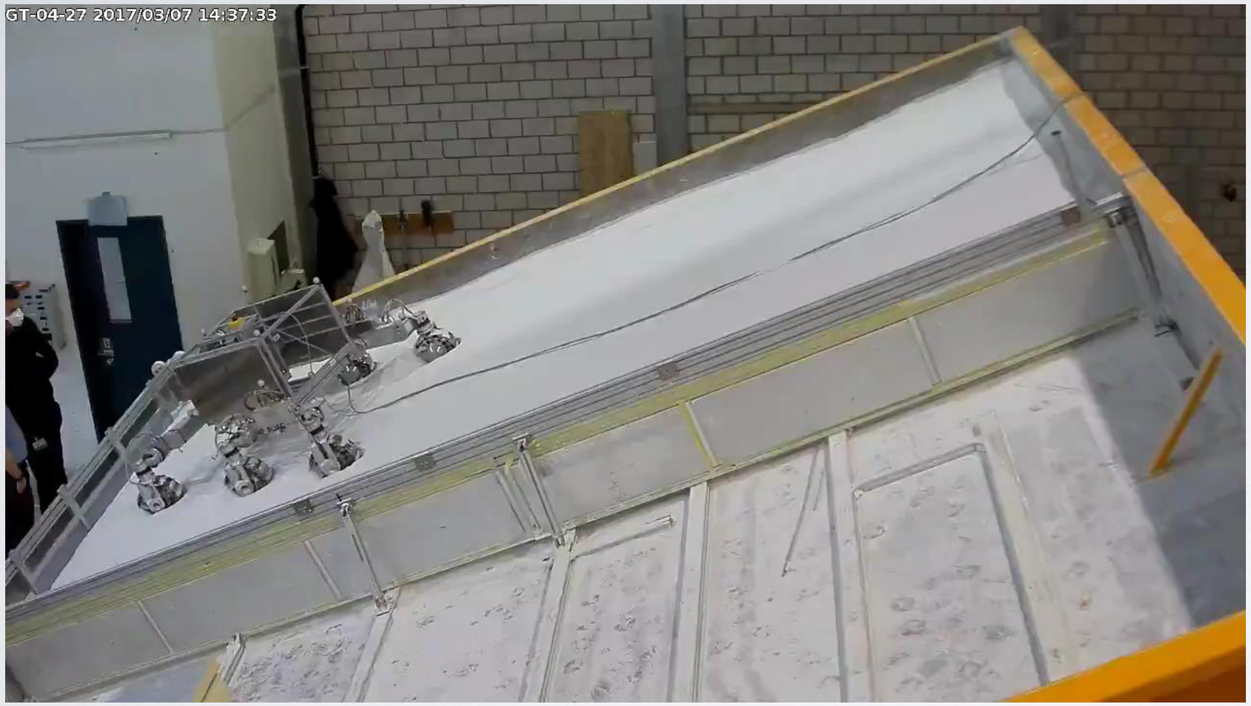
6 supporting wheels
6 driven wheels
6 steered wheels
6 articulated knees



Rover locomotion system, TAS-I/ADS/MDA

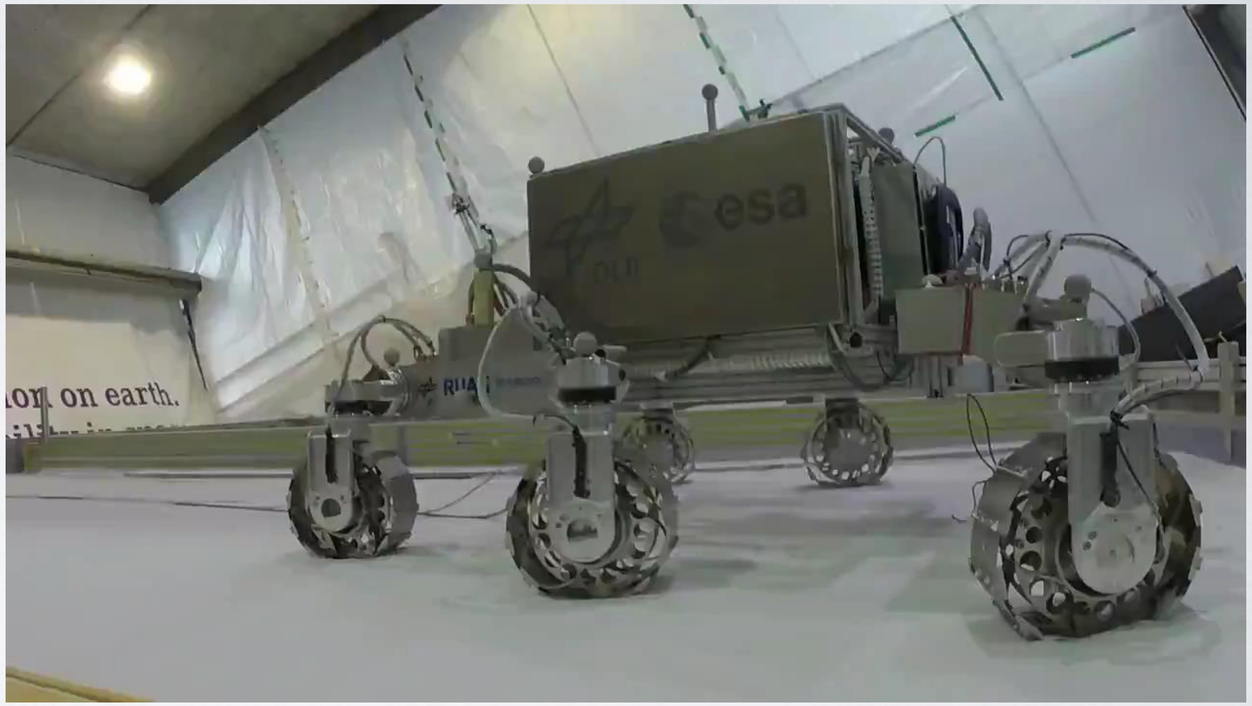
ES2 Soil - 21° Upslope - Back & Forth

Vivotec camera (GT-04-27)



video accelerated x25

GoPro camera (GT-04-27)



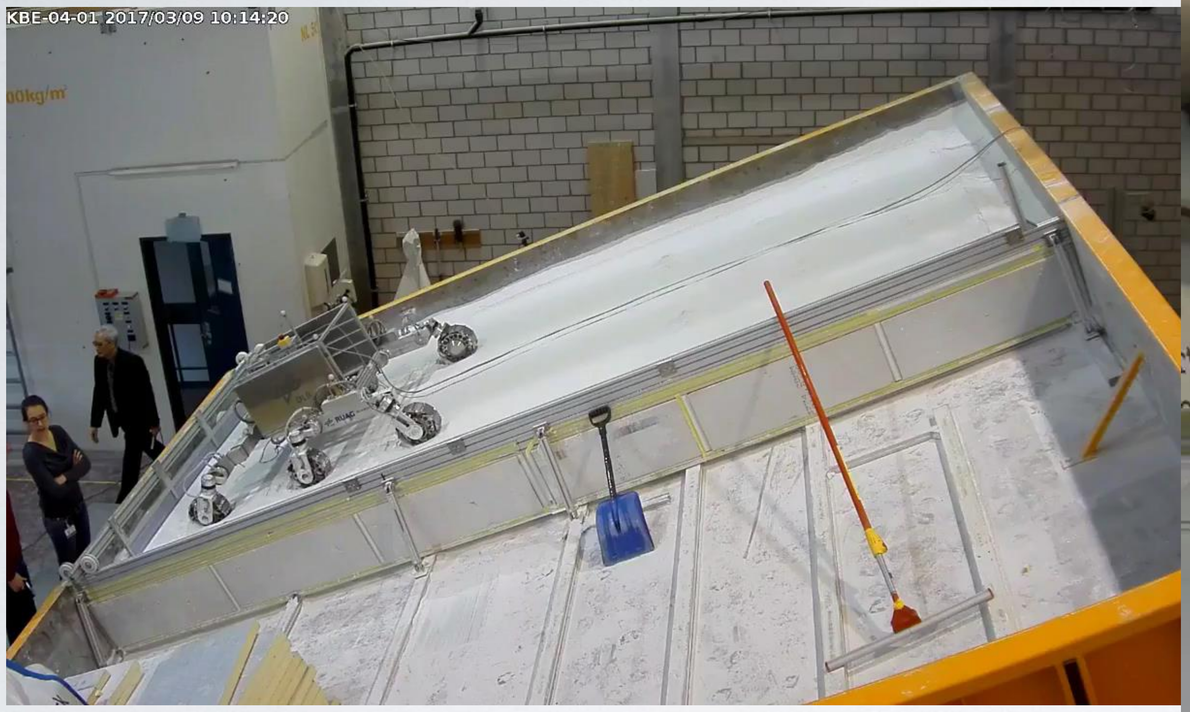
video accelerated x25

Credit: RUAG, Airbus Defence & Space, ESA

Result: progress of 1.3 m in 94 min, excessive sinkage & slip

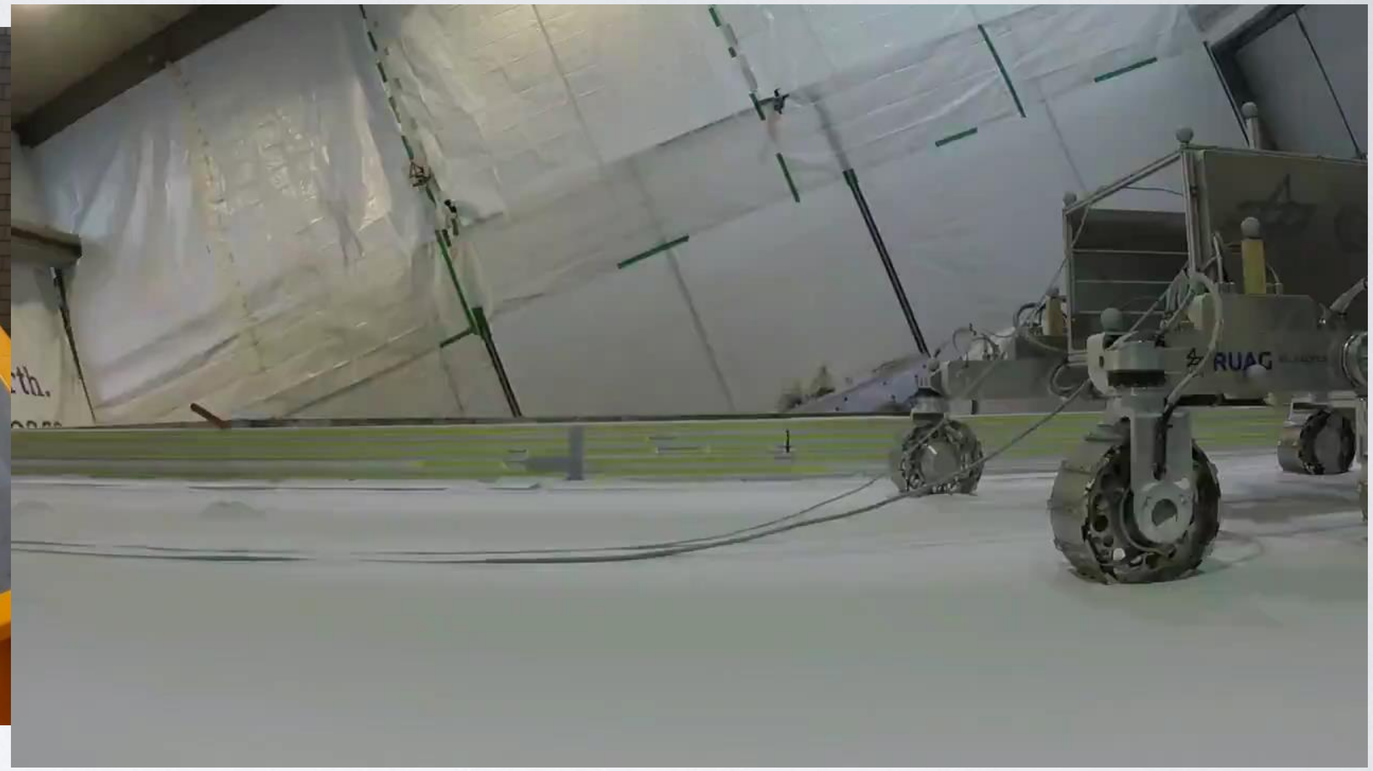
ES2 Soil - 21° Upslope - Wheel Walking

Vivotec camera (KBE-04-01)



video accelerated x15

GoPro camera (KBE-04-01)



video accelerated x15

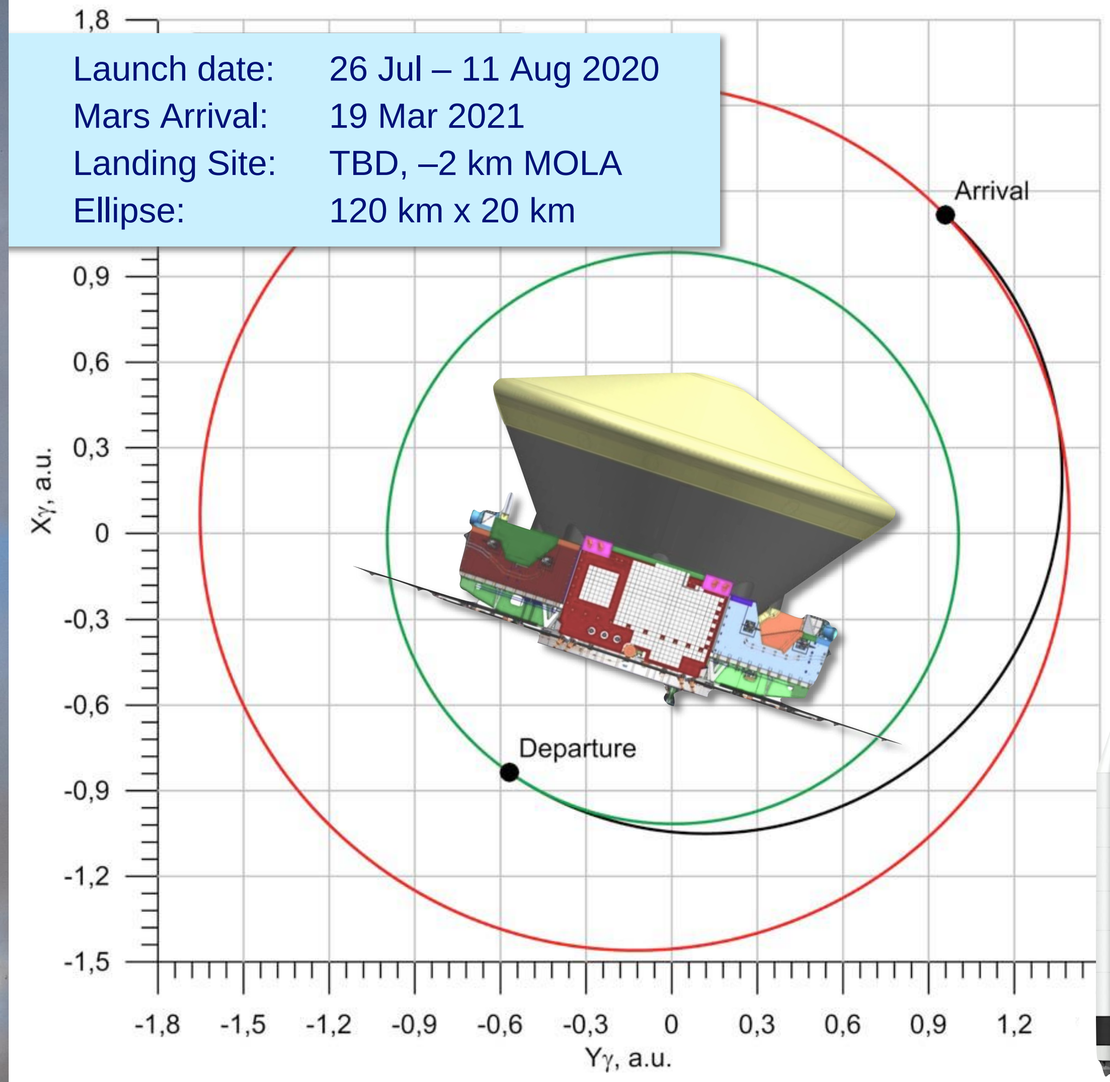
Credit: RUAG, Airbus Defence & Space, ESA

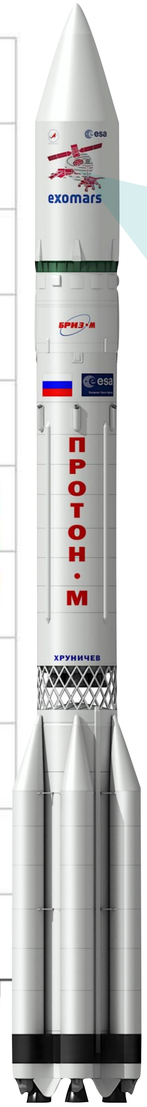
The tested WW gait respects all hardware kinematic constraints.

Result: progress of 3 m in 34 mins, low sinkage

Launch

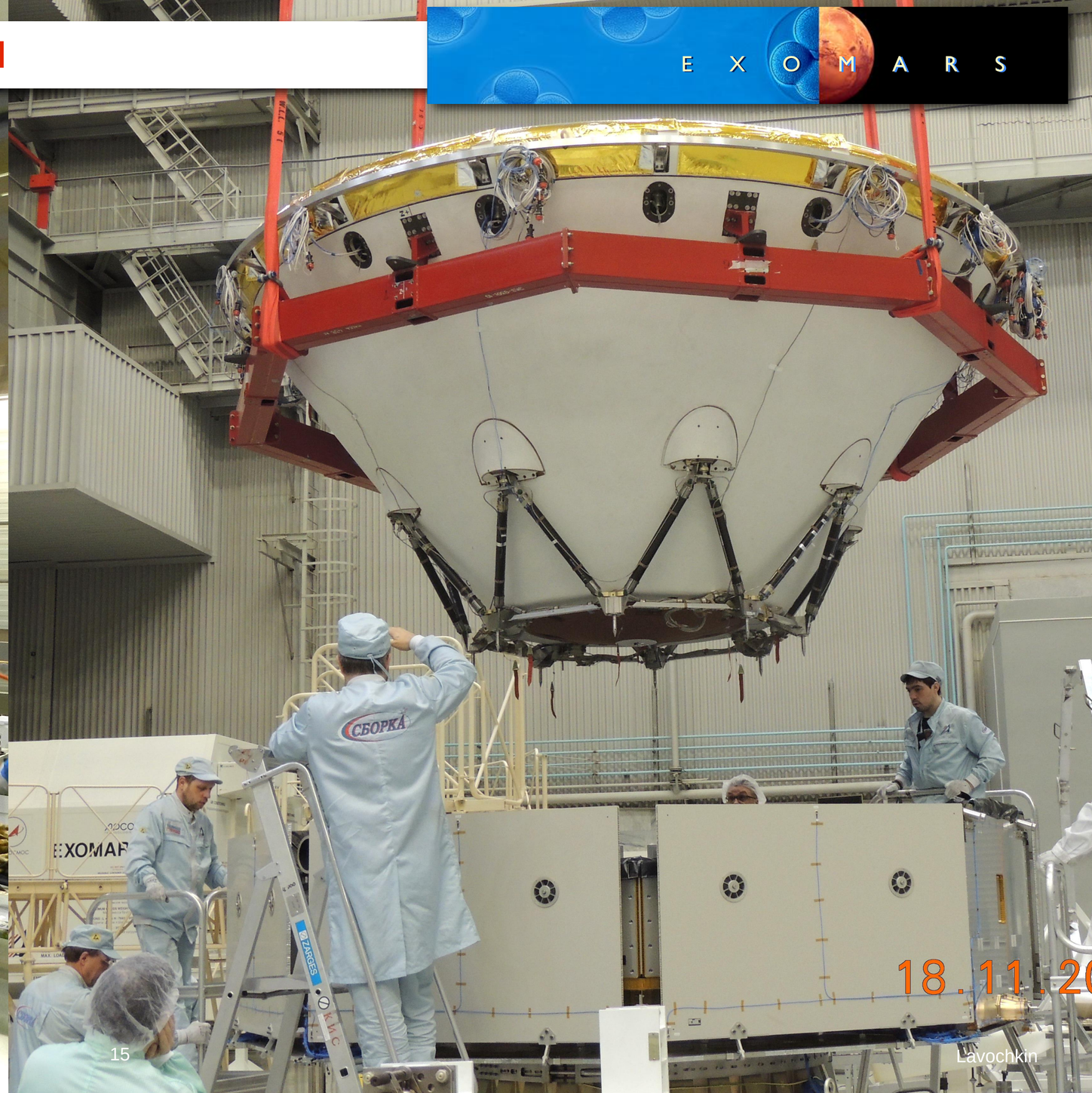
Launch date:	26 Jul – 11 Aug 2020
Mars Arrival:	19 Mar 2021
Landing Site:	TBD, –2 km MOLA
Ellipse:	120 km x 20 km





Mamers Valles, MEX / HRSC

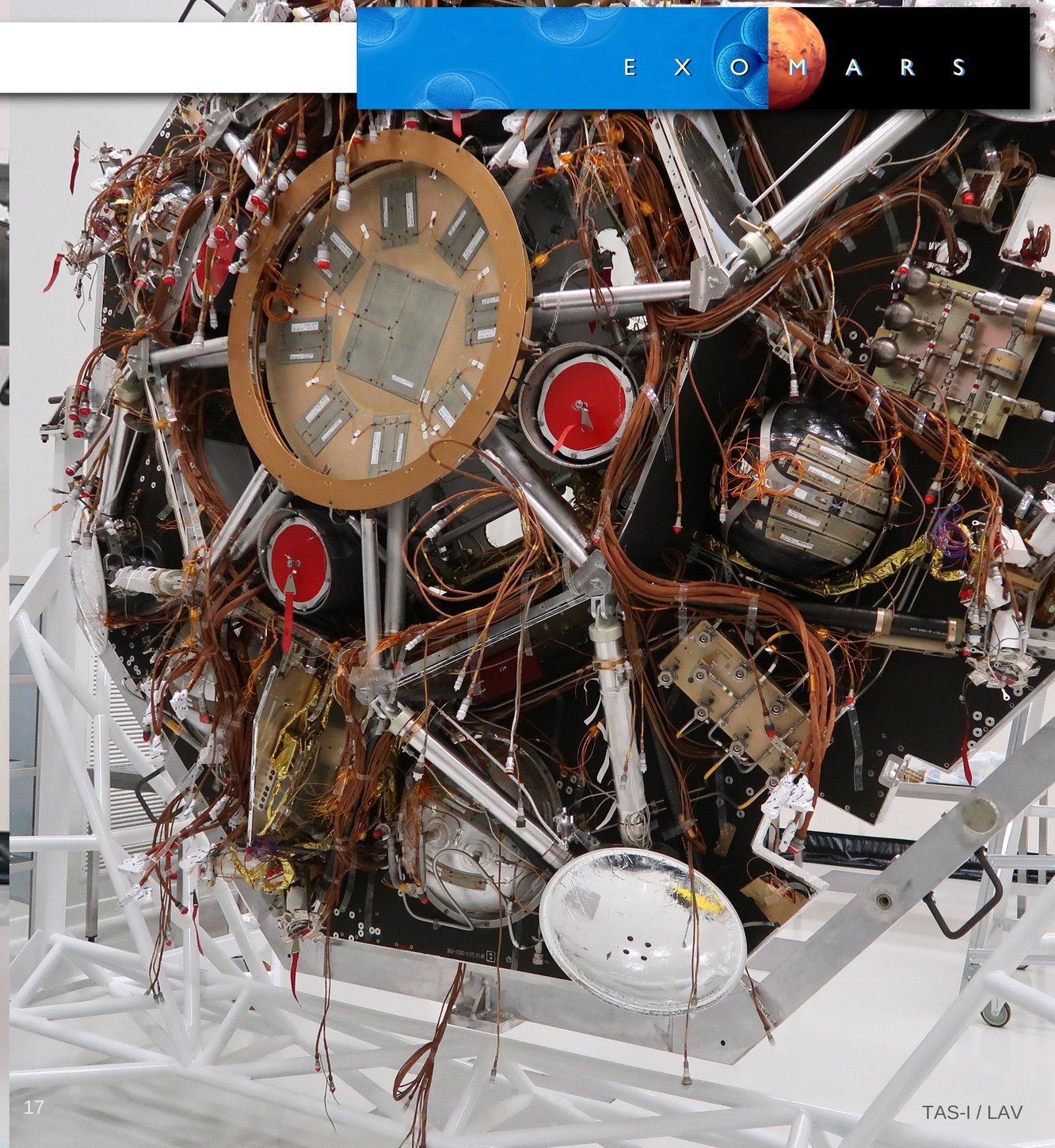
Carrier Module FM



Lander Structural Model

Lavochkin

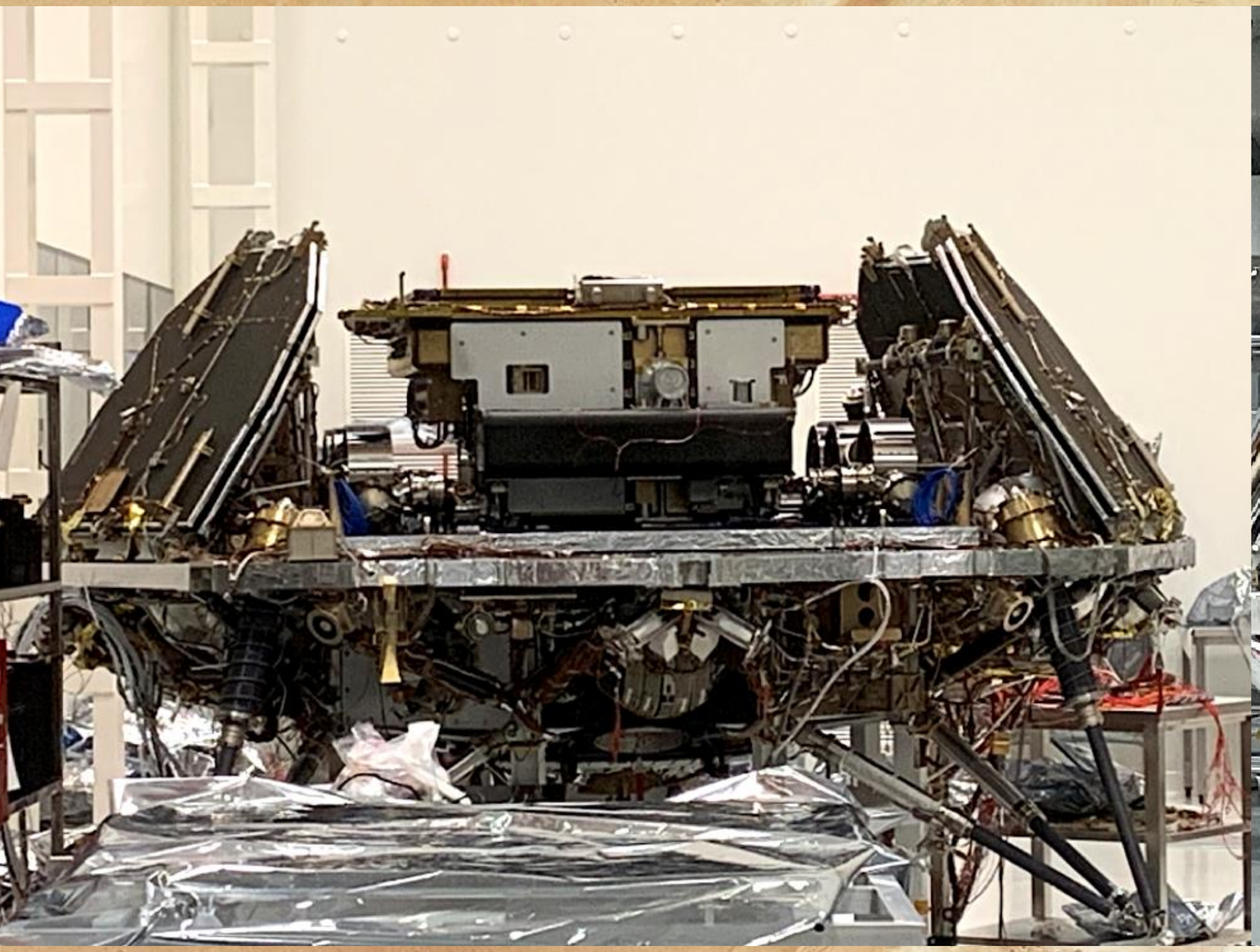
Descent Module FM

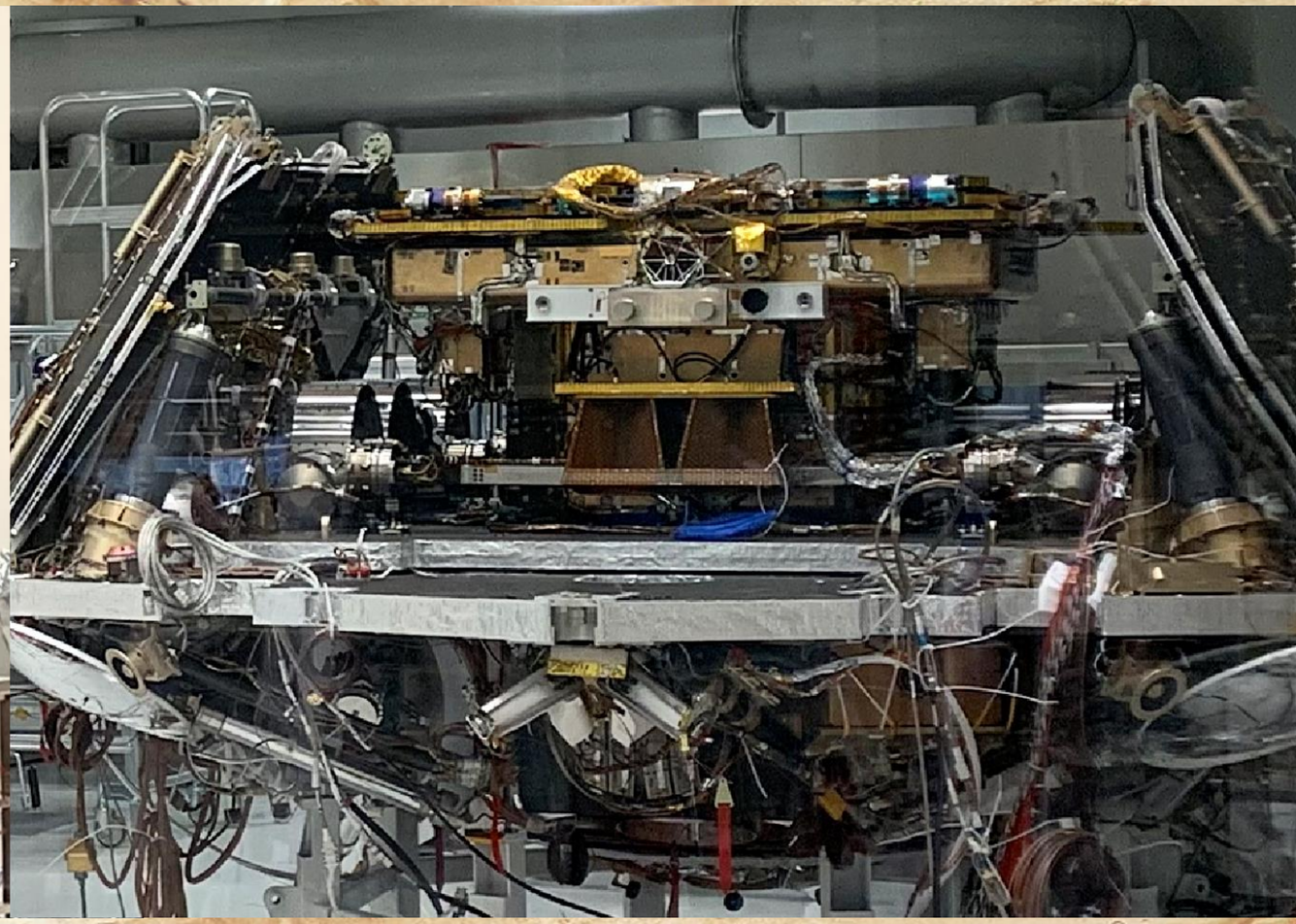


TAS-I / LAV

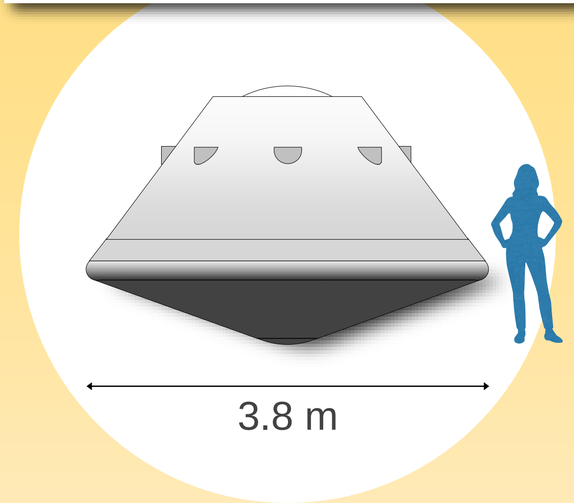
Descent Module FM

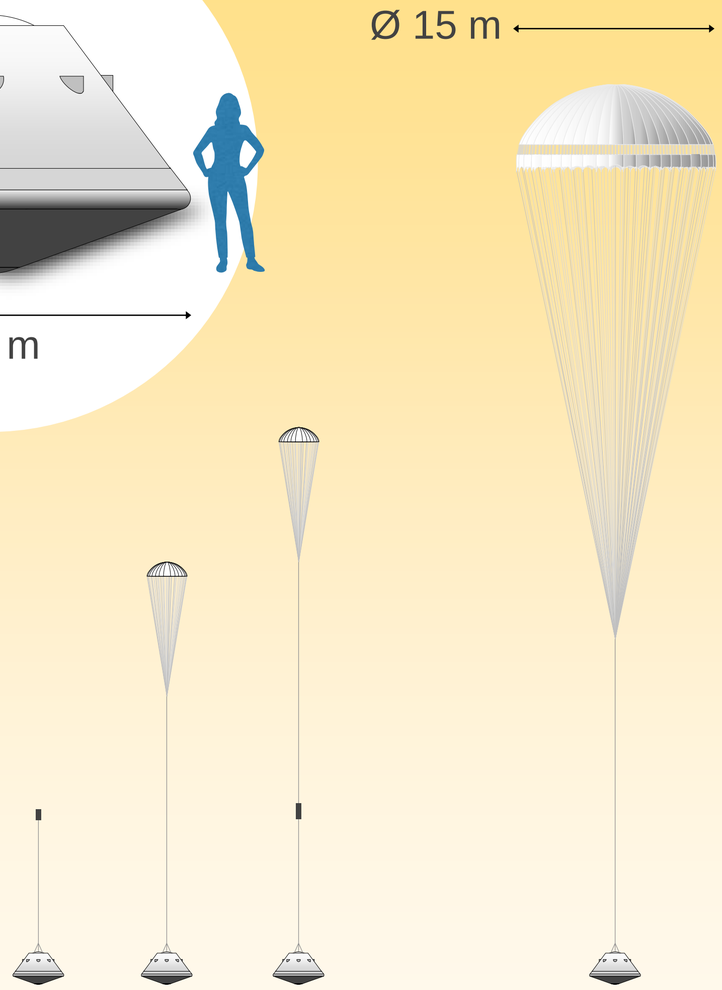
Descent Module FM





Parachute Deployment Sequence



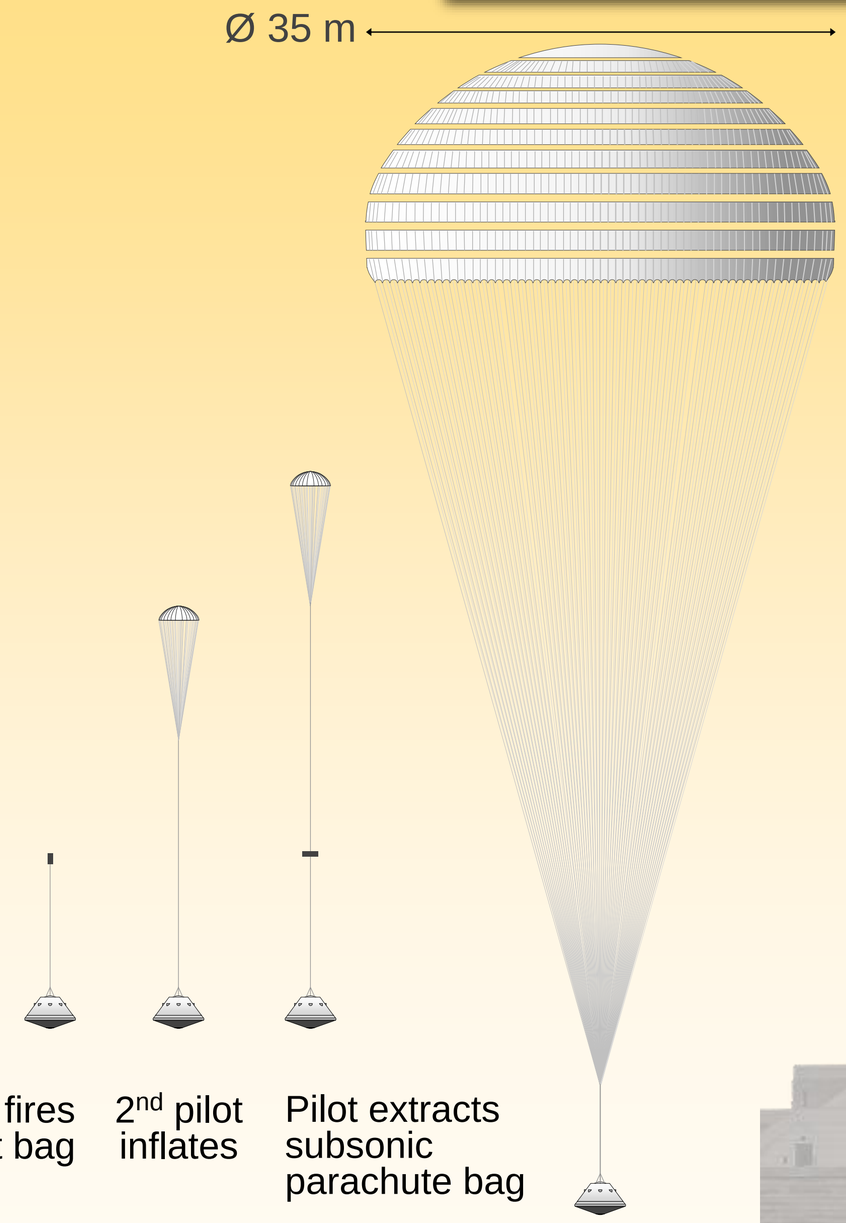


Mortar fires 1st pilot bag

1st pilot inflates

Pilot extracts supersonic parachute bag

Supersonic parachute inflates



Mortar fires 2nd pilot bag

2nd pilot inflates

Pilot extracts subsonic parachute bag