





SILVANA MIRANDA
Switch

Space 4

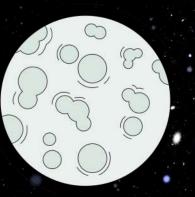
OCTOBER 2ND 2024



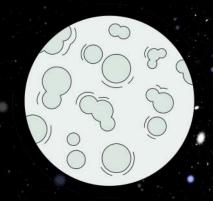
SILVANA MIRANDA Switch * Space 4 OCTOBER 2ND 2024

1 The Space Environment





1 The Space Environment



2. Human Health Challenges for Space Exploration
Current and Proposed
Countermeasures





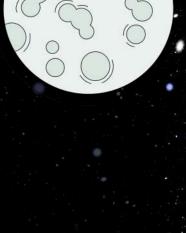
1 The Space Environment

2. Human Health Challenges for Space Exploration

Current and Proposed

Countermeasures

3. Industry Collaboration
Opportunities





1 The Space Environment

3. Industry Collaboration

Opportunities

2. Human Health Challenges for

Space Exploration

Current and Proposed

Countermeasures

4. Engaging the Next Generation



1 The Space Environment

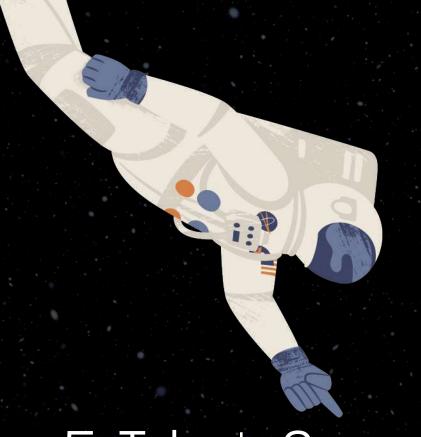
2. Human Health Challenges for Space Exploration

Current and Proposed

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3. Industry Collaboration
Opportunities

4. Engaging the Next Generation



5. Take to Space Message



THE SPACE ENVIRONMENT



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THE SPACE ENVIRONMENT



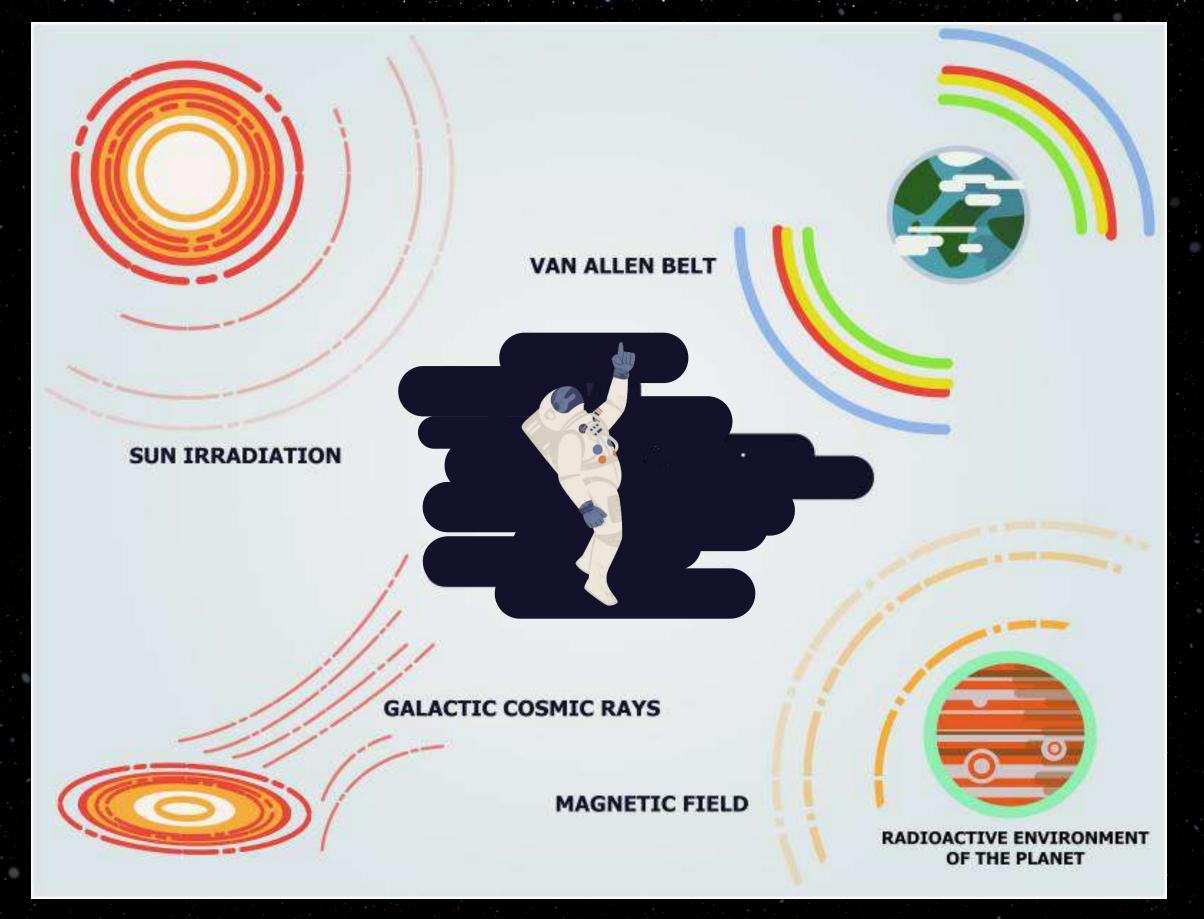


SOURCES OF

IONIZING

RADIATION

IN SPACE







EFFECTS RADIATION EXPOSURE

Chronic or late effects

Acute effects

Cancer

Cataract

Degenerative diseases

Brain

Lung

Cardiovascular

Reproductive system Immune system Acute radiation syndrome

Prodromal syndrome

Hematopoietic syndrome

Skin effects







EXPOSURE



Shielding

Operational

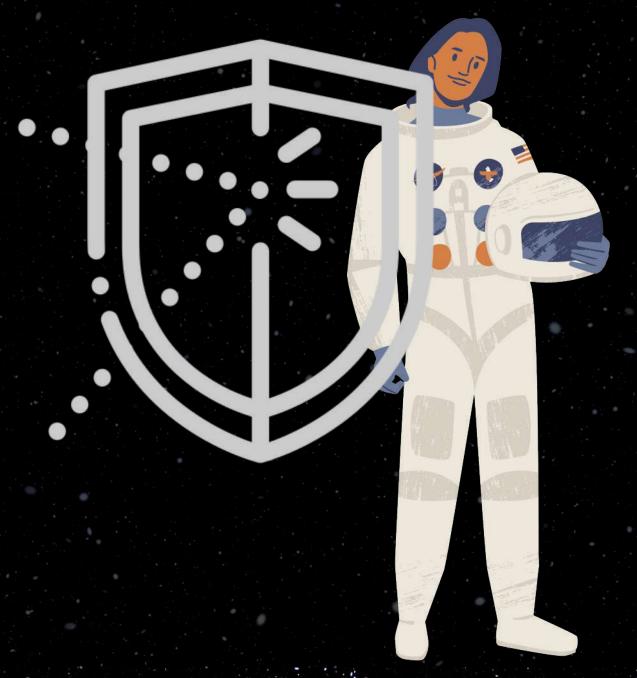
Dietary

Pharmacological





EXPOSURE



Shielding

RADSHIELD 2024

European Space Radiation Shielding Workshop 12-13 June 2024 | ESA/ESTEC



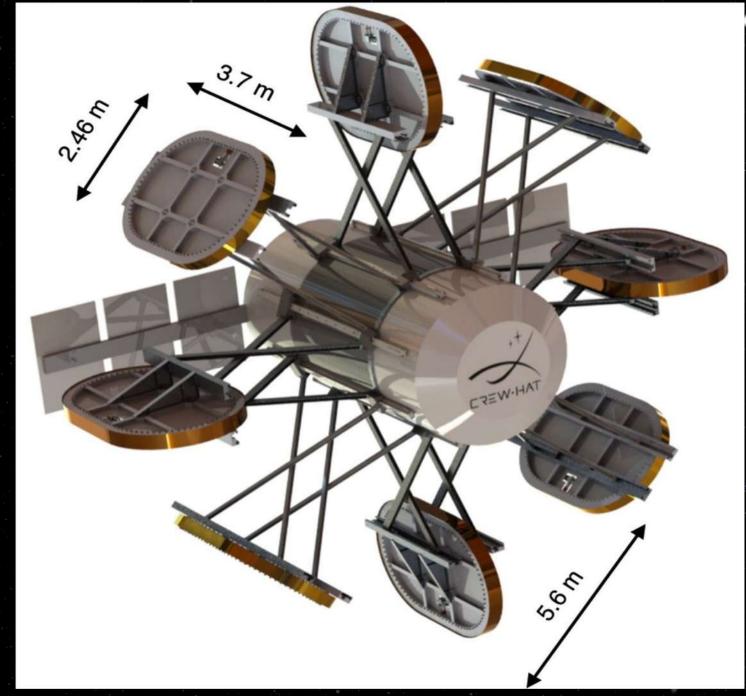
Credit: ESA



EXPOSURE



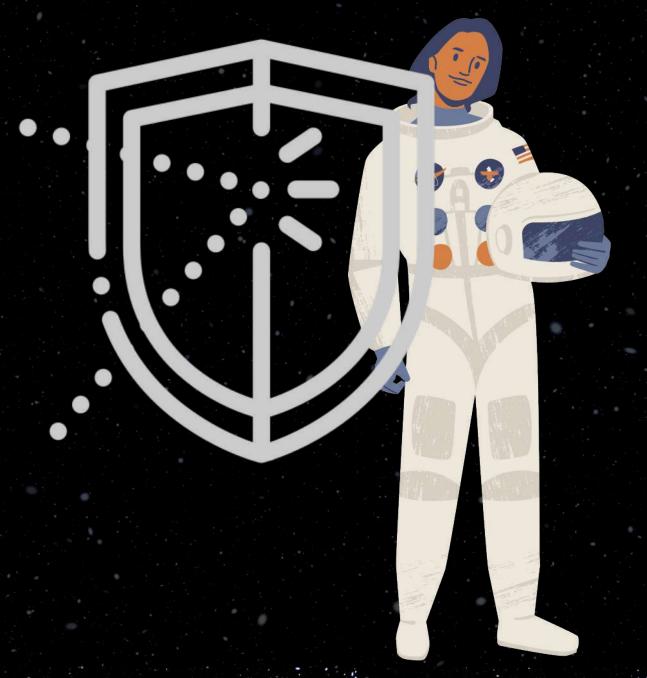
Shielding



Graphic depiction of the CREW HaT concept Credits: Elena D'Onghia

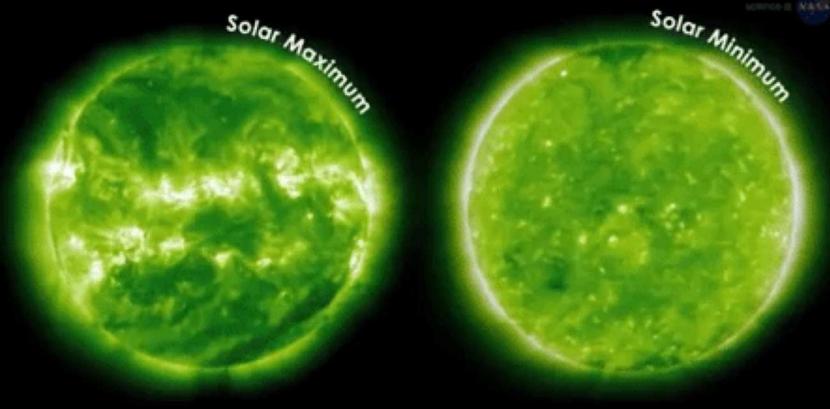


EXPOSURE



Shielding

Operational

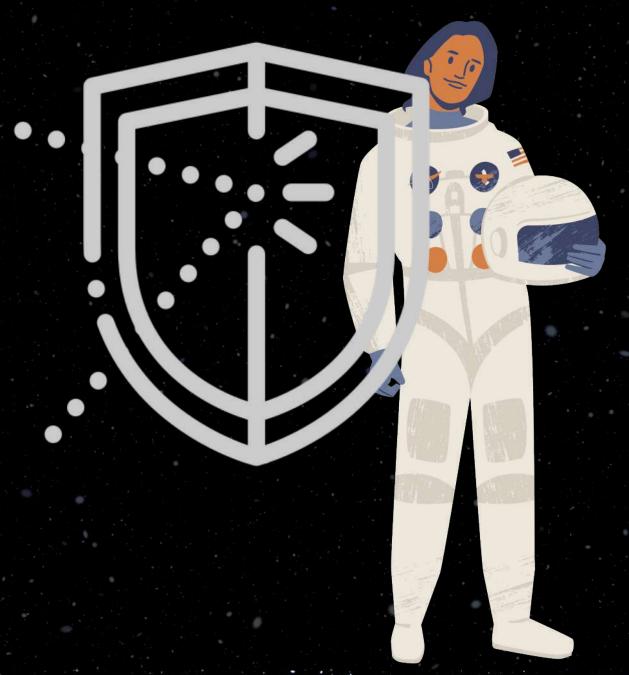


Credit: NASA





EXPOSURE



Shielding

Operational

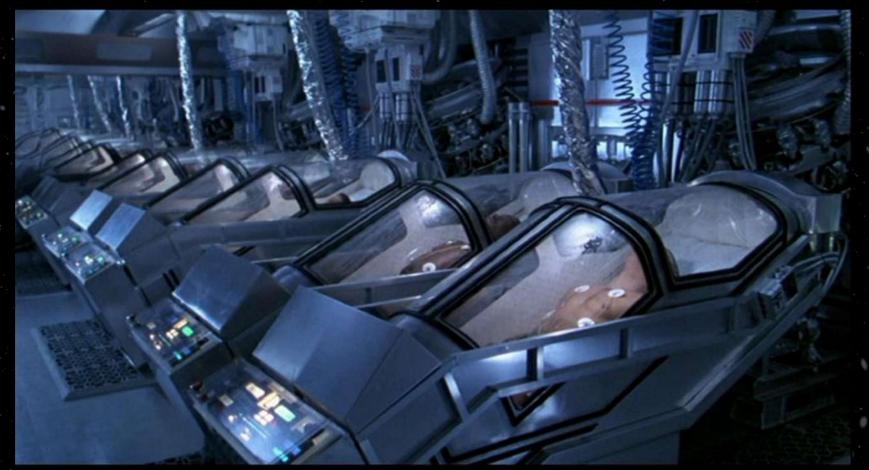


Image credit: 20th Century Fox, Alien





EXPOSURE



Shielding

Operational

Dietary

Pharmacological





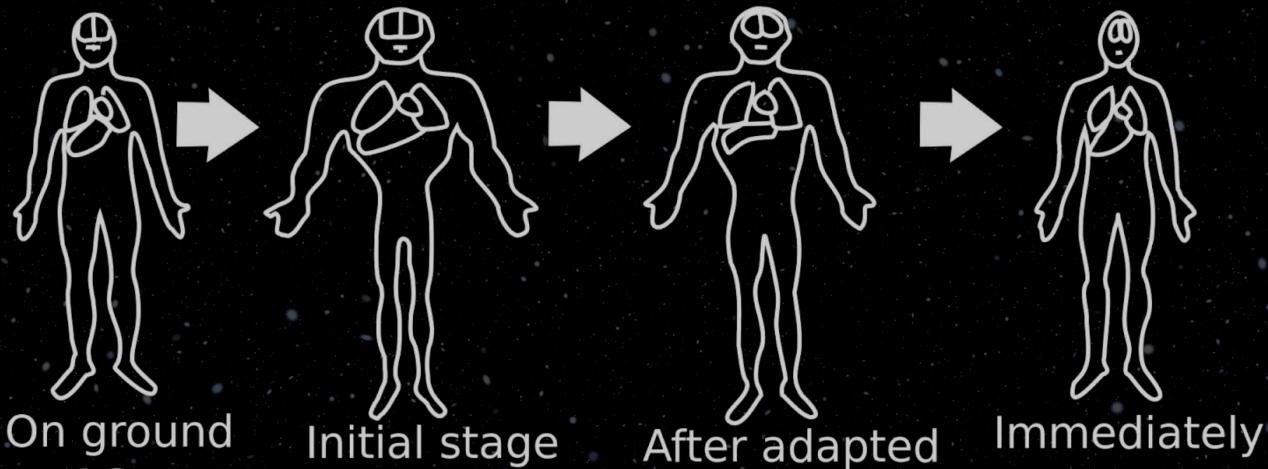


Credit: NASA



1G

ALTERED GRAVITY EFFECTS



in space

to microgravity

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after return

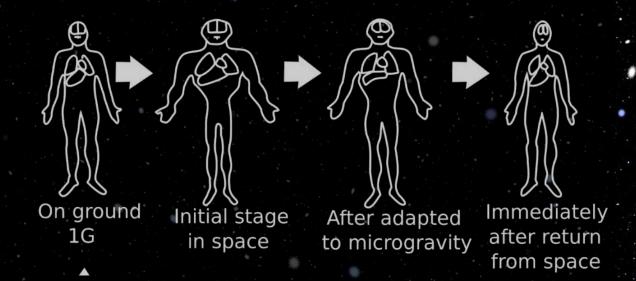
from space



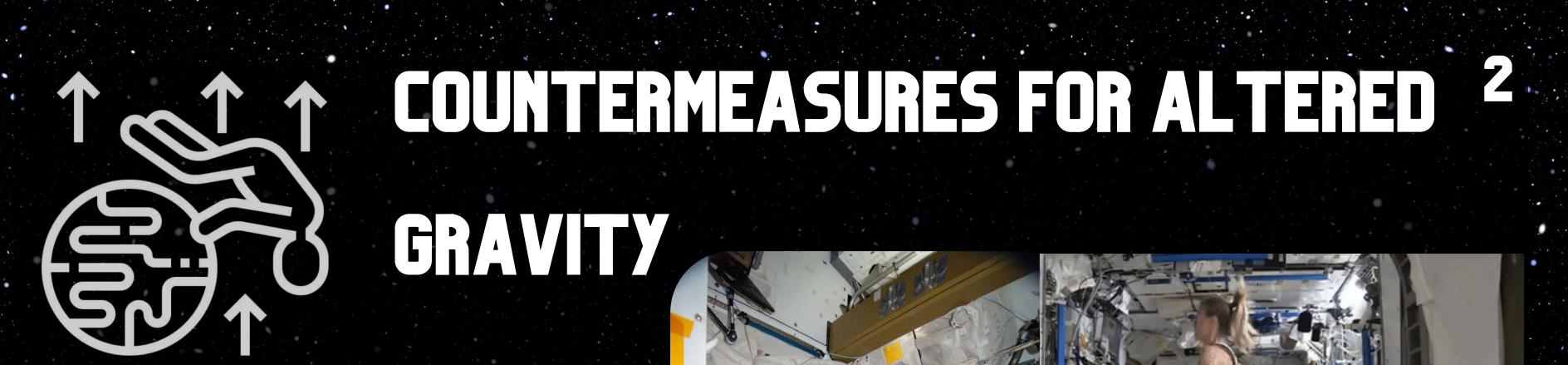
ALTERED GRAVITY EFFECTS

Intracranial pressure Vision impairment Cardiovascular deconditioning

Muscle atrophy
Bone density loss
Altered kidney function













Exercise, Exercise, Exercise!



↑ ↑ COUNTERMEASURES FOR ALTERED

GRAVITY





Lower body negative pressure devices

Credit: NASA



↑ COUNTERMEASURES FOR ALTERED 2

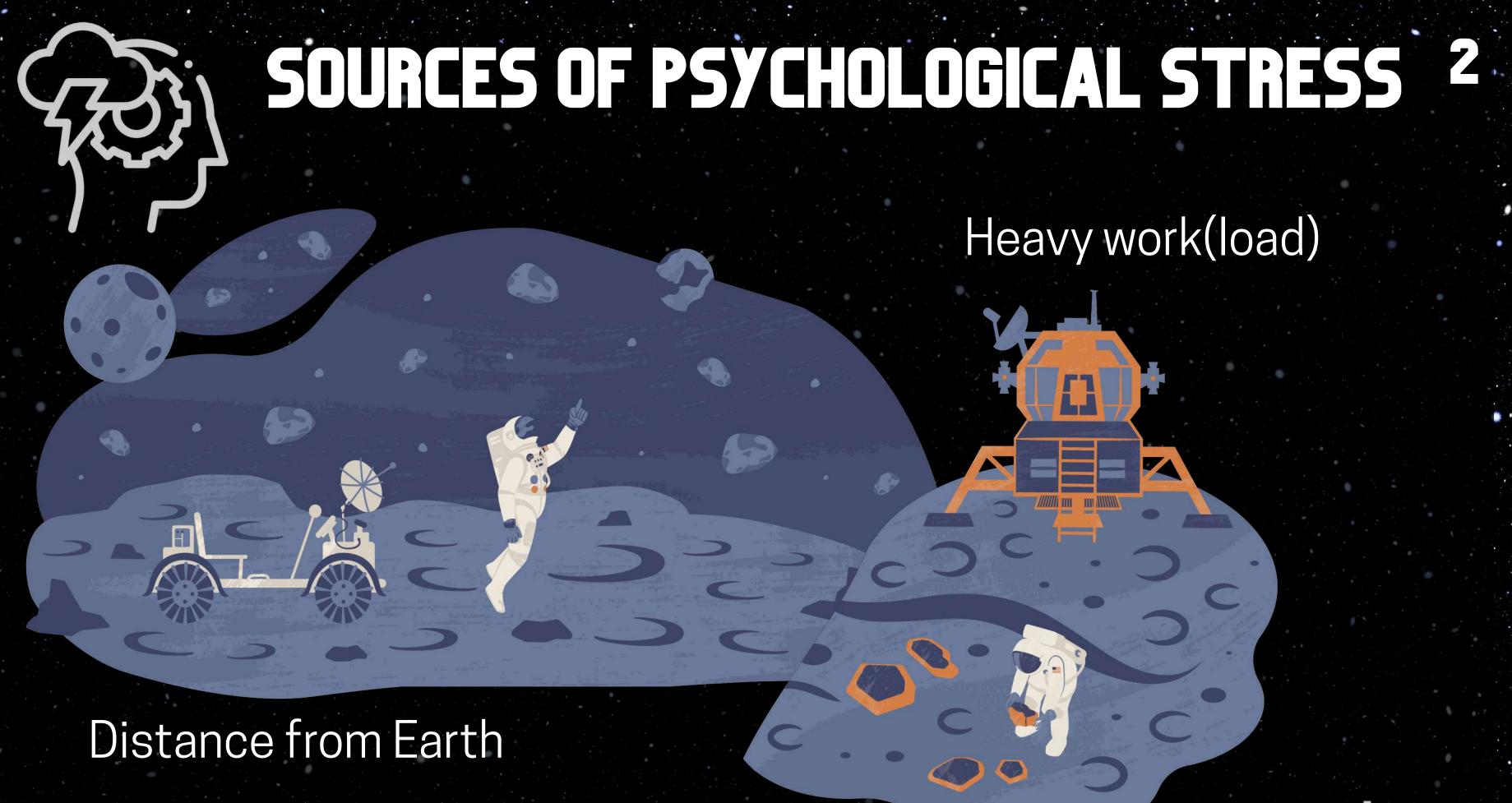
GRAVITY





Diet and pharmacologic intervention





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SOURCES OF PSYCHOLOGICAL STRESS 2

Sleep disruption

And circadian rhythm dysfunction



Credit: NASA



SOURCES OF PSYCHOLOGICAL STRESS 2

Isolation

Hostile environment





Credit: NASA



STRESS MANAGEMENT IN SPACE

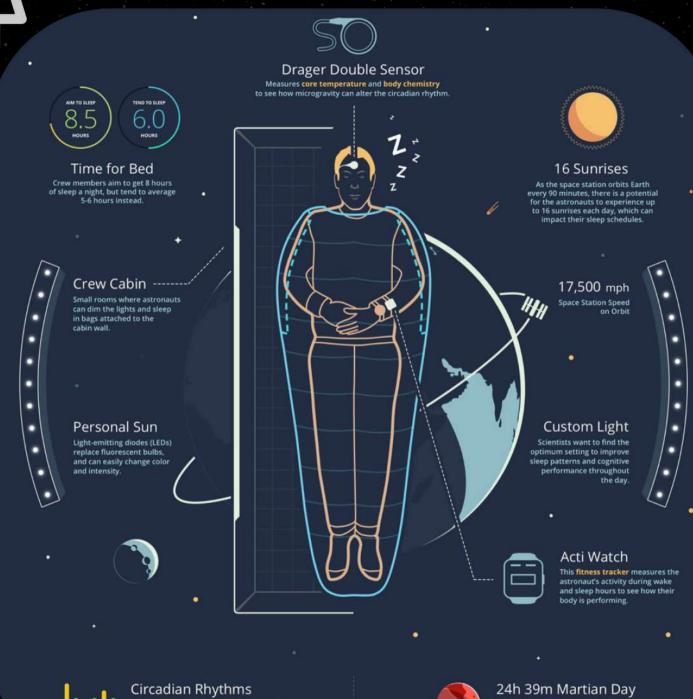




Credit: NASA



STRESS MANAGEMENT IN SPACE

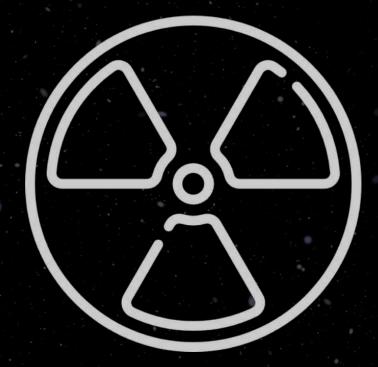


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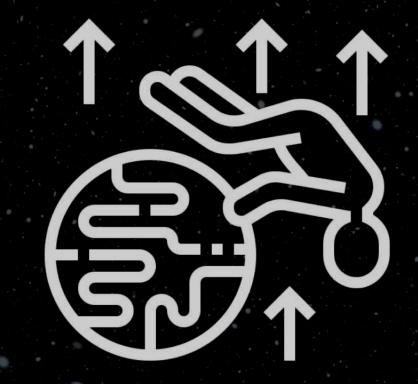


We need to understand how the human body might adapt, so the first people on the surface of Mars won't fall asleep on the job.

SPACE: A GROWING FRONTIER FOR INNOVATION 3













INSPIRING FUTURE SCIENTISTS, ENGINEERS, AND INNOVATORS





Current opportunities for university students



The Space Training Catalogue



Take to Space Message



Take to Space Message



Take to Space Message



Take to Space Message



sck cer

THARKYOU!



HEALTH
CHALLENGES IN
SPACE
AND HOW TO
OUTCOME THEM

sck cen





BIOSCIENCE ENGINEERING

SILVANA MIRANDA
Switch
Space 4

OCTOBER 2ND 2024