Increment 47&48 ESA P/L Overview
POIWG #39

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SpX-8 Delay: Impacts and Rollovers to 47/48

- **Rollovers from Inc 46: SPHEROIDS (Biology Experiment)**
  - Up- & Download with SpX-8
  - Execution (in 2 Kubik boxes) during SpX-8 mission
  - Crew Time: 08:55
- **Other Hardware for Upload on SpX-8:**
  - EMCS Spares
  - ENERGY Water Kit
  - MSL Batch 2b – proposal to advance 7 of 14 SCAs from SpX-9
- **Other Hardware for Download on SpX-8:**
  - AquaMembrane (SDM samples)
    - Samples expire in early March → might be moved to 44S
  - R&R‘ed Kubik eboxes (2)
  - BIOLAB HM Access Door & Reference EC
  - ESA PAO items

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Recurrent Experiments

- Airway Monitoring (US LAB & Airlock; Inc 48)
- Circadian Rhythms
- DOSIS 3D measurements, PDP download 45S & upload 47S
- ENERGY (Inc 47)
  - → Food & consumables upload moved from SpX-8 to OA-6
- EML Batch 1 ops (using SAMS) + samples D/L on SpX-10
- MSL Batch 2b (MSRR)
- PK-4 [Russian Crew time]
  - → Ops in June, Inc week 16; using SAMS S/N 121-F08
- SKIN B
- Space Headaches
- MagVector & WiseNet
- Vessel ID System
  - → Maritime Awareness installation - U/L SpX-9 (?)
  - → Draft PODF coordination/review done

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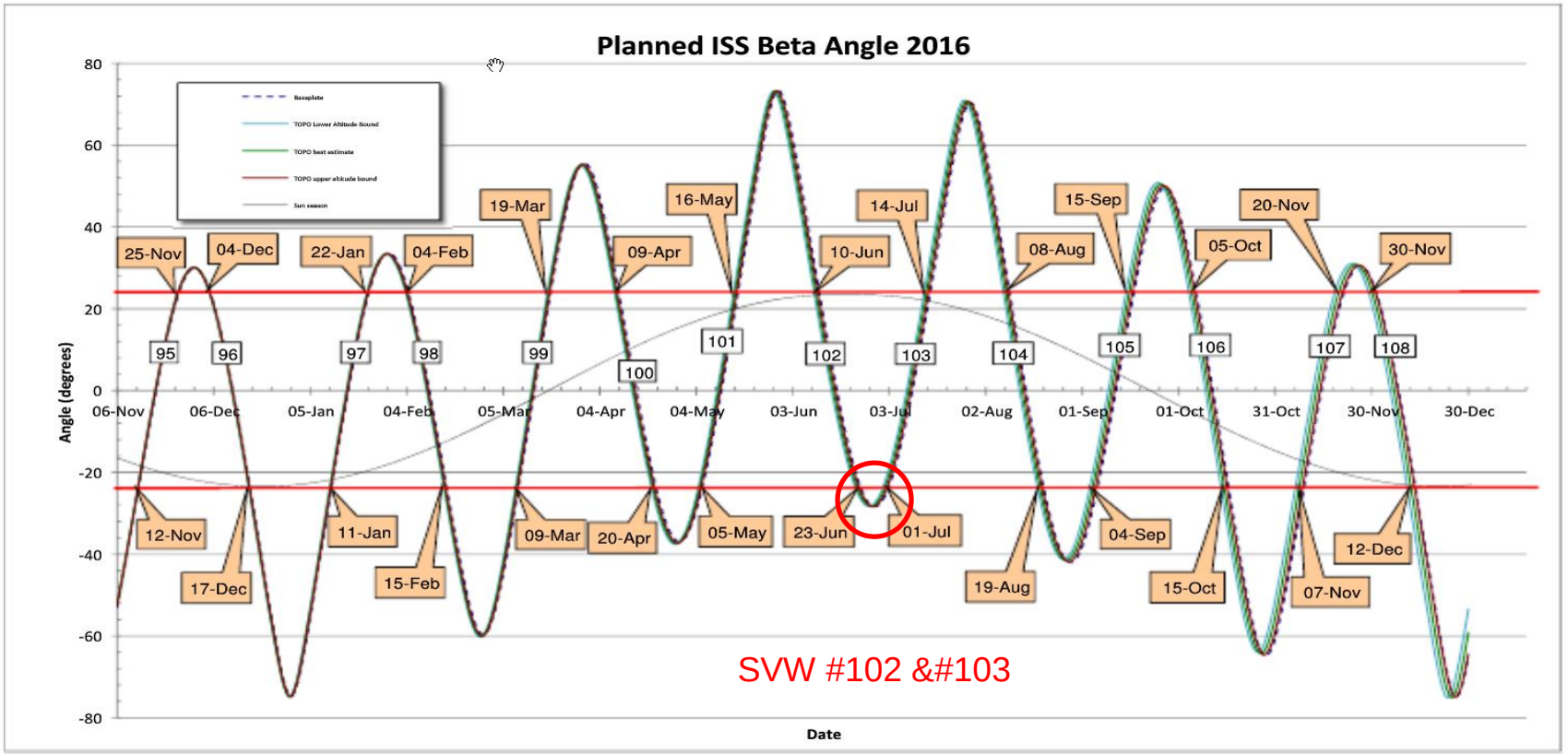
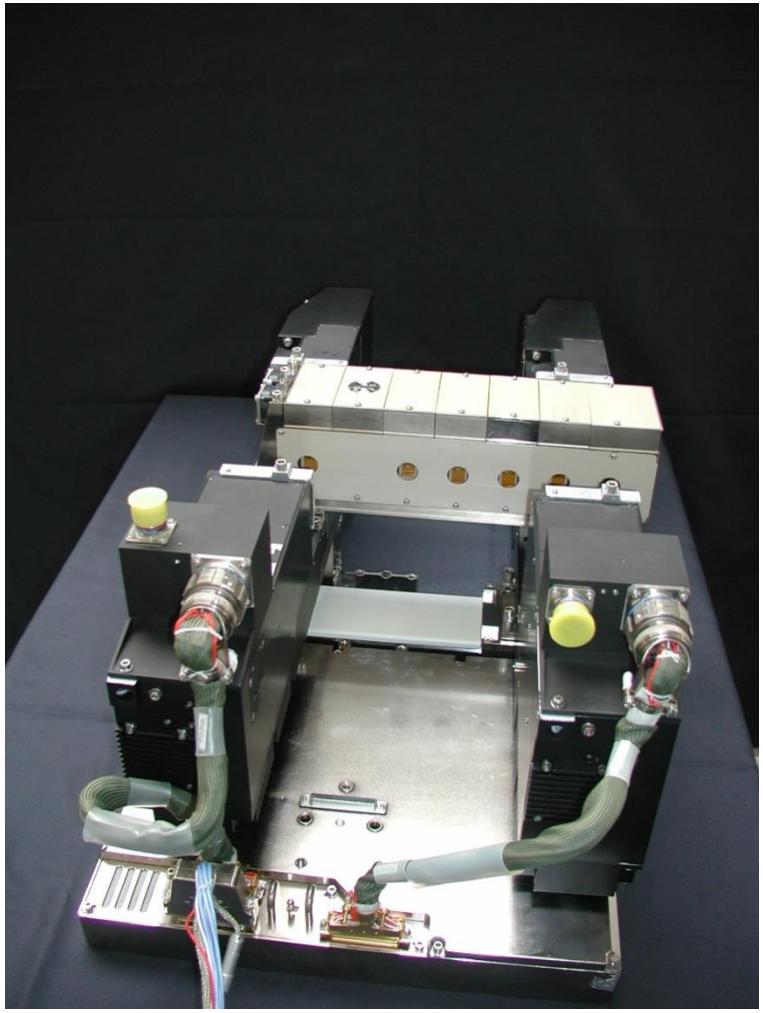
Recurrent Experiments

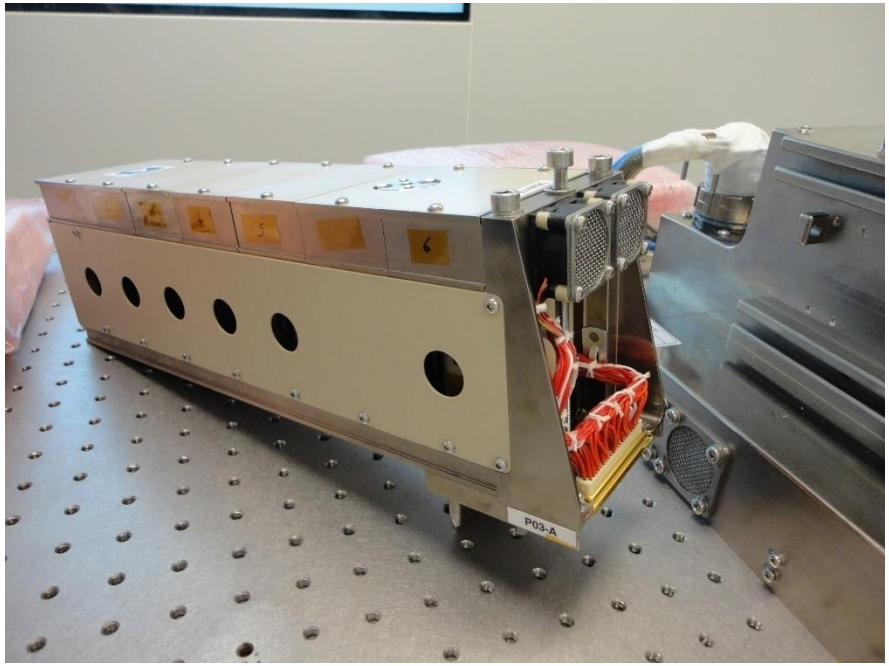
- **SOLAR (with SVW Bridging from June 23rd to July 1st)**
  - →**Expected attitude YPR -11.5 -2.0 +1.2**
  - →**Baseplate Beta Angle**



Recurrent Experiments

➢ SODI DCMIX#3b





Study of Soret and Diffusion coefficients: how the concentration of different liquids containing water, ethanol and tri-ethylene-glycol varies under a thermal gradient.

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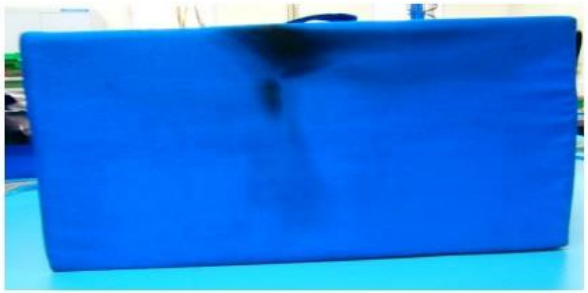
Recurrent Experiments

- **SODI DCMIX#3b: Background**
  - → **SODI DCMIX#3 – Orb-3 (October 2014)**



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Recurrent Experiments

- **SODI DCMIX#3b**
  - **Upload currently manifested on SpX-10**
  - **Assessment ongoing for move to SpX-9**
    → Logistics, Readiness (less time for ops fam. w/ EM)
    → MSG slot negotiation
    → OOS TIM plans with arrival on SpX-9
  - **Ops starting July 2016**
  - **Cell array lifetime limited (4 months)**

Recurrent Experiments

➢ AquaMembrane II

- **Technology demonstration:**
  1. **To demonstrate the function of an Aquaporin Inside Membrane (AIM) test apparatus in micro gravity.**
  2. **To use the AIM test apparatus to investigate concentration polarization effect in micro gravity.**

  → Aquaporin technology is a viable candidate for replacement of existing multifiltration beds.

- **AquaMembrane I was performed by Andreas Mogensen during SDM.**
- **HW upload currently on SpX-10, but move to SpX-9 under review**

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New Experiments

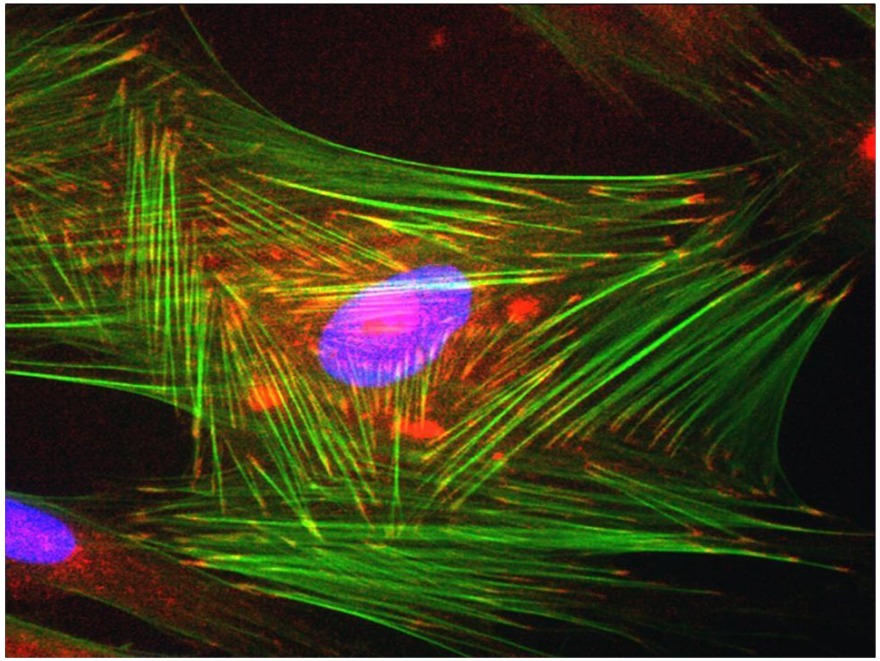
- **Cytoskeleton**
  - **Upload / Download currently manifested on SpX-10**
  - **Assessment ongoing for move to SpX-9**
    → i.e. Logistics, Readiness; OOS TIM with SpX-9
  - **Required BIOLAB maintenance as prerequisite**
    → Handling Mechanism Door R&R, BGB Filter R&R, Cold Spot Sponge and Seal R&R, TCU 1&2 Silica Gel Bag R&R
  - **Ops / science run has strict time constraints**
  - **Cold Stowage after experiment run**
  - **The RNA fixated Culture Chambers at -100 to -20° C (NASA CS)**
  - **The Sample Reservoirs at -100 to -80° C (NASA CS)**
  - **The PFA fixated Culture Chambers at 0.5 to 8° C (BLB TCU 4° C)**

New Experiments

➢ Cytoskeleton: Background

• The scientific aim is to study the how the structures inside mammalian cells react specifically to microgravity. So far no solid scientific evidence is available about how and why. The Cytoskeleton experiment is expected to contribute to answering this question.

• Two different cell lines, both of human origin, will be tested.
A fibroblast cell line (synthesizes the extracellular matrix and collagen) and an osteoblast cell line (synthesizes bone)



Computer-assisted image analysis of PFA-fixed human skin fibroblasts

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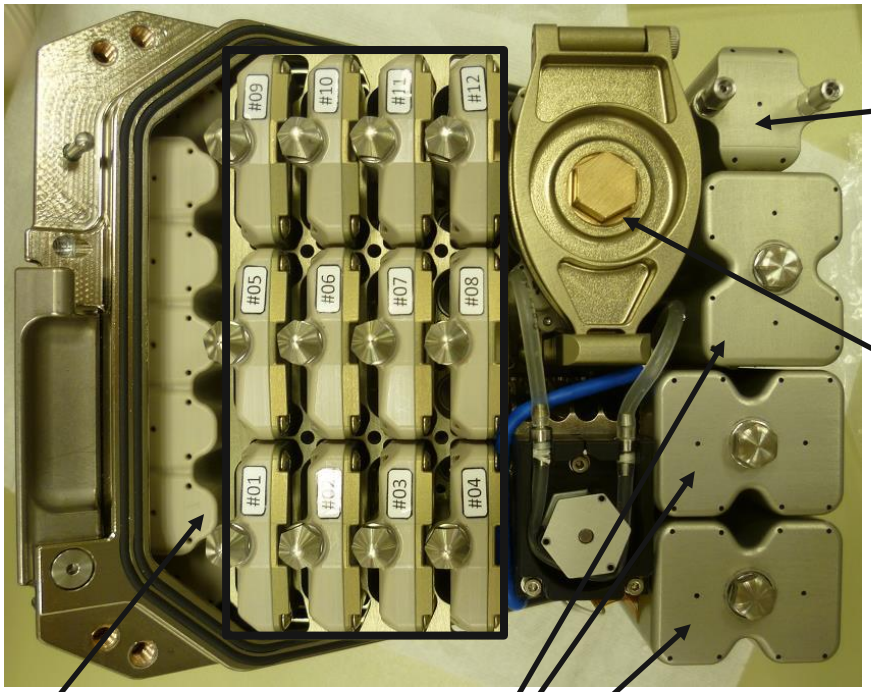
New Experiments

➢ Cytoskeleton: Hardware

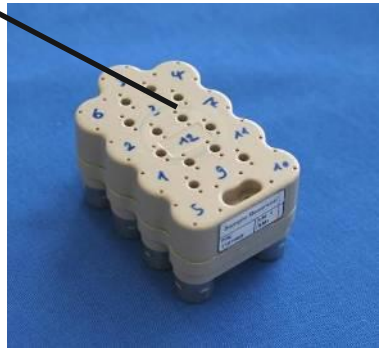
Culture Chamber / Reservoir Transport Container

IAEC



Fixative Reservoir Single

Sample Reservoir



Culture Chamber

Fixative Reservoir Double

6 different Integrated Advanced Experiment Containers (IAEC) are uploaded at ambient temperatures.

New Experiments

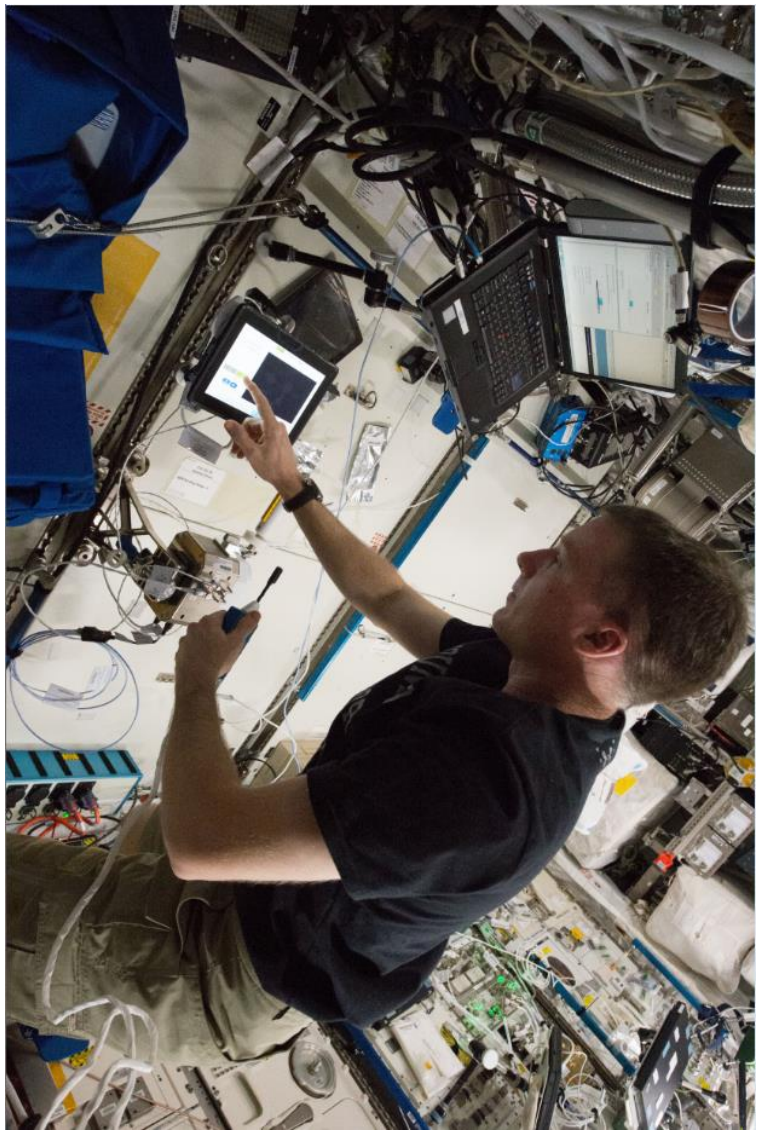
➢ Haptics-2

Technology demonstration experiment to validate for the first time a bilateral control interaction to take place between space and ground. The experiment allows operators (i.e. ISS crew) in a microgravity environment to control in real-time robotic assets on Earth.

Haptics-2 will compare the performance achievable through two different communication links, being

- a Ku-IPS forward link through TDRSS with substantial amount of time-delay and high bandwidth and,

- a direct S-band link through the KONTUR-2 system which has a short time-delay and reduced bandwidth.



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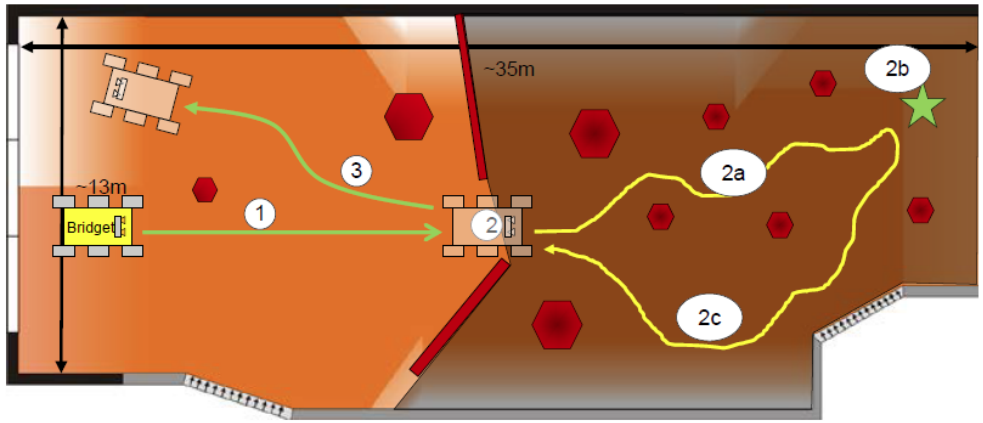
New Experiments

➢ Meteron / Supvis-M (more details in dedicated presentation)

- Multi-purpose End-To-End Robotic Operations Network
- SUPVIS-M session scenario:

- The rover will be commanded by **Ground** to the edge of a zone in shadow or harsh lighting conditions.
- **Crew will take over control and**
  - **perform inspection of the zone in penumbrae, identify a safe path**
  - **identify a number of science targets and map their location**
  - **get out of the penumbrae.**
- **Ground** will then take back control over the rover.



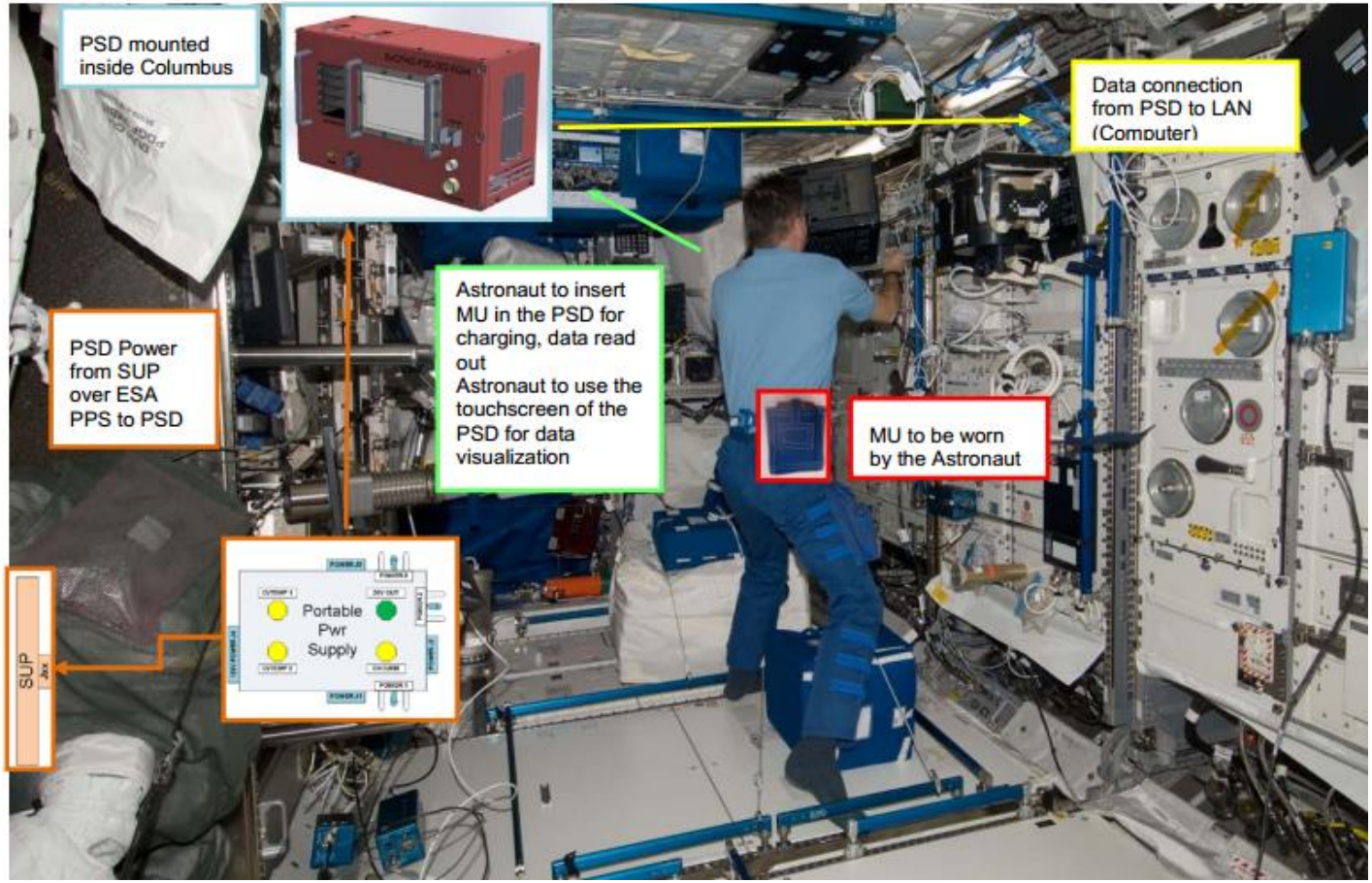
New Experiments

➢ EuCPAD – ESA Active Dosimeter

- **Upload on SpX-10 → potential move to SpX-9**

Personal Storage Device (PSD) with 5 Mobile Units (MU) Read Heads to charge the MU's and to allow dosimetric data download to PSD data base.

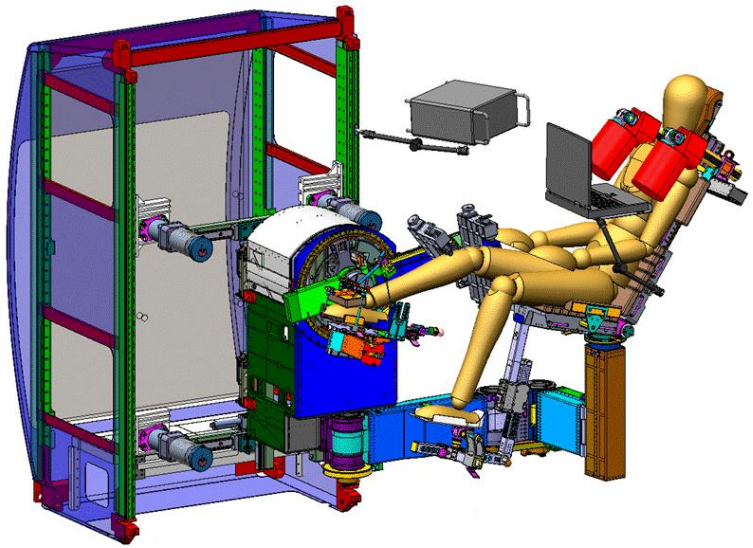
Data recorded will be retrieved by using the MPCC system



New Experiments

➢ MARES Commissioning Part 2 - Follow Up

- Goal: implement the corrective actions to get MARES up and running for SARCOLAB
- Split in 2 days, 2 crew members (subject and operator)
- Based on MARES Commissioning Part 2 activities



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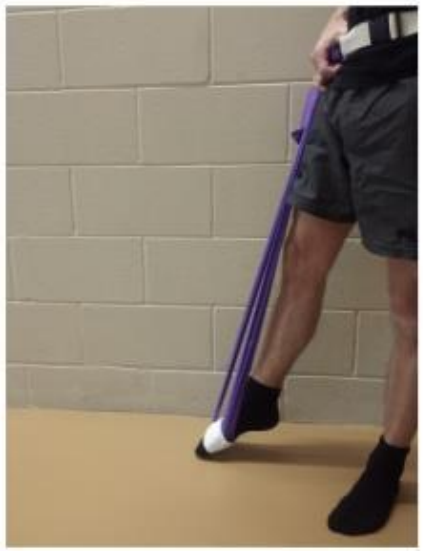
New Experiments

➢ VASCULAR ECHO (CSA sponsored experiment)

- **Goal: Measuring and quantifying cardiac and vascular structural and functional changes, and observing biomarkers during 6 months of spaceflight and up to one year of recovery of crew members**
- **Based on MARES Commissioning Part 2 activities**
- **Using following ESA HW:**
  - **- EPM Rack**
  - **- EPM Laptop**
  - **- Cardiolab Portable Doppler (CDL PDOP)**



Vascular Echo Exercise Band

Plantar flexions: 30 x in one minute

EPO Peake

➢ AstroPi

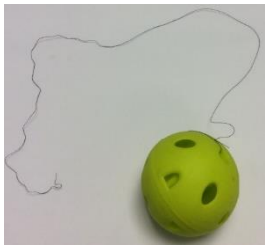
Raspberry Pi is a credit-card sized computer that enables students to explore computing

Both AstroPi will run programs written by the winners of a student competition

➢ Generic Videos

➢ Classroom Video Demonstrations (CVD)

- **CVD consist of five physics demonstrations to be filmed.**



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London Marathon

- **Tim Peake will be running the London Marathon**
  - **Sunday, April 24th, 2016**
  - **Crew choice event**
  - **Endurance exercise training on-orbit**

    → 3-4 long runs between 2-8 weeks prior to the marathon, actual T2 run-time 80-100 minutes on weekends
  - **ESA PR activities, e.g. pre-recorded messages, downlink phases of marathon, live uplink of BBC to Tim,**
  - **Tim can be followed by the public by having a special avatar → Tim enters belt speed in the iPad App**

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Questions?