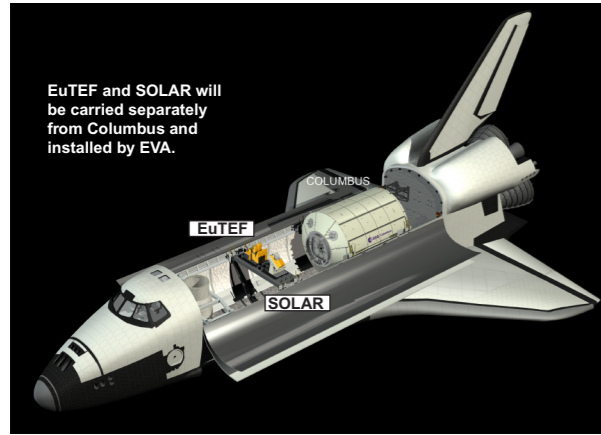


Operations and Utilisation

Accommodation & Transport:

EuTEF will be transported on orbit by the Space Shuttle. It will go to space on the same mission like the European Columbus module will go. EuTEF and SOLAR will be carried separately from Columbus and installed by EVA.



Operational Concept:

The survival heaters will raise the temperature so that the DHPU can be switched on after about 24 h to receive power from feed 1. The DHPU will sequentially power up all the experiments, allowing for the specific needs of several that could endanger the whole payload complement. Thirty days after switch-on, EuTEF will be considered as operational. After about 1,5 years, the

experiments will be swapped for a new batch, yet to be selected.

The scientific and housekeeping data will be downlinked via the Columbus Data Management System into the ISS. The Columbus Control Centre in Oberpfaffenhofen (D) will relay them to the EuTEF Facility Responsible Centre (FRC) in ESTEC's Erasmus Center. Here, the required data will be extracted and forwarded to the respective Principle Investigators (PIs).

EuTEF commands, restricted to parameter uploads to change, for example, experiment modes, will come from the PI sites into the FRC.

The validation of commands and resources and verification of timelines will be performed in the EuTEF Control Centre (ECC), which will then return them to the FRC for upload, using the Columbus/ISS channels.

Utilisation Scenario:

The Facility Responsible Centre (FRC) for all EuTEF instruments and operations will be the Erasmus User Support and Operation Centre at ESA Noordwijk, The Netherlands. The FRC will operate in conjunction with users at their User Home Bases (UHB).

Schedule:

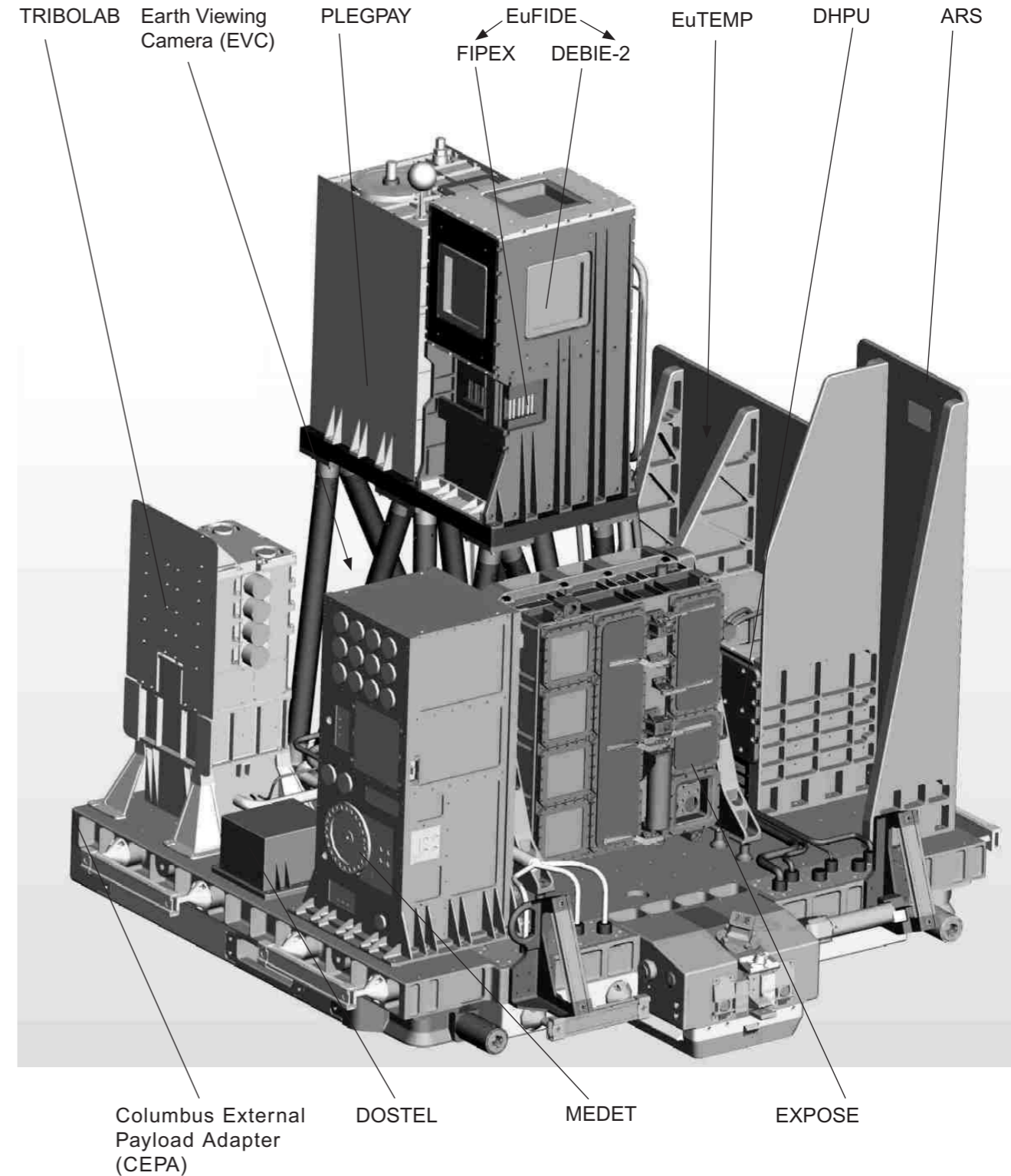
The EuTEF flight unit, including the final set of instruments will be integrated in February 2006.

The prime contractor is Carlo Gavazzi Space (Italy).

European Technology Exposure Facility - EuTEF

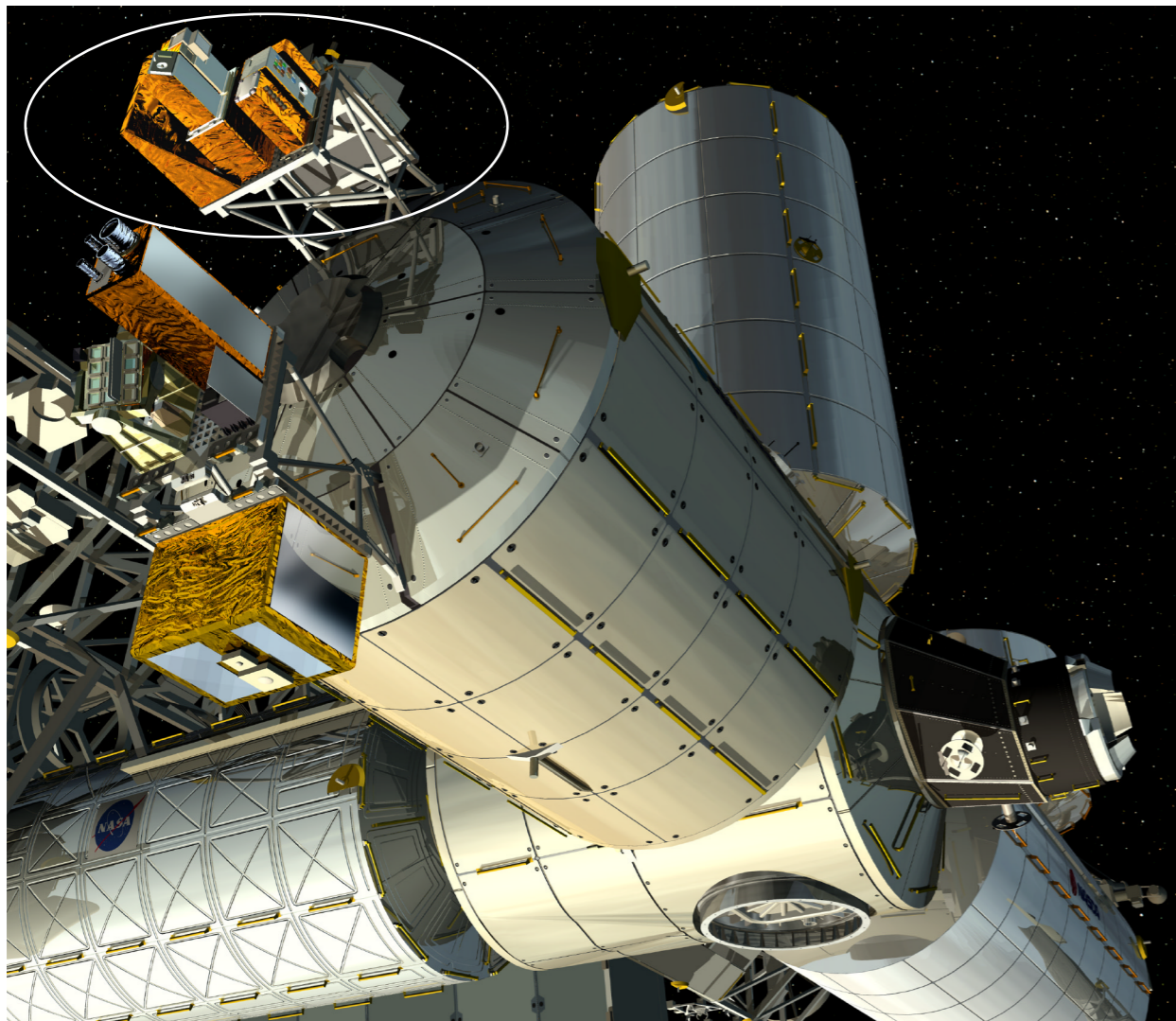
Multi-user external facility on outside of Columbus

Programmable, fully automated, multi-user facility with modular and flexible accommodation for a variety of technology payloads requiring direct access to the space environment. EuTEF is specifically designed to facilitate the rapid turnaround of experiments.



Illustrations: ESAD, Ducros

	PROJECT :	International Space Station	
	TITLE :	European Technology Exposure Facility	DOCUMENT N° EUC-ESA-FSH-030
			REV. 1.0



Facility Description

Columbus External Payload Facility - CEPF

The External Payload Facility consists of two external structures mounted symmetrically on the starboard end-cone of the Columbus Laboratory (Figure 3-45). The Facility provides a total of four accommodation locations with associated sets of resources for external payloads requiring specific viewing or exposure to the space environment. The accommodation locations are such that one faces towards the zenith direction (i.e., directly away from the Earth); one towards the nadir direction (i.e., directly towards the Earth), with the remaining two facing towards the starboard side of the ISS (i.e., perpendicular to the ISS velocity vector).

The accommodation location facing Zenith Starboard will be occupied by the multi-purpose facility EuTEF. A modular architecture provides standardised interfaces for nine instrument modules, all of which can be operated simultaneously. It is a platform to provide to the Principal Investigators (PI) and Industry community easy and low cost access to the external environment of the International Space Station, in terms of PA, Safety,

Technical and Programmatic. EuTEF with its unique opportunities supports the utilisation of the ISS.

The experiments and facility infrastructure are accommodated on the Columbus External Payload Adapter (CEPA), consisting of an adapter plate, the Active Flight Releasable Attachment Mechanism (A-FRAM) and the connectors and harness. The instruments are mounted either directly on the Adapter plate or a support structure that elevates them for optimum exposure to the ram (direction-of-flight) and zenith directions.

The facility infrastructure consists of a Data Handling and Power Unit (DHPU) and its thermal control system, which translates the services from Columbus. It receives two feeds of 120 Vdc from the CEPF via the A-FRAM connectors. Feed 1 is converted to 28 Vdc as the instruments' primary supply; feed 2 is only for survival heaters, in case feed 1 is lost. Inside EuTEF, the DHPU distributes data using a MIL-1553B interface and a serial RS422 link for specific interfaces. The link to the CEPF uses an Ethernet connection, a MIL-1553B, and the HRDL for the pictures of the Earth Viewing Camera (EVC).

Additionally, temperatures are measured autonomously at several points on EuTEF while the assembly is unpowered (EuTEMP).

EuTEF can accommodate nine instruments, all of which can be operated simultaneously.

In total, the payload mass is < 350 kg, requiring < 450 W peak.

The first round of experiments consists of:

- **TRIBOLAB**, testbed for tribology properties of materials in space (INTA, INASMET, CDTI contract);
- **PLEGPAY**, PLasma Electron Gun PAYload for plasma discharge in orbit (AAS Florence, under ASI contract);
- **MEDET**, Material Exposure and Degradation Experiment on TEF in space (CNES, ONERA, University Southampton, ESA);
- **DEBIE-2**, micrometeoroid and orbital debris detection (Patria Finavitec, under ESA contract). Shares a standard berth with FIPEX);
- **FIPEX**, Flux Probe EXperiment, a atomic oxygen detector (University of Dresden). Shares a standard berth with Debie-2 in the module EuFIDE;
- **EXPOSE**, photobiology and exobiology (Kayser-Threde, under ESA contract);
- **DOSTEL**, a DOSimetric radiation TELEScope for radiation measurements (DLR Institute of Flight Medicine);
- **EuTEMP**, a EuTEF temperature measurement device for monitoring the thermal environment during unpowered transport from the Shuttle to the CEPF. (EFACEC, under ESA contract);

- **EVC**: an Earth Viewing Camera, developed by ESA/Carlo Gavazzi Space for outreach activities.

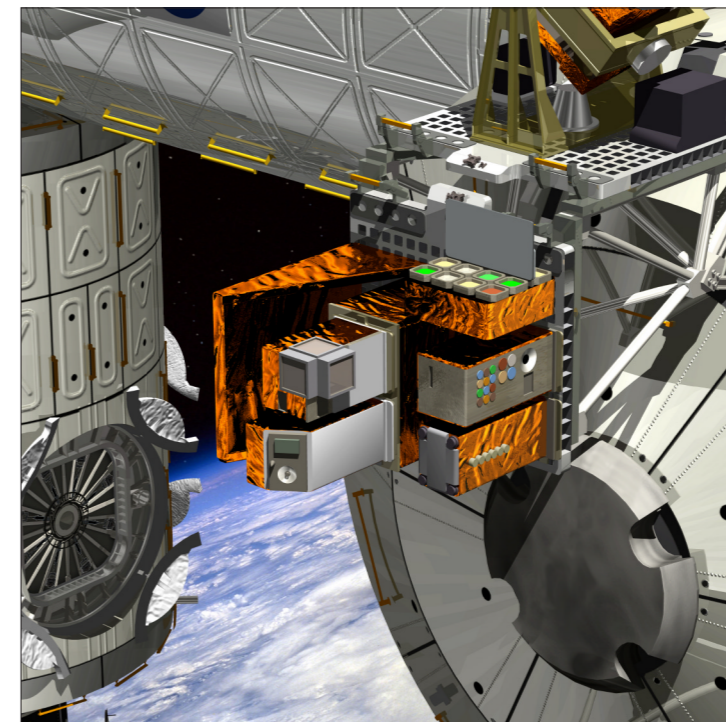
Integration and Installation

The experiments are being qualified separately before installation on EuTEF, where they will then be functionally tested with the facility electronics. The integrated facility will, after a system-level environmental testing, be accepted for installation on the CEPF. After receiving the Flight Readiness Certificate from ESA, EuTEF will be shipped to KSC in Florida to meet the Mission Peculiar Experiment Support Structure (MPRESS) that will host it in the Shuttle cargo bay. After installation of EuTEF and SOLAR on the MPRESS, they will be handed over to NASA's Shuttle team.

Aboard the Shuttle, 28 Vdc will power the 'stay-alive' heaters.

Mission 1E will first attach Columbus to the ISS and power it up. A spacewalk on day 6 will install, first, SOLAR and then EuTEF. Before EuTEF is moved, its stay-alive heaters will prepare for the unpowered 5 h phase (the battery-powered EuTEMP will monitor the temperatures). An astronaut strapped to the Station's Canadarm2 will release EuTEF from the MPRESS by activating the A-FRAM. It will then be pulled from its soft-dock magnets and hand-delivered to the CEPF. Power feed 2 will be immediately activated to ensure survival of the payload in cold conditions.

Number of payload models:	9
Retrieval opportunities:	After 1.5 years
Power availability:	< 450 W
Mass:	< 350 kg



Position of EuTEF on Columbus' end cone. see also left page