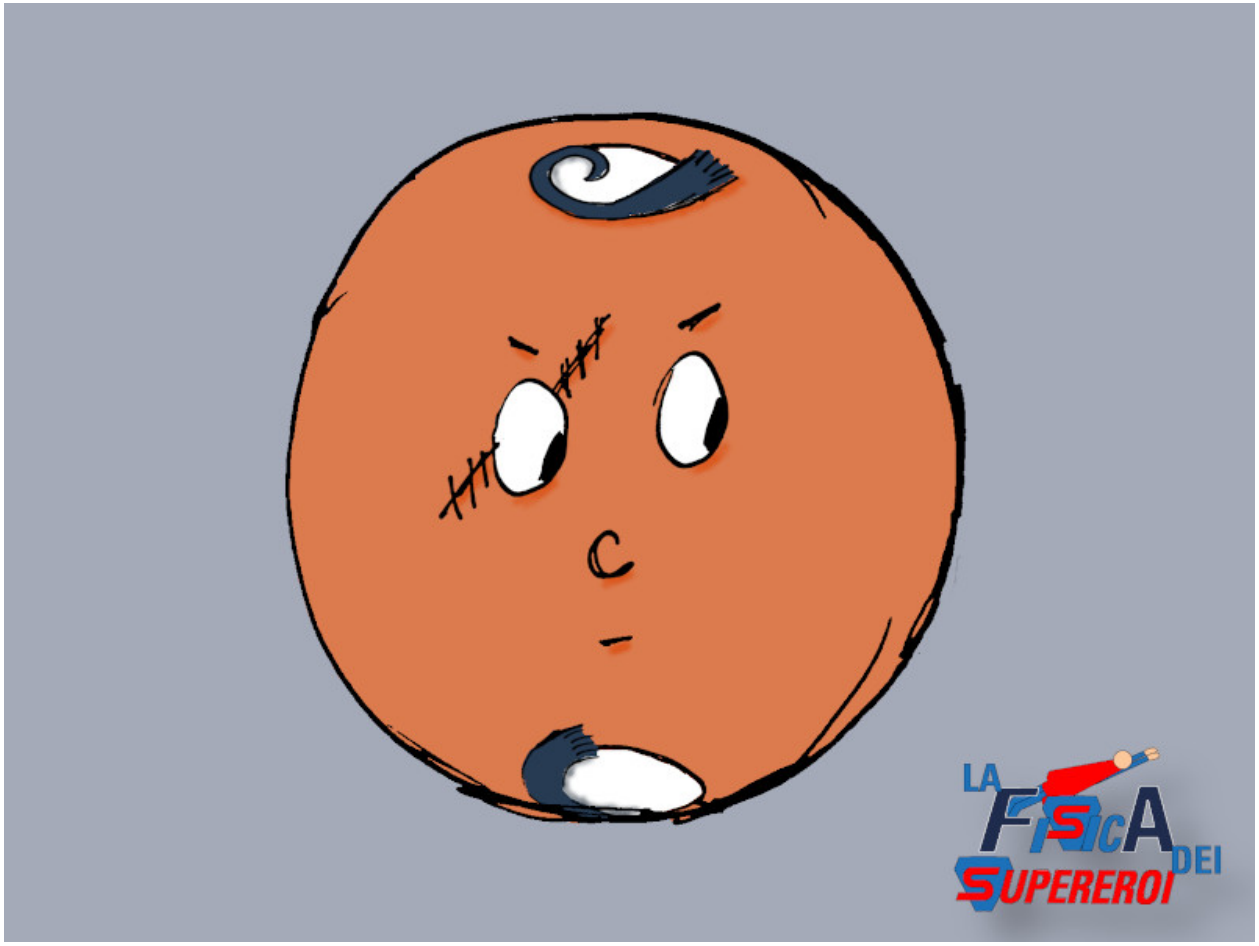
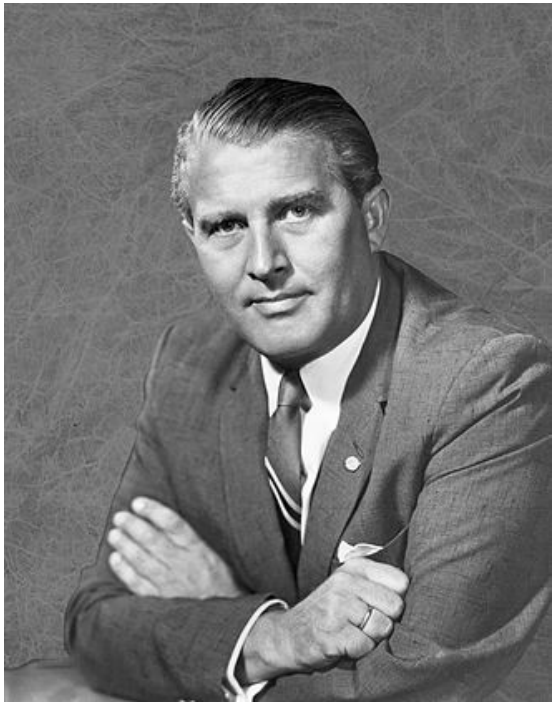

C
LA FISICA DEI SUPEREROI

All Star Comics n.13 (1941)

Gardner Fox, AAVV

All Star Comics n.13 (1941)

All Star Comics n.13 (1941)



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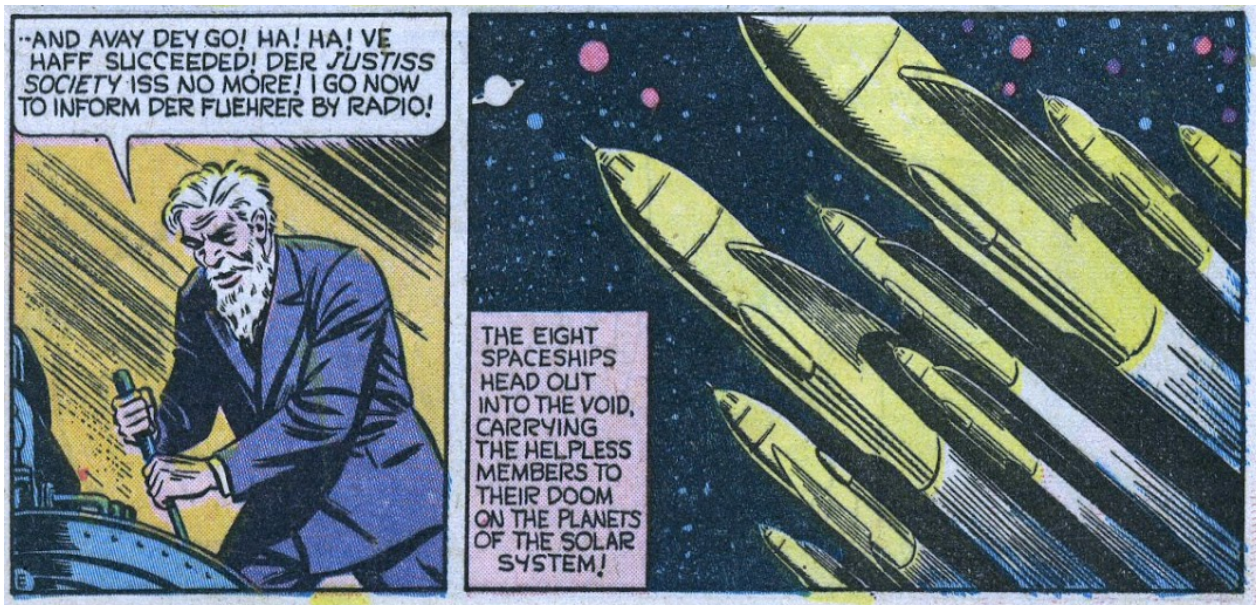

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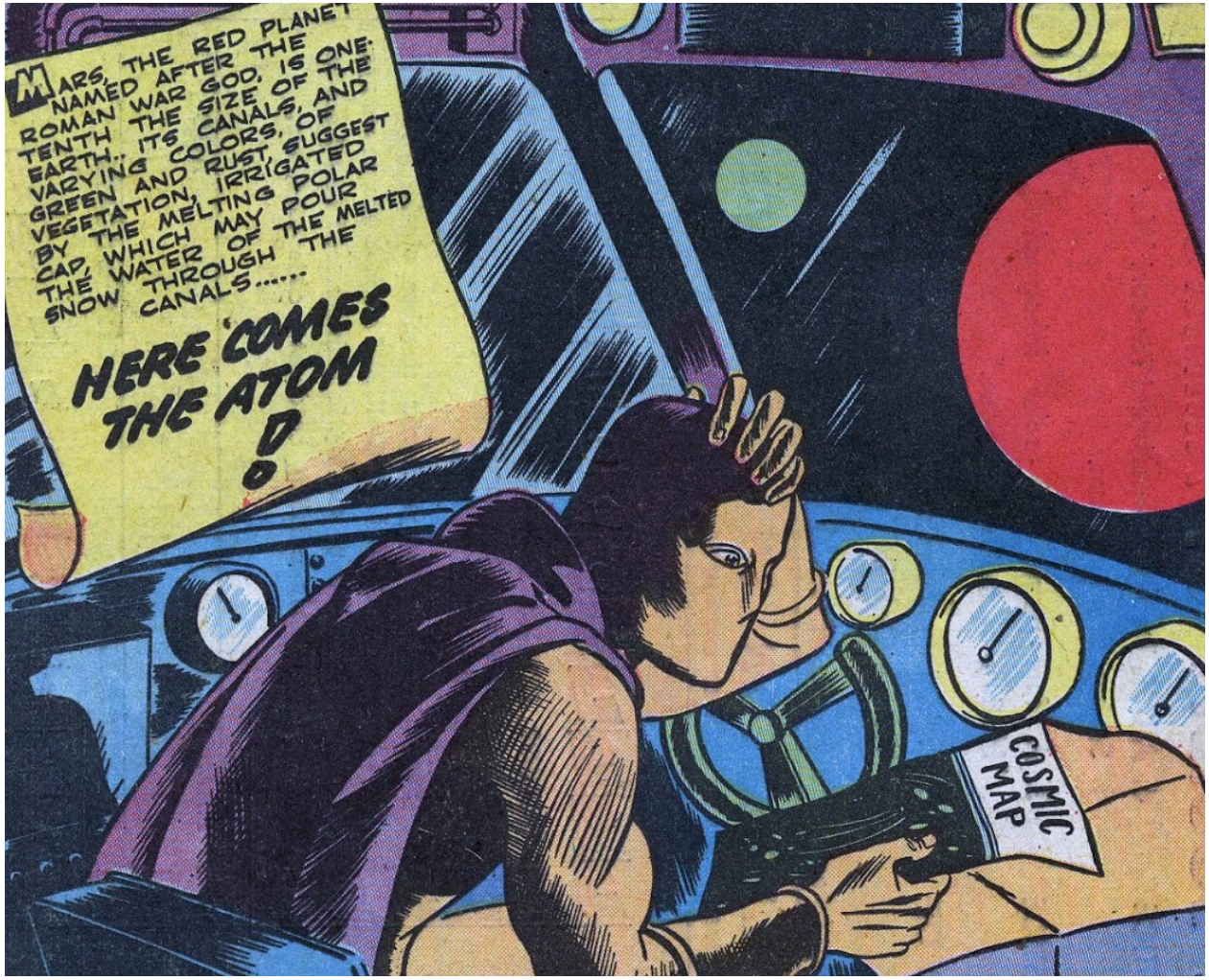
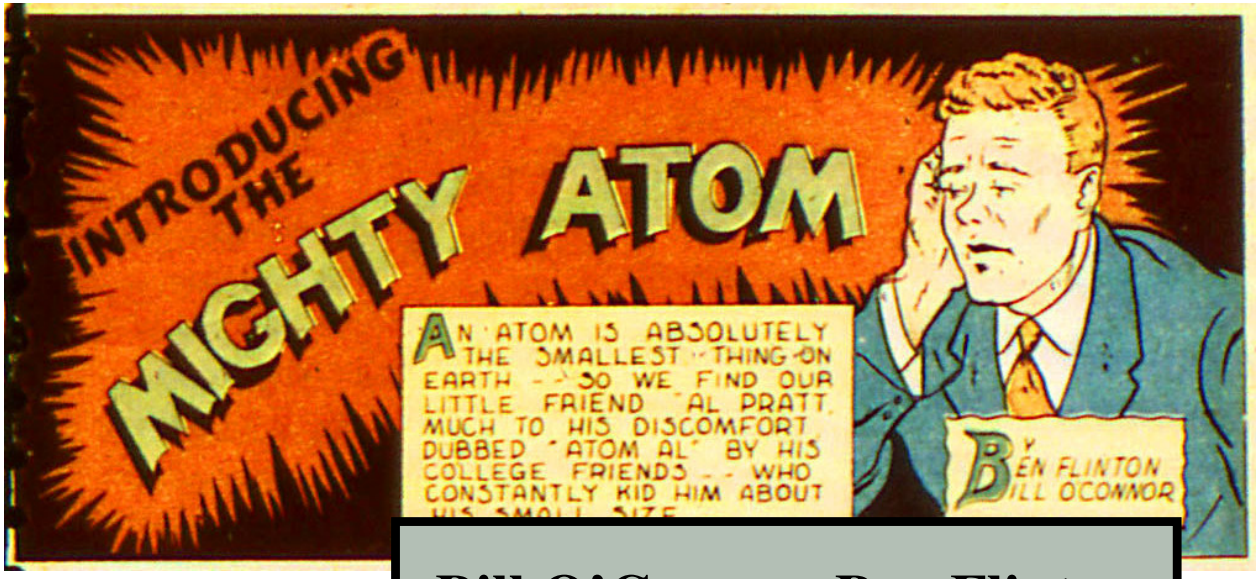


Atomo: Al Pratt

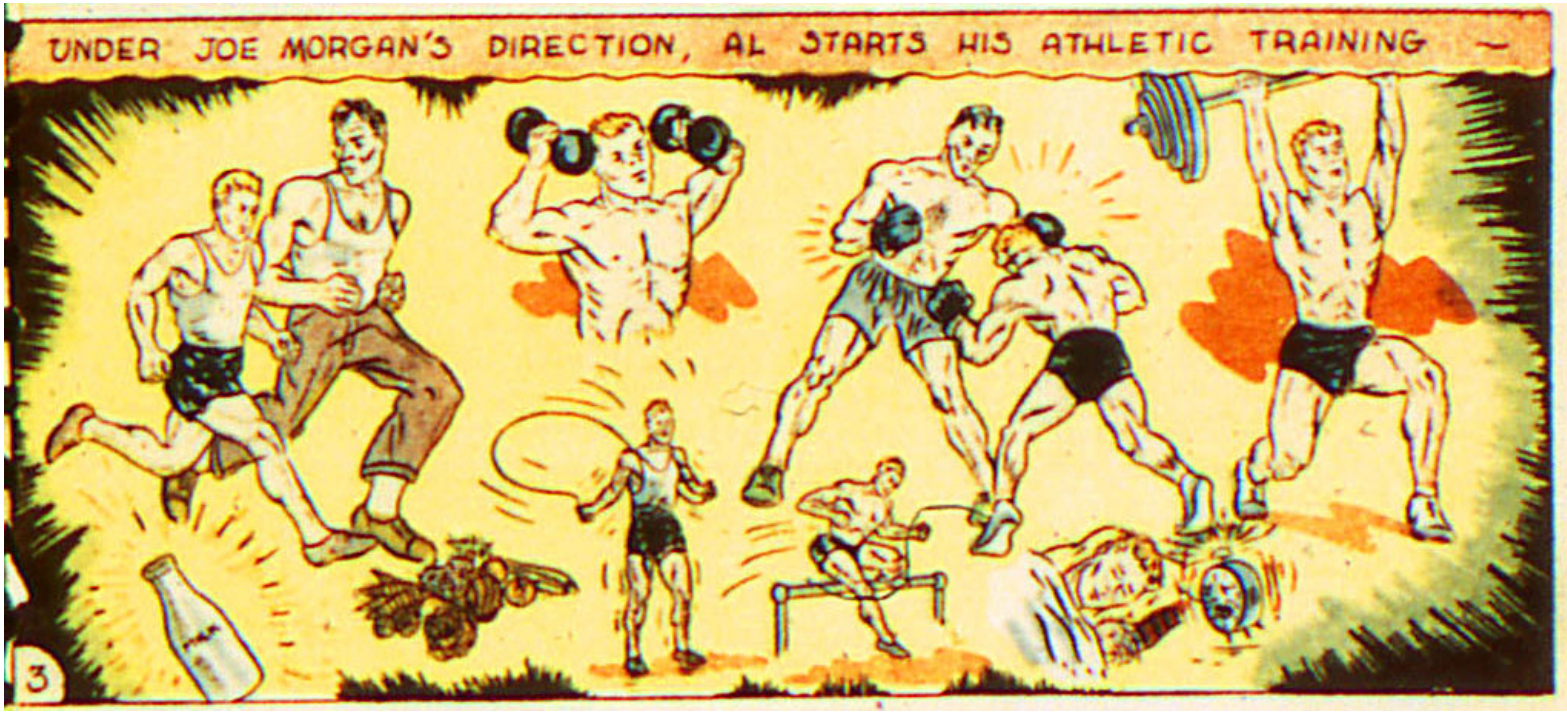
All-American Comics # 19

Atomo: Al Pratt

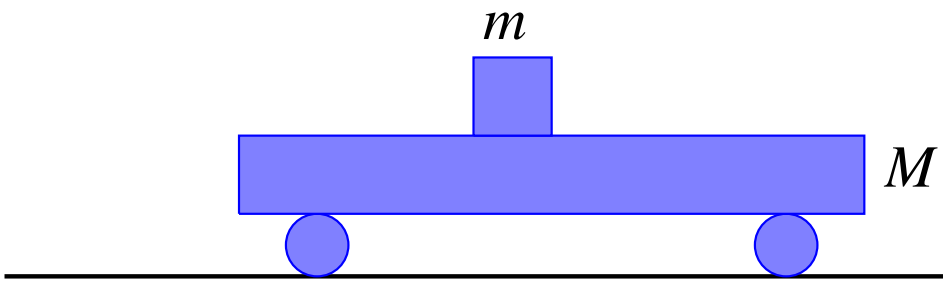


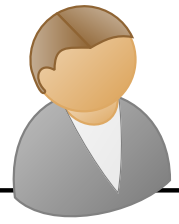
Bill O'Connor, Ben Flinton

Atomo: Al Pratt



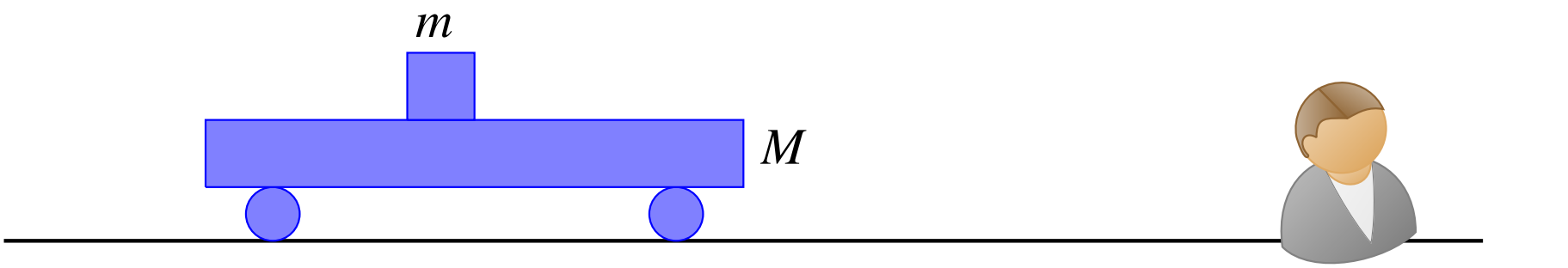
Muovere un carrellino





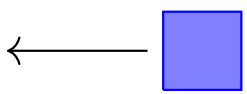
Bob sul marciapiede

Muovere un carrellino

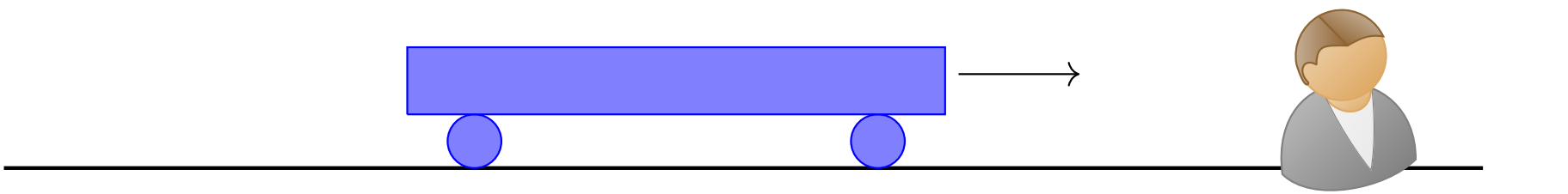


Bob sul marciapiede

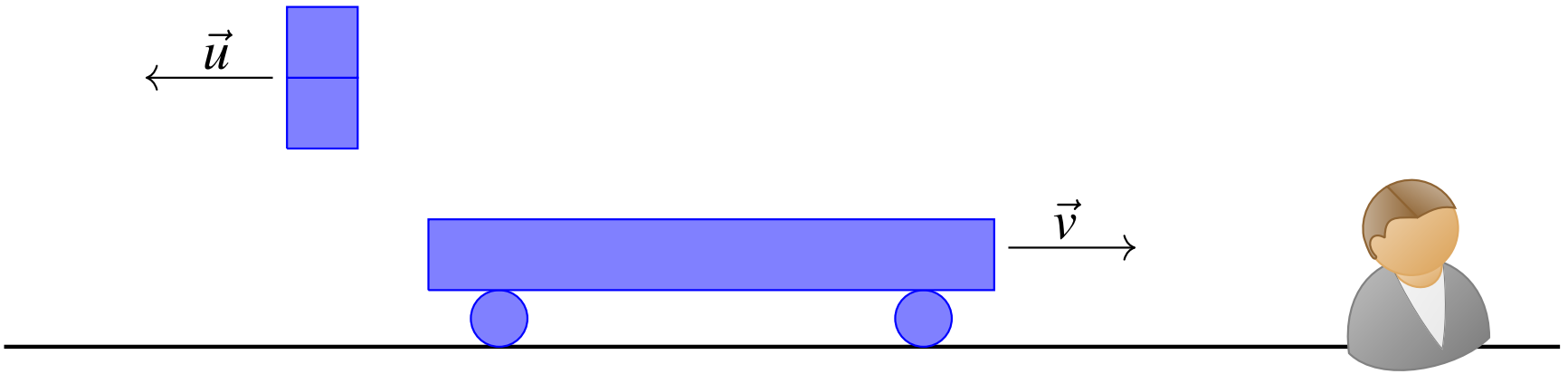
$\vec{u}$ = velocità relativa tra m e M



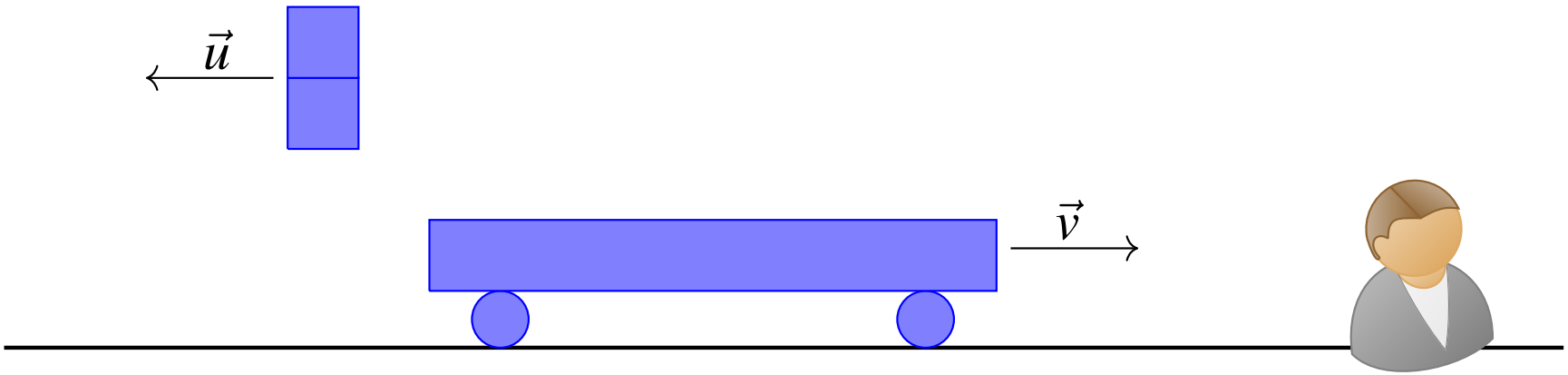
$\vec{v}$ = velocità di M rispetto a Bob



Aumentiamo i blocchetti



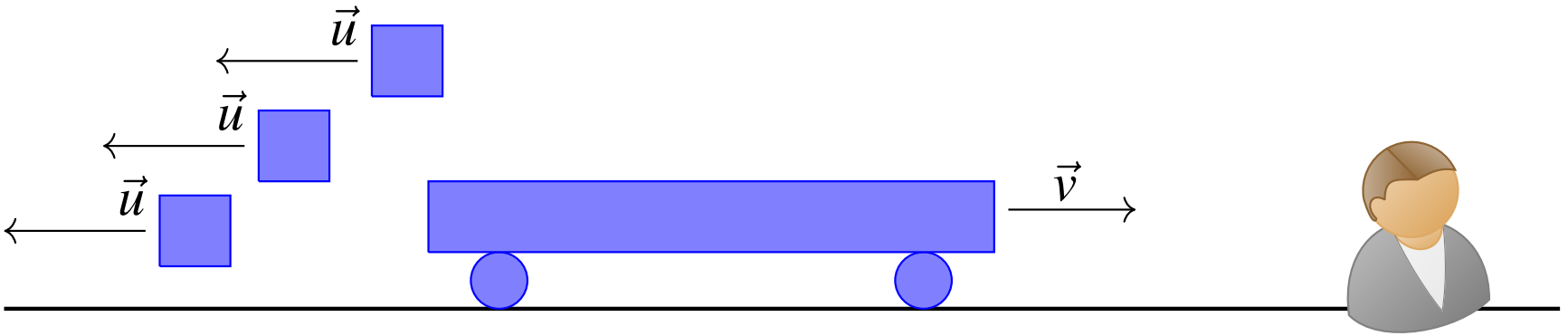
Aumentiamo i blocchetti



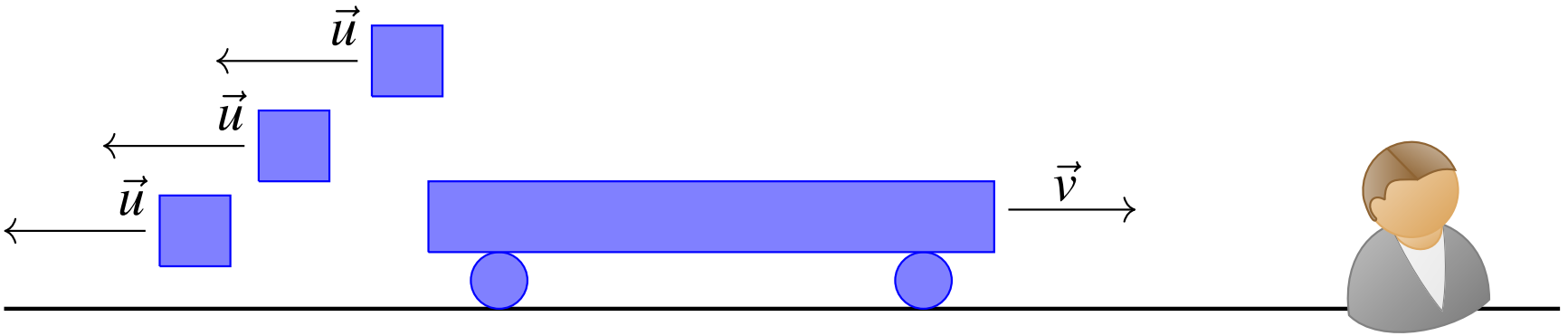
$$\vec{v}_{2b} = \frac{2m\vec{u}}{M+2m}$$

$$\vec{v}_{Nb} = \frac{Nm\vec{u}}{M+Nm}$$

Aumentiamo i blocchetti



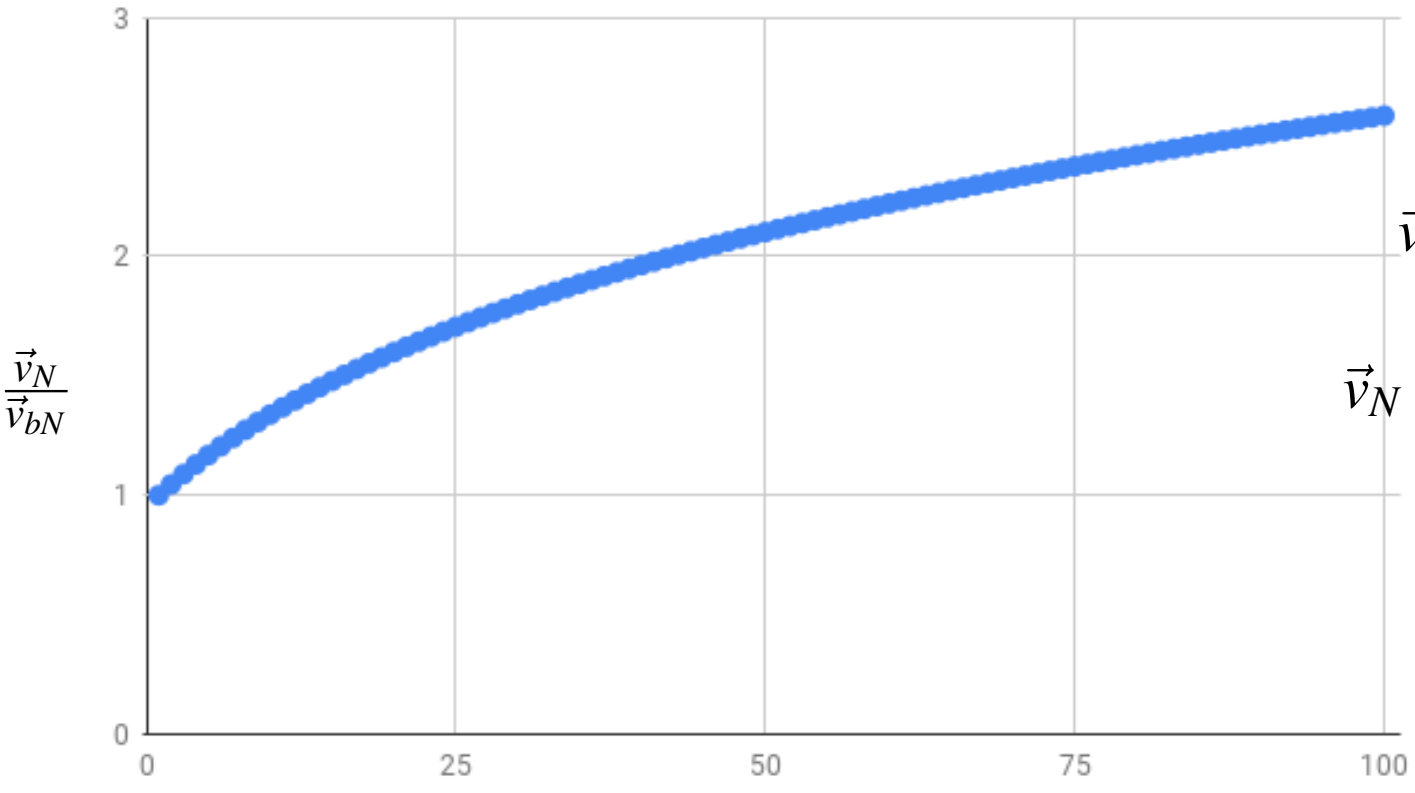
Aumentiamo i blocchetti



$$\vec{v}_3 = \frac{m\vec{u}}{M+3m} + \frac{m\vec{u}}{M+2m} + \frac{m\vec{u}}{M+m}$$

$$\vec{v}_N = \sum_{i=1}^{N} \frac{m\vec{u}}{M+im}$$

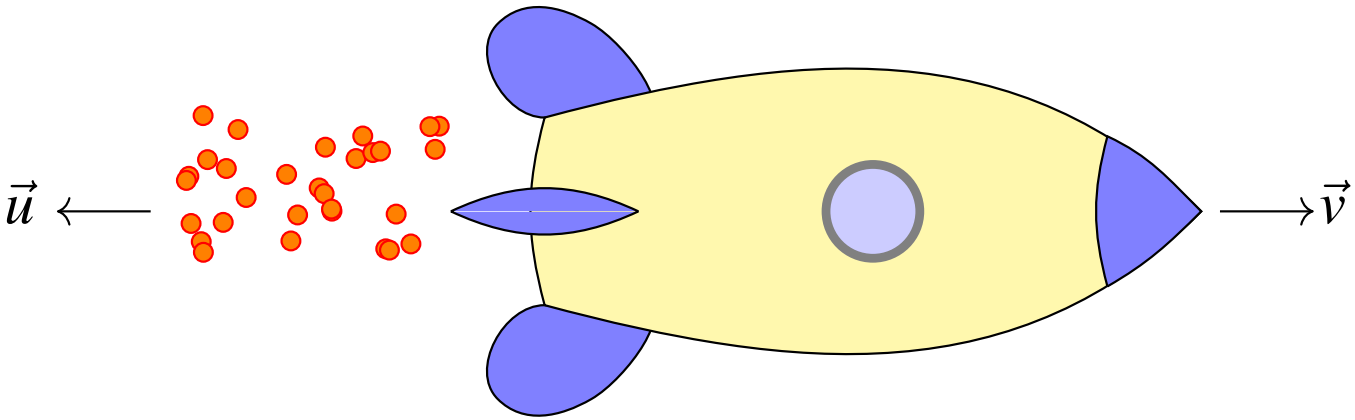
Confrontiamo i due metodi



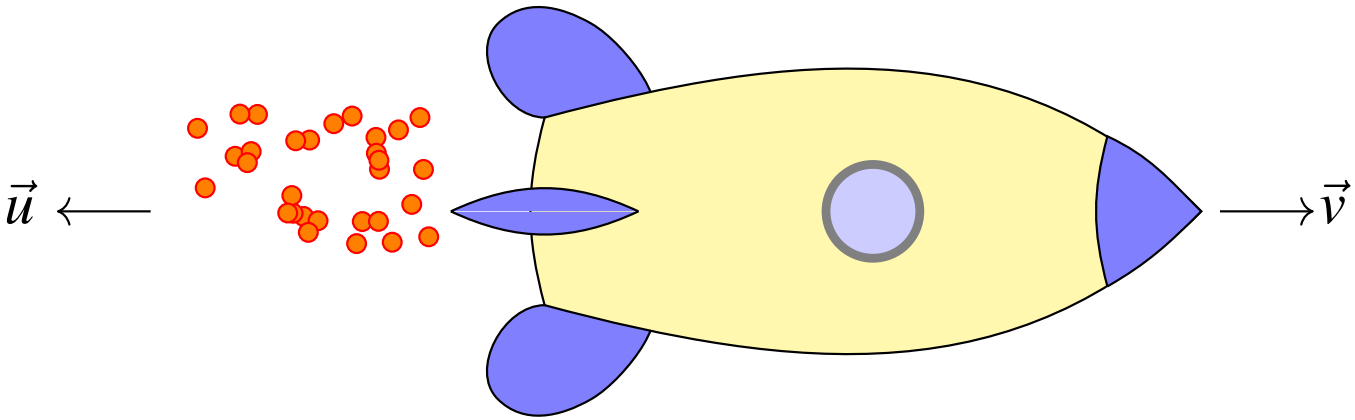
$$\vec{v}_{Nb} = \frac{Nm\vec{u}}{M+Nm}$$

$$\vec{v}_N = \sum_{i=1}^{N} \frac{m\vec{u}}{M+im}$$

L'equazione del razzo

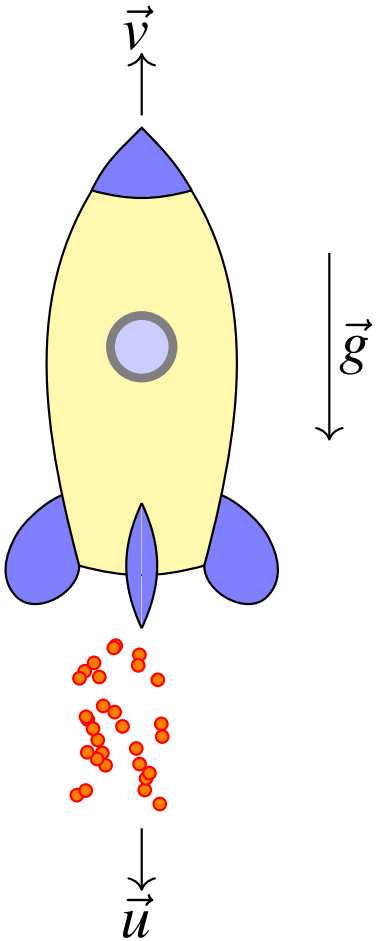


L'equazione del razzo



$$m\,\frac{\Delta\vec{v}}{\Delta t} = \vec{F}_{\text{ext}} + \vec{u}\frac{\Delta m}{\Delta t}$$

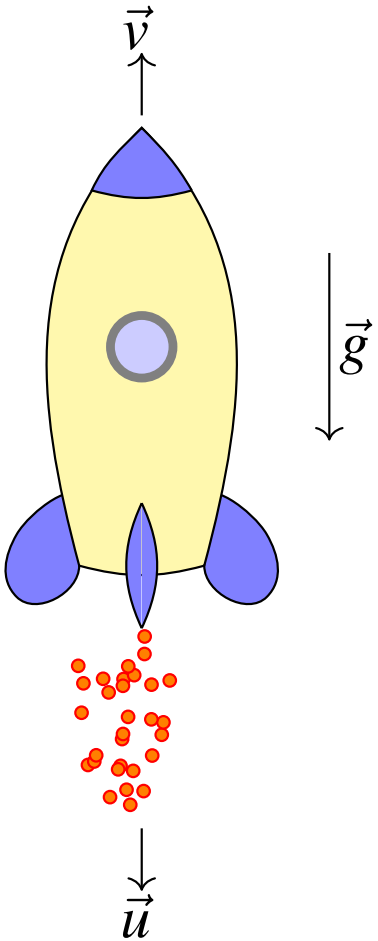
L'equazione del razzo



$$m\frac{\Delta v}{\Delta t} = -mg - u\frac{\Delta m}{\Delta t}$$

$$v = -u \ln \frac{m_i}{m_f} - gt$$

L'equazione del razzo

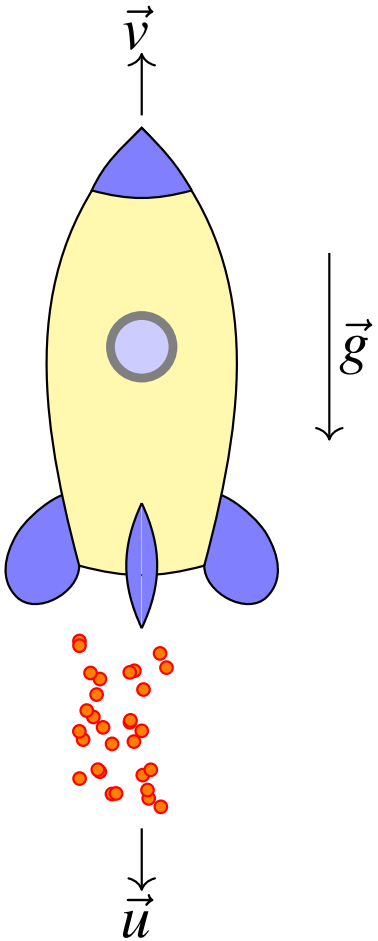


$$m\frac{\Delta v}{\Delta t} = -mg - u\frac{\Delta m}{\Delta t}$$

$$v = -u \ln \frac{m_i}{m_f} - gt$$

Konstantin Ciolkovskij

L'equazione del razzo



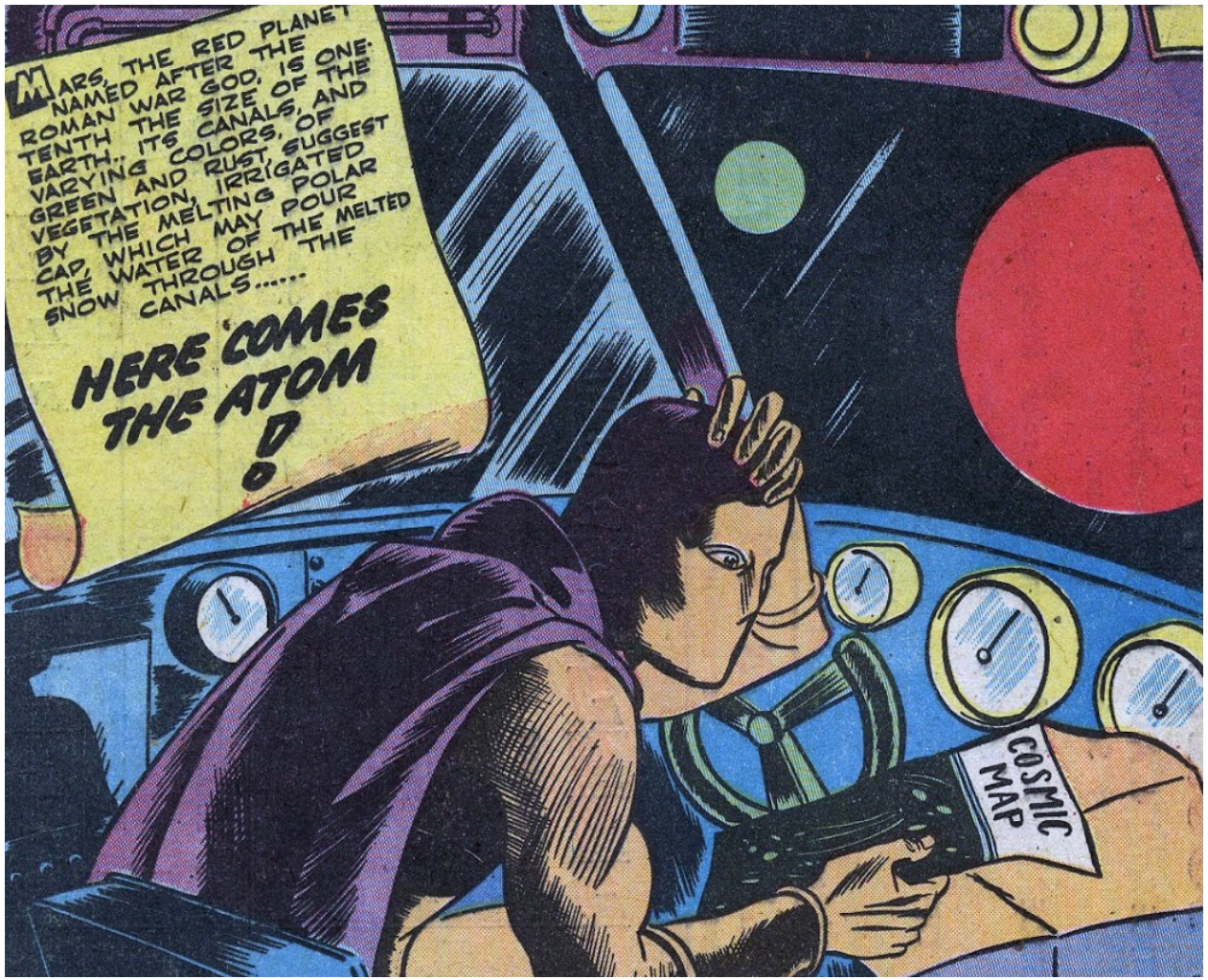
$$m\frac{\Delta v}{\Delta t} = -mg - u\frac{\Delta m}{\Delta t}$$

$$v = -u \ln \frac{m_i}{m_f} - gt$$

Konstantin Ciolkovskij

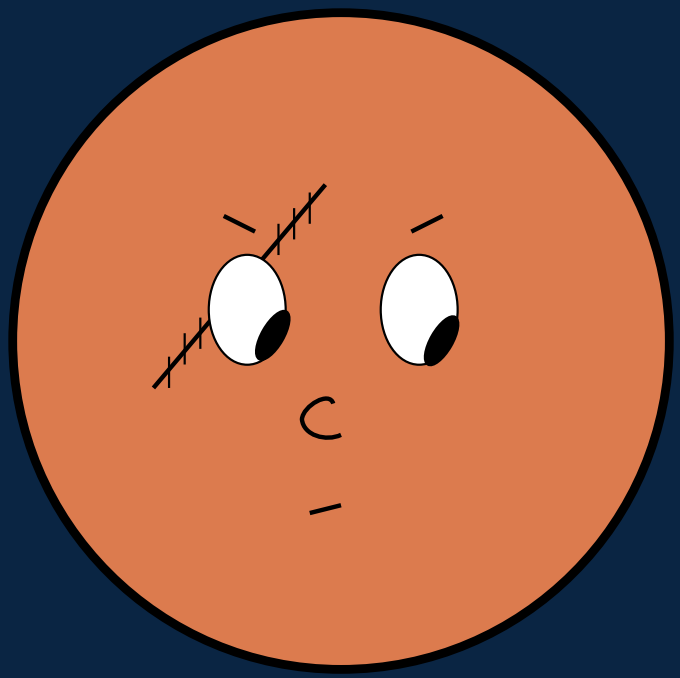
Per il principio di conservazione
della quantità di moto,
è possibile accelerare un corpo in una data direzione,
espellendo massa nella direzione opposta.

Curiosità marziane

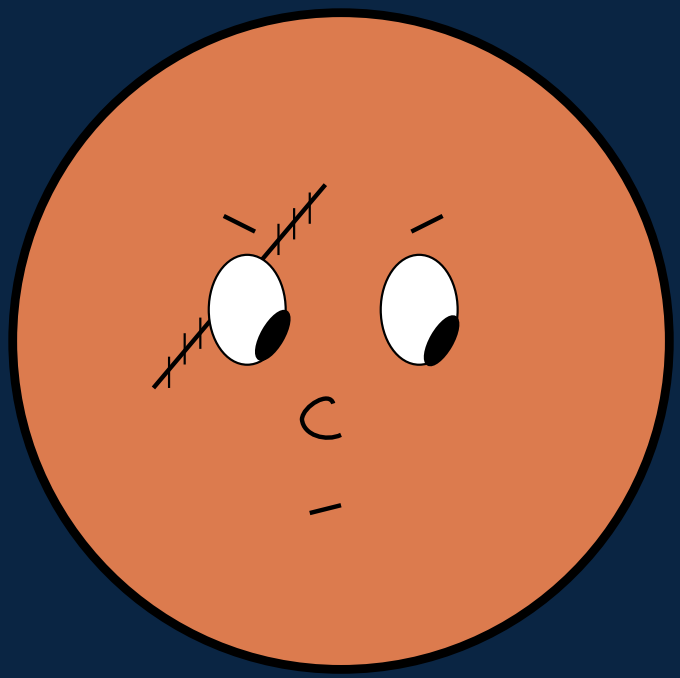


Curiosità marziane: distanza dal sole

Curiosità marziane: caratteristiche fisiche

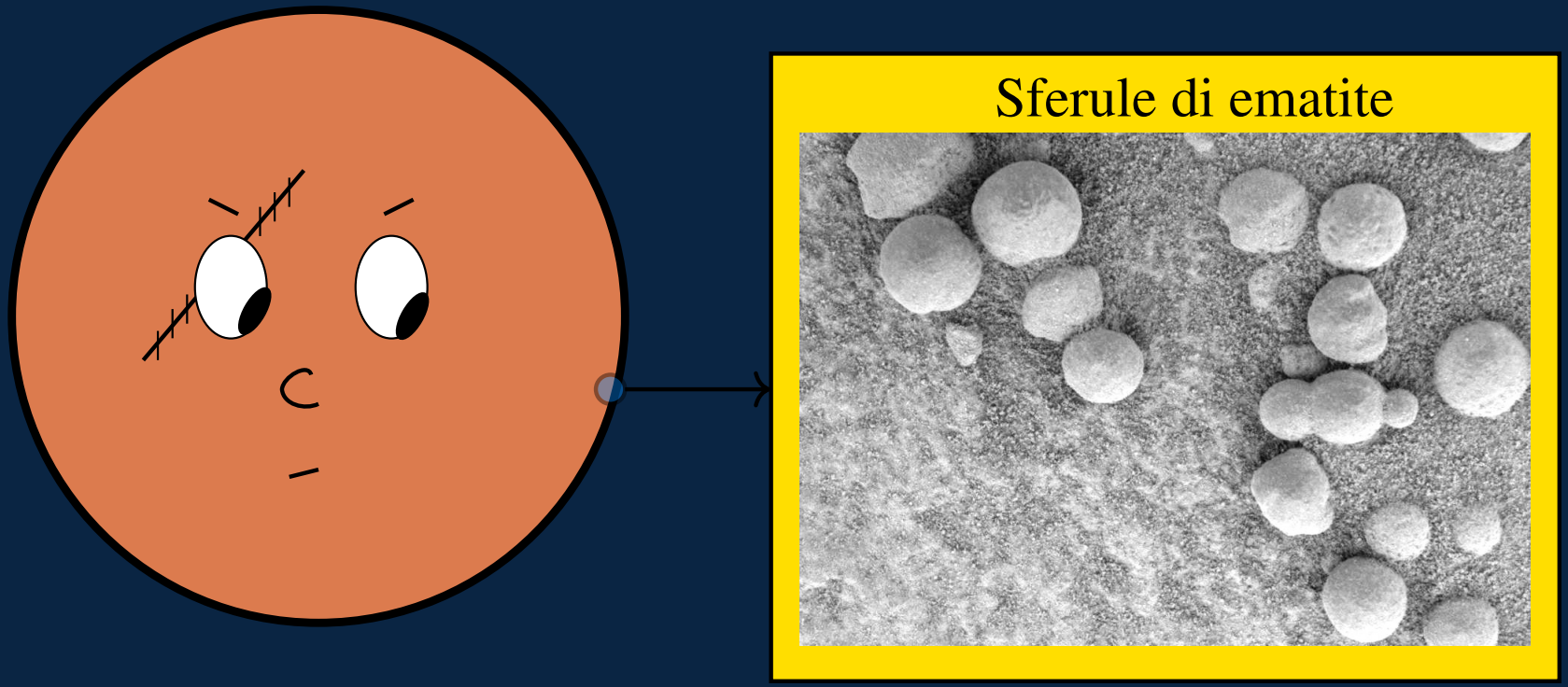


Curiosità marziane: caratteristiche fisiche

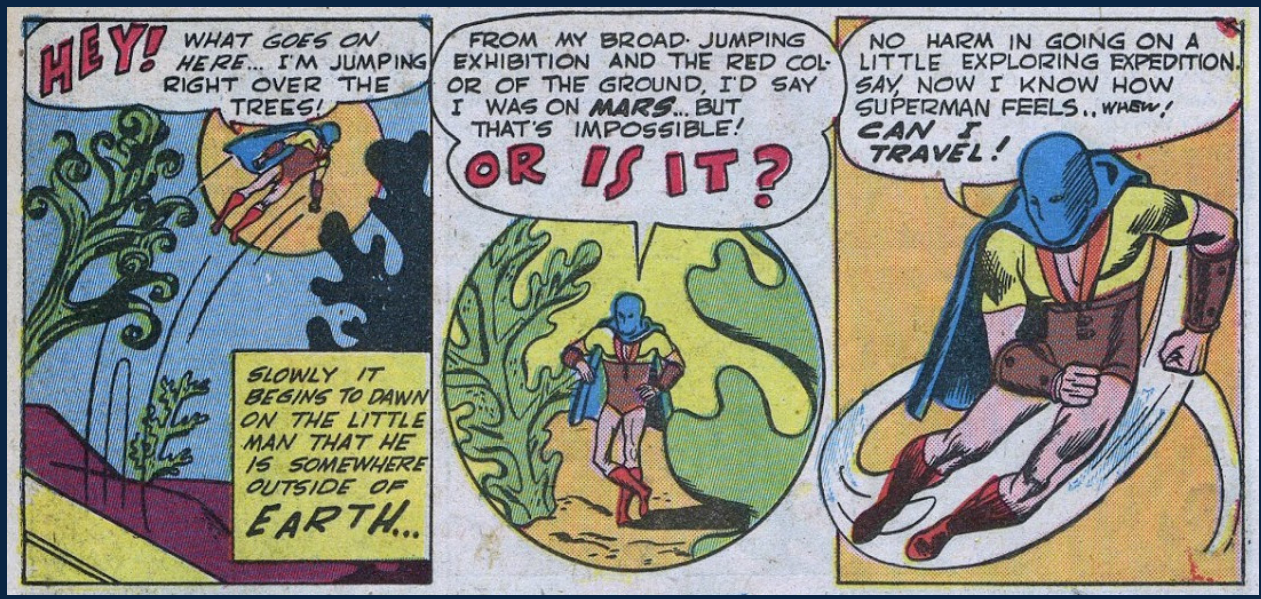


Marte è il 4.o pianeta dal Sole
Possiede due lune:
Phobos, con un diametro di
22.2 chilometri
e Deimos, con un diametro di
12.6 chilometri

Curiosità marziane: caratteristiche fisiche



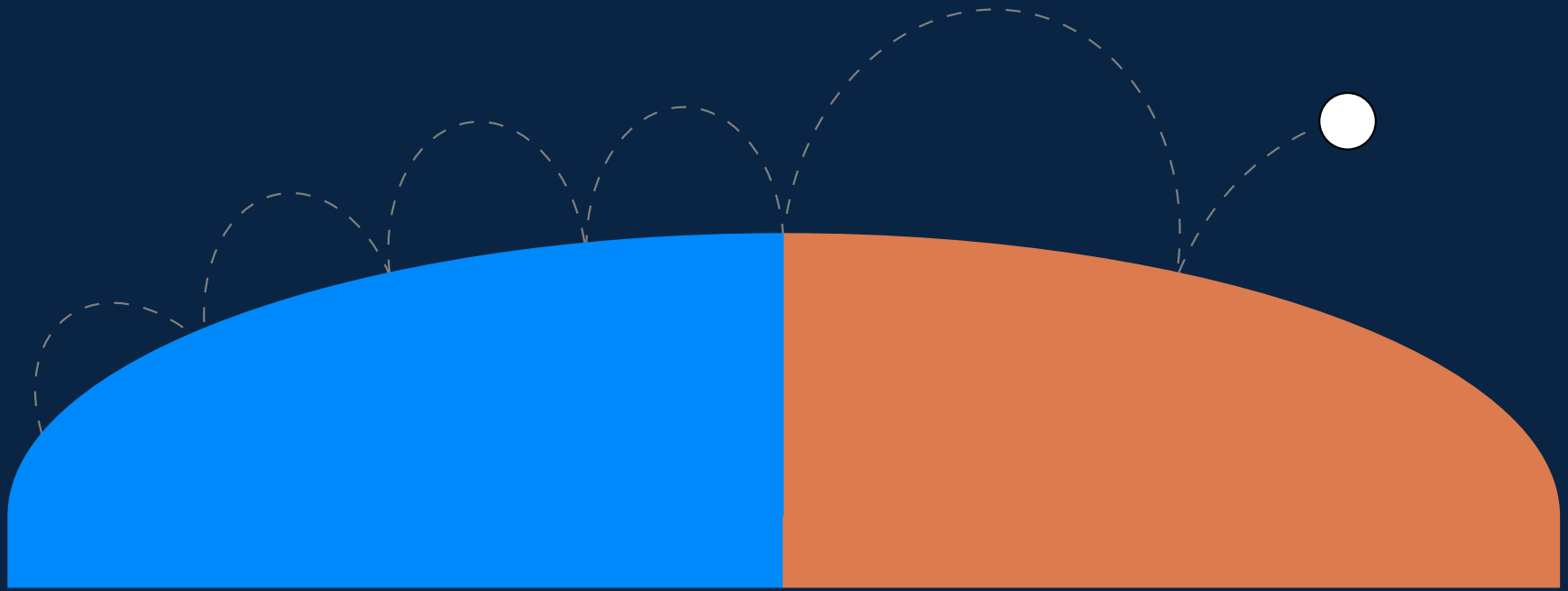
Curiosità marziane: gravità e atmosfera



Curiosità marziane: gravità e atmosfera

Gravità

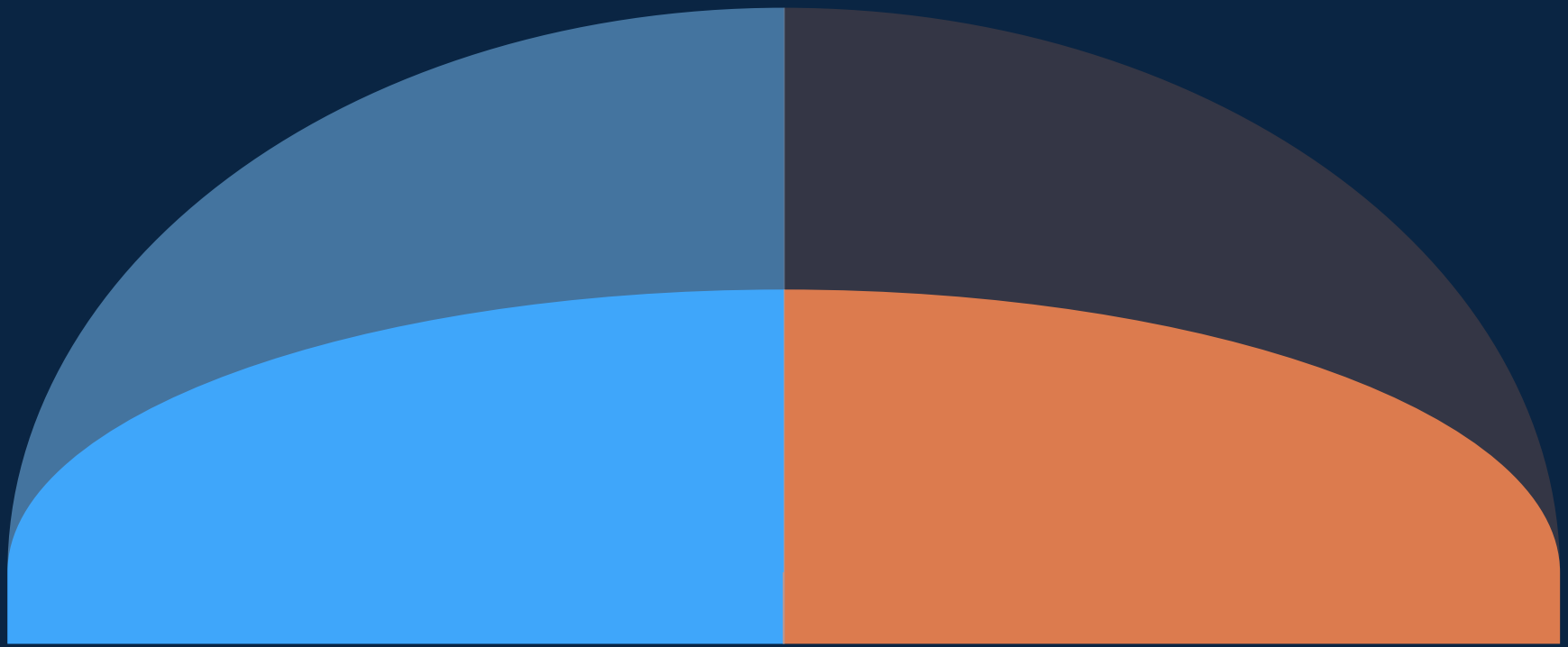
Un astronauta su Marte sperimenterebbe una gravità del 62.5% inferiore rispetto alla Terra



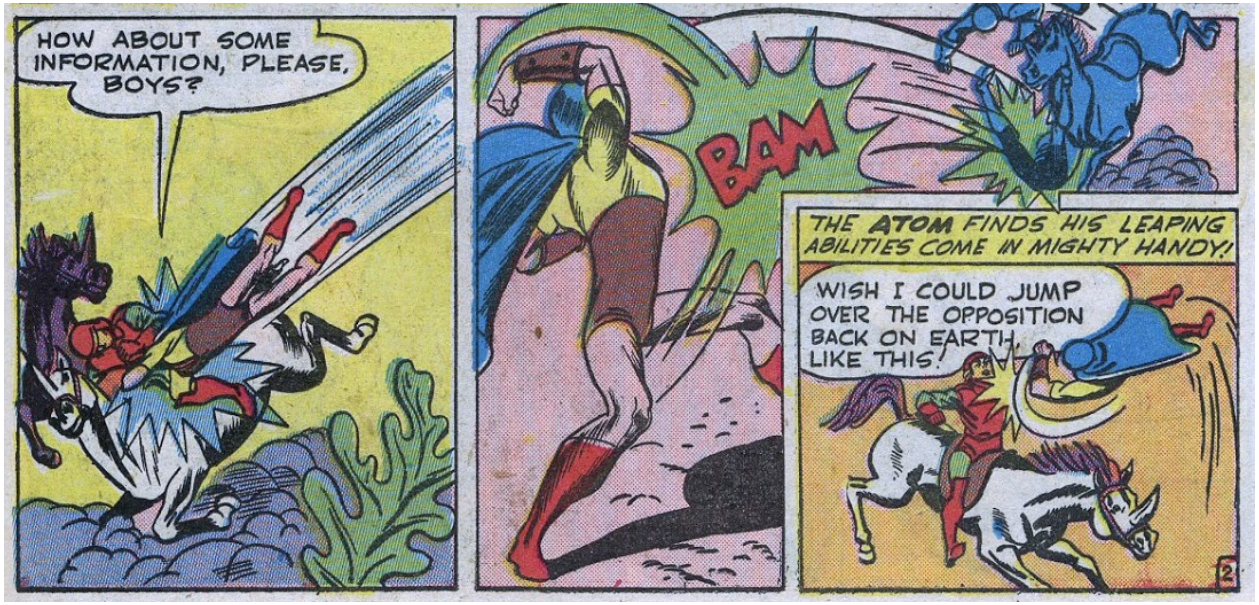
Curiosità marziane: gravità e atmosfera

Atmosfera

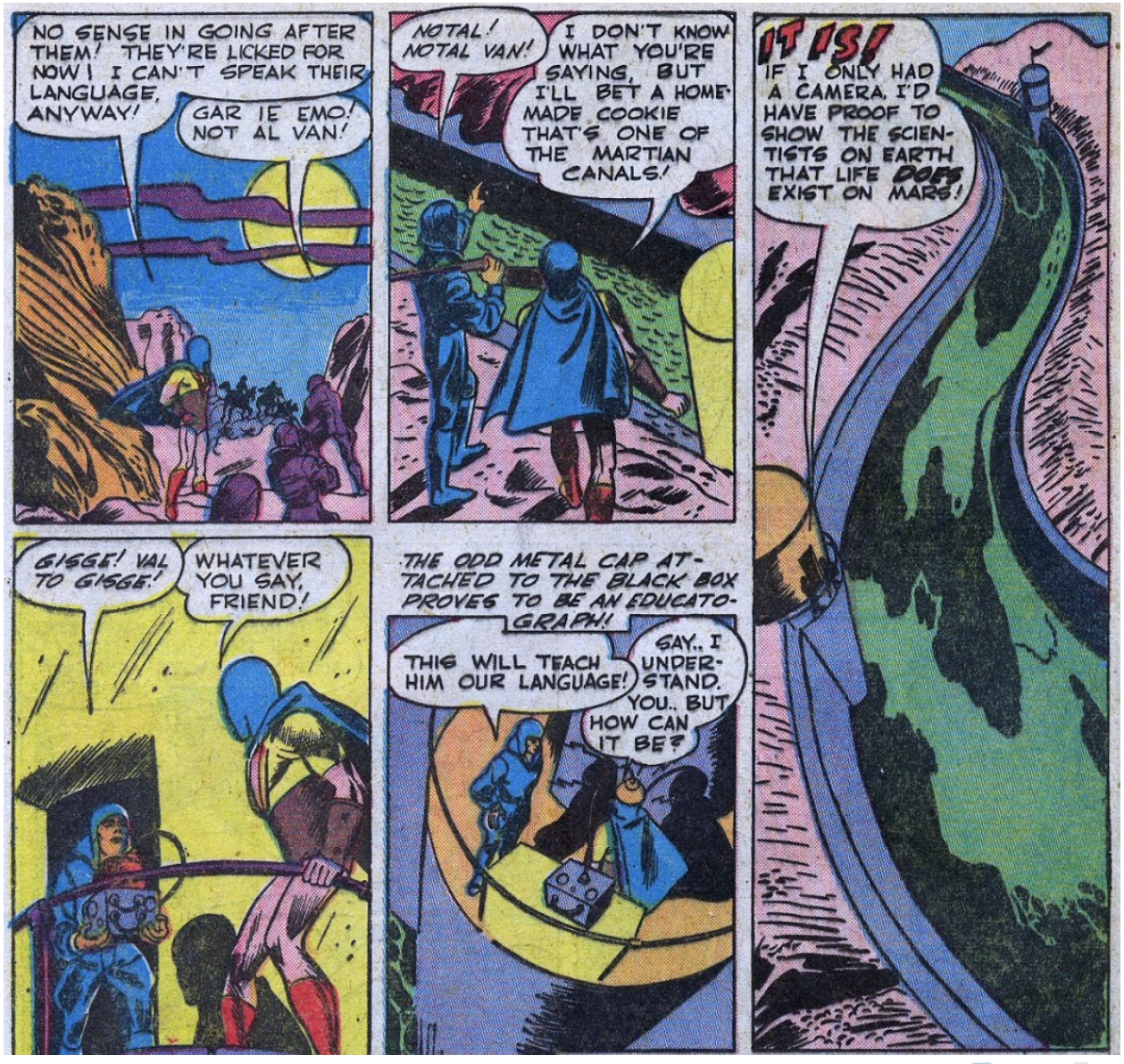
L'atmosfera su Marte, ricca di CO_2 (96%) è circa 100 volte meno densa di quella sulla Terra



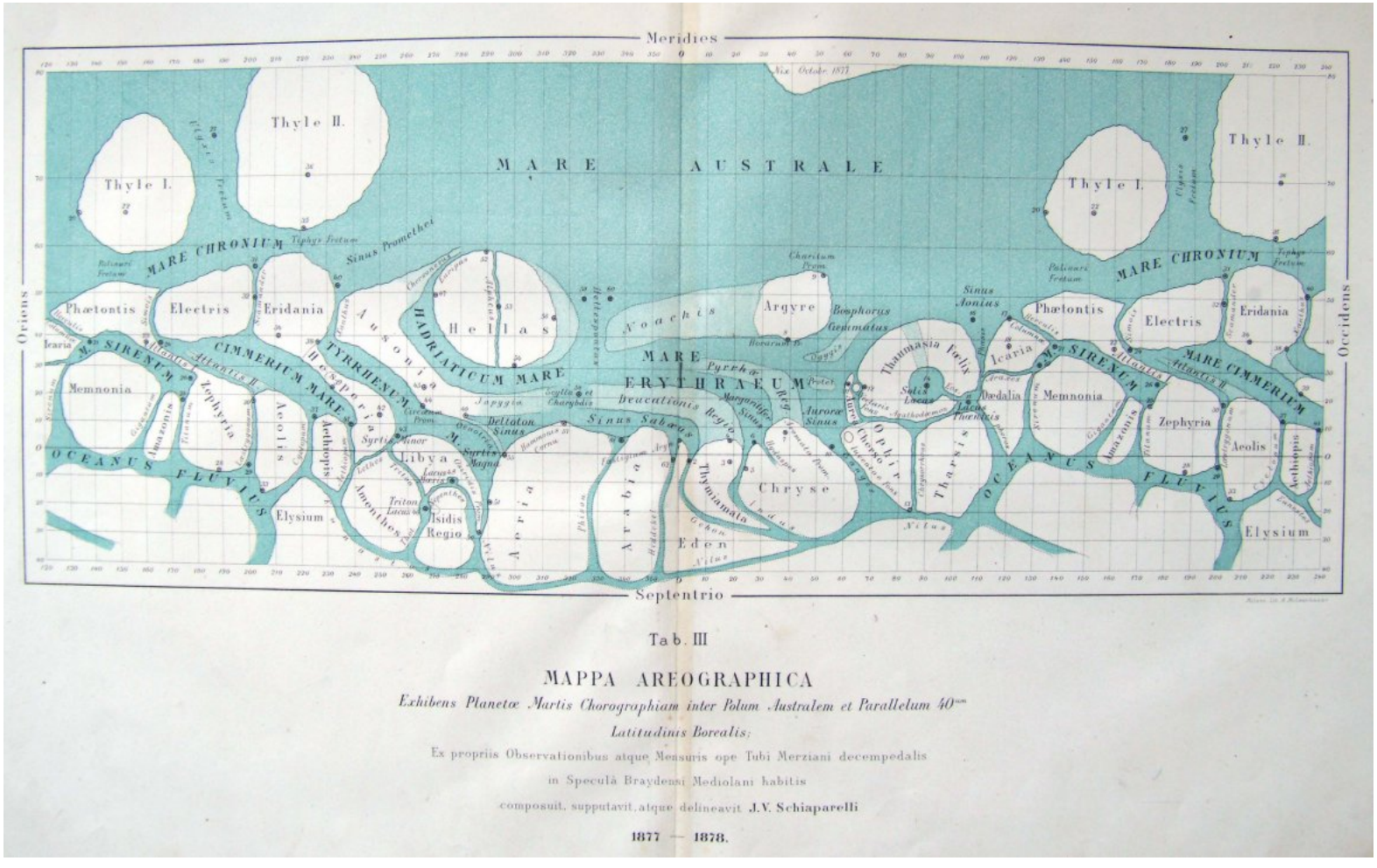
Incontrare i marziani



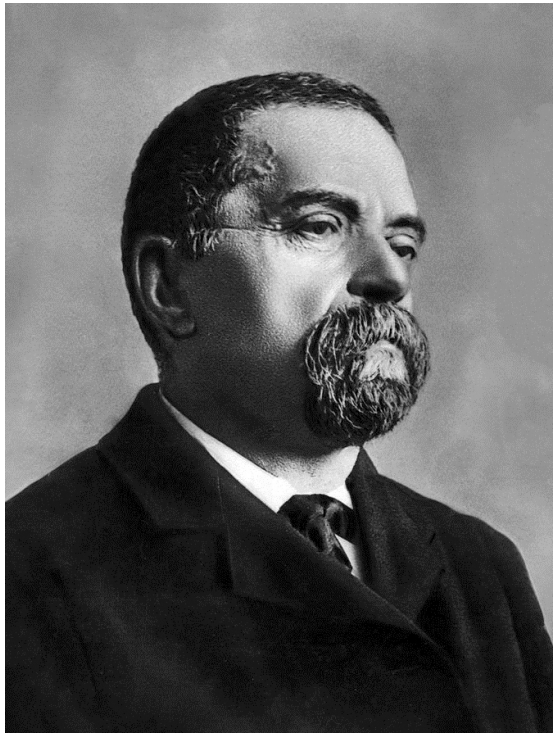
Incontrare i marziani



La prima mappa di Marte



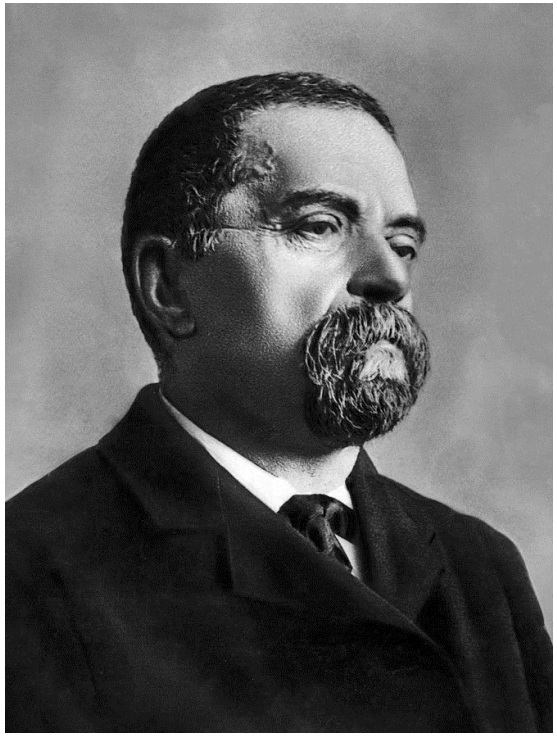
La prima mappa di Marte



Giovanni Virginio Schiaparelli

Direttore dell'Osservatorio Astronomico di Brera

La prima mappa di Marte



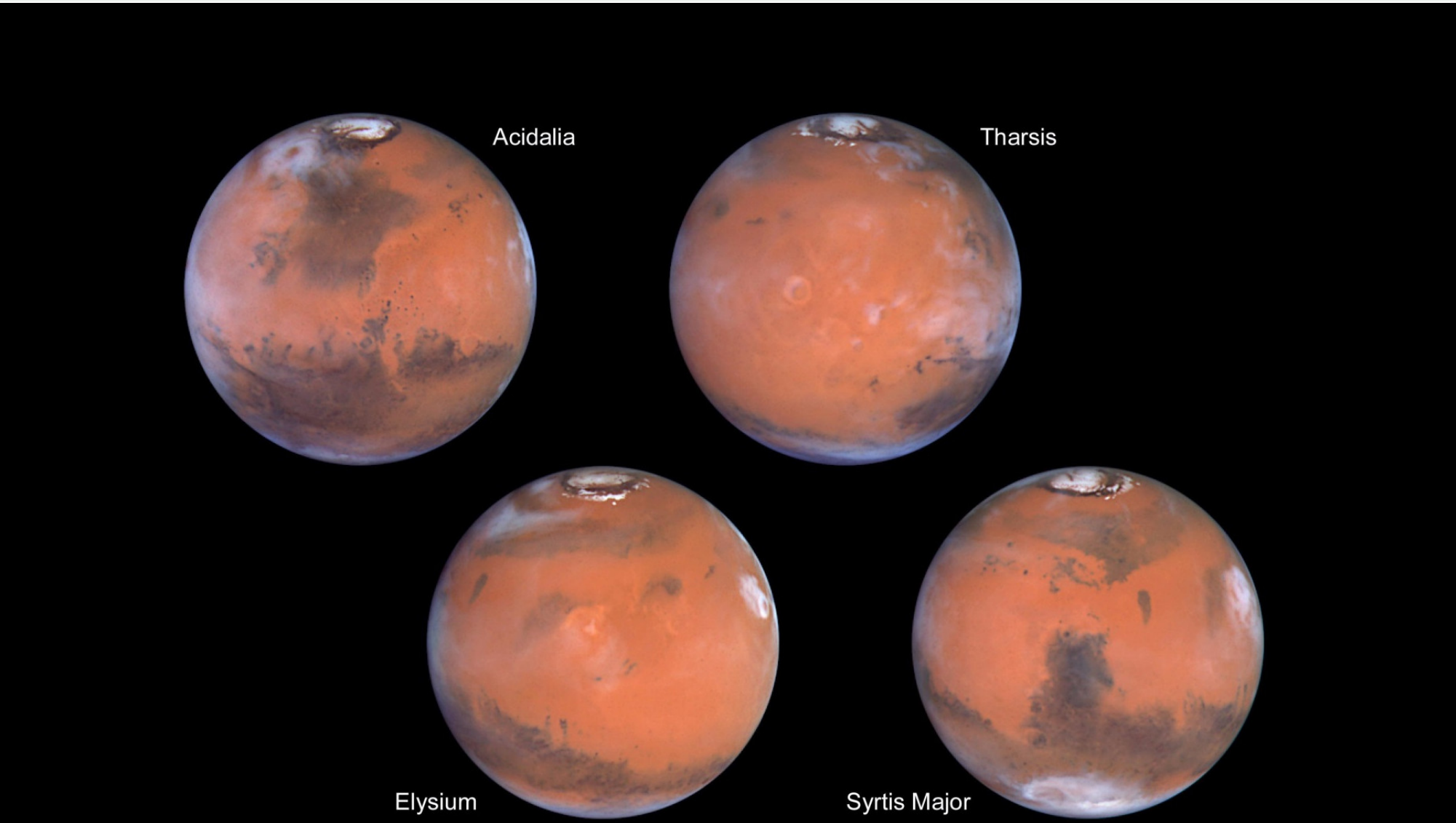
Giovanni Virginio Schiaparelli

Direttore dell'Osservatorio Astronomico di Brera

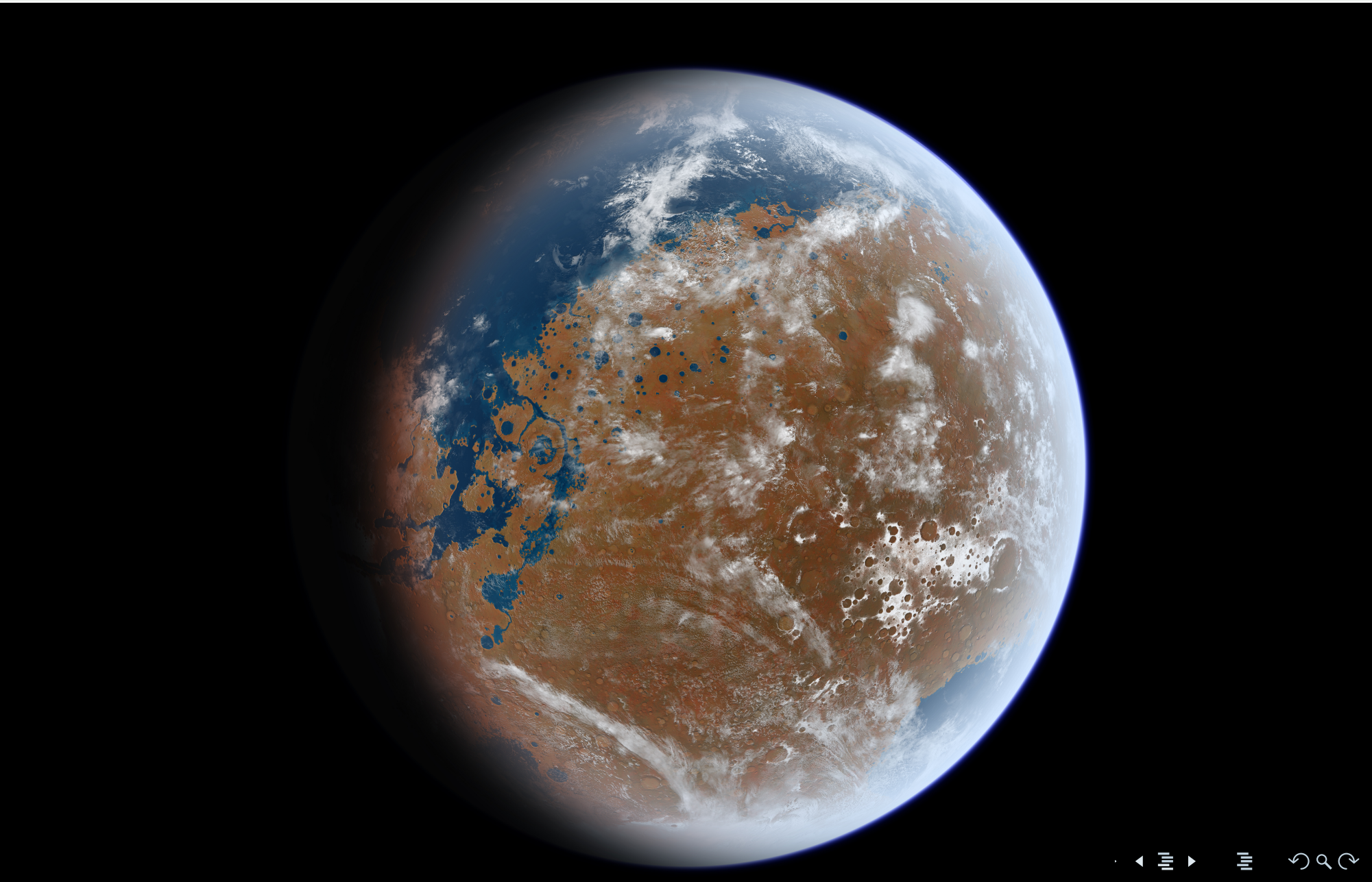
Estate 1877

Marte in congiunzione

Marte oggi



Marte ieri

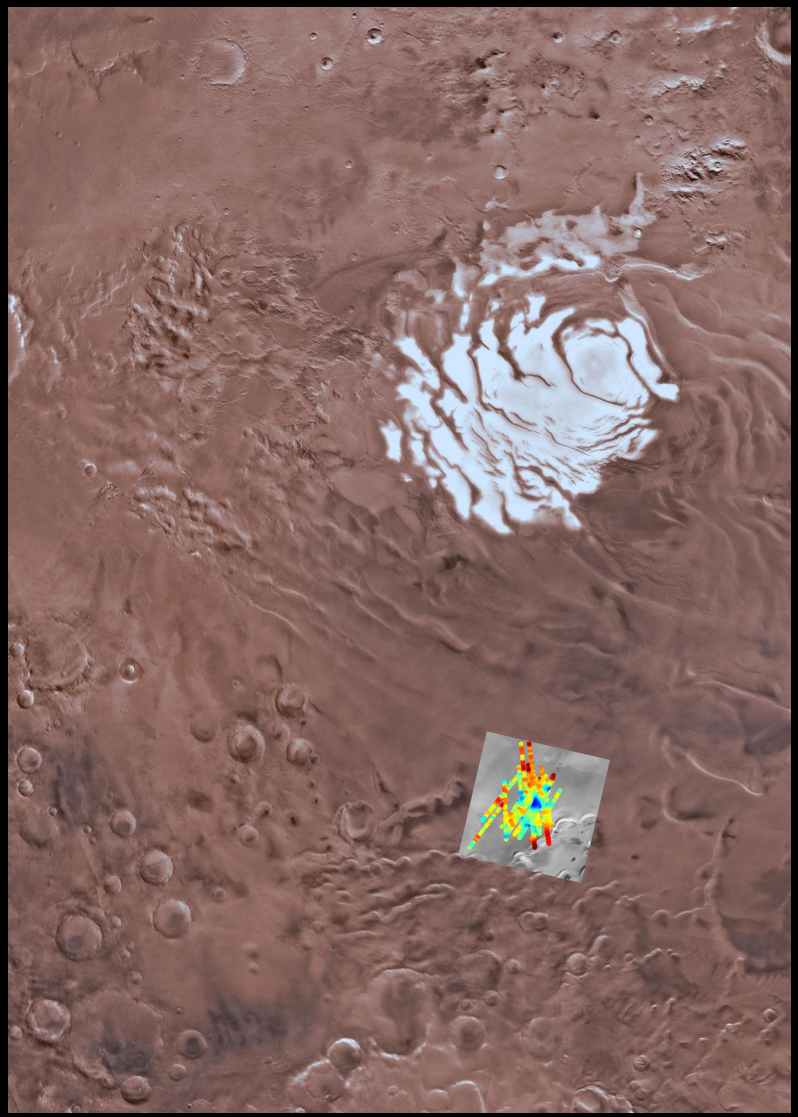


Brindisi

25 luglio 2018

Roberto Orosei
INAF

Un lago salato



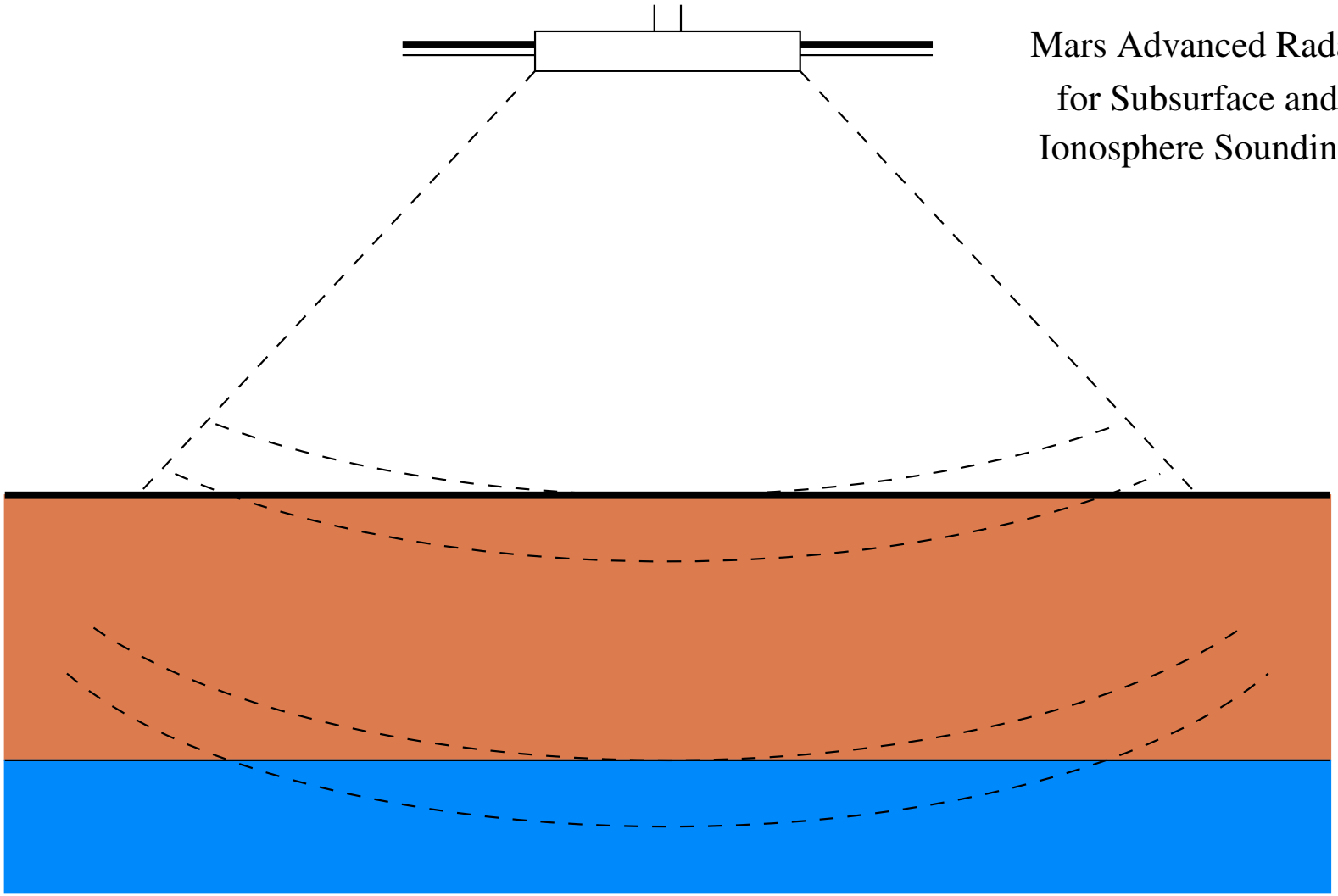
Profondità: 1500 m

Estensione: 20 km

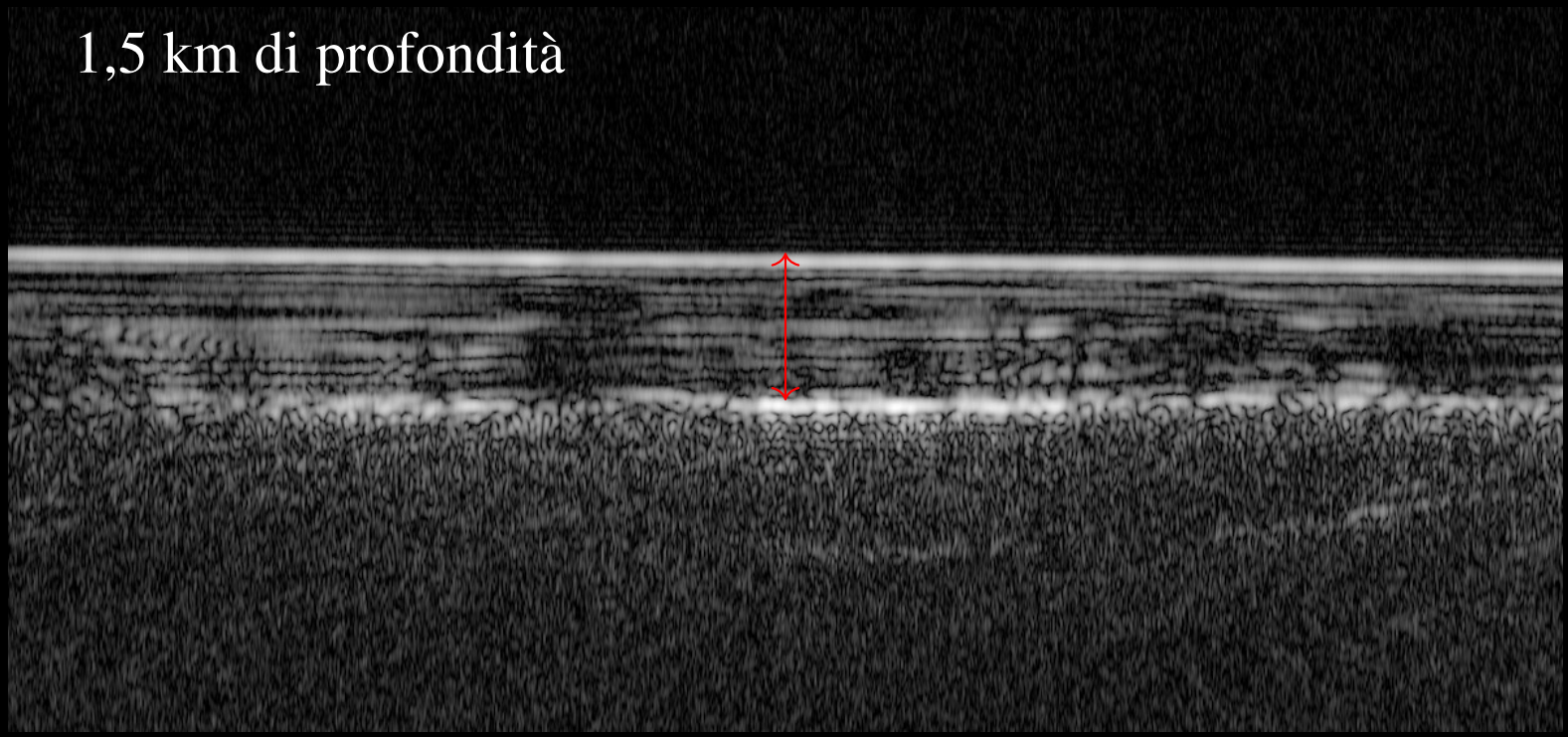
Spessore: almeno 1m

Temperatura: tra $-10°C$ e $-20°C$

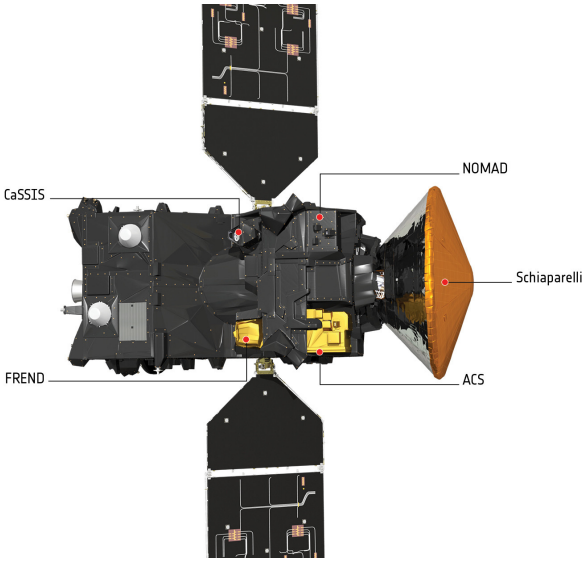
MARSIS


Mars Advanced Radar
for Subsurface and
Ionosphere Sounding

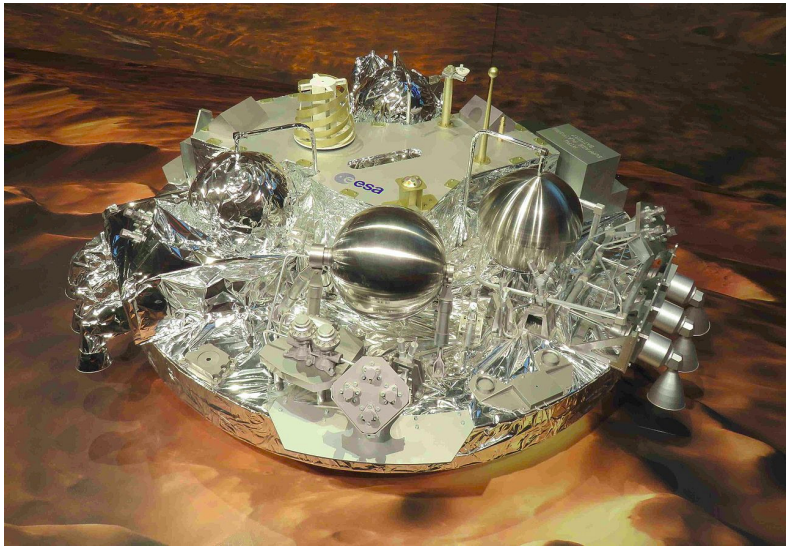
Una foto col radar



ExoMars 2016

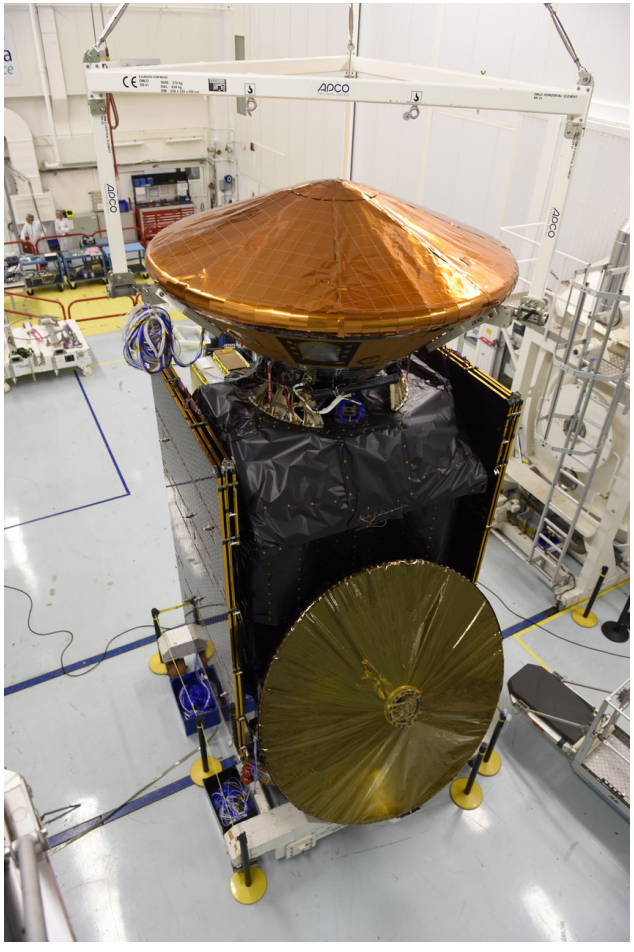


Journey to Mars



Schiaparelli's descent to Mars

ExoMars 2016



Schiaparelli

Dimostratore tecnologico per atterraggio

Trace Gas Orbiter - **TGO**

Atmosfera, ricerca di gas rari - metano

Ghiaccio di acqua superficiale e subsuperficiale

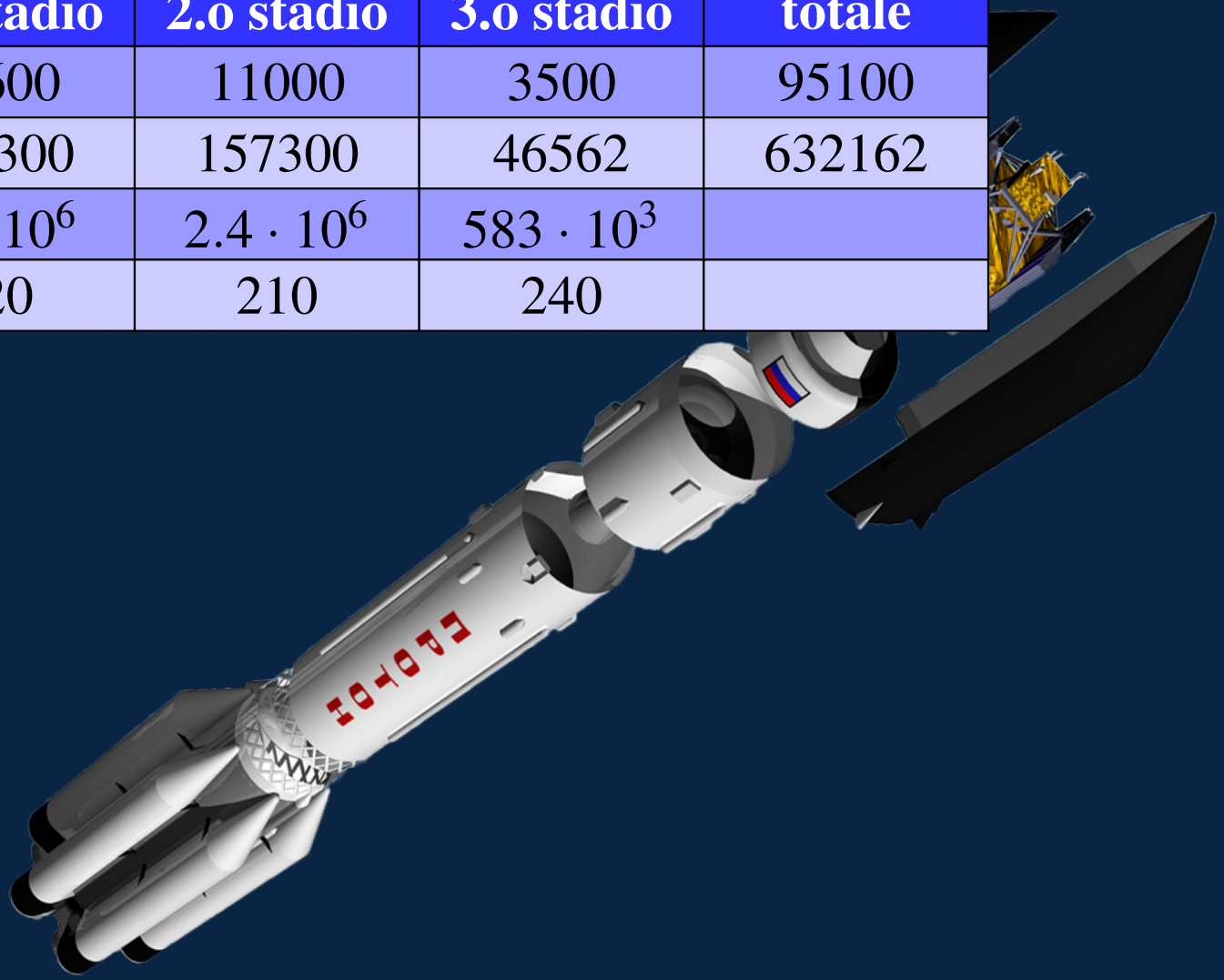
Identificazione del luogo di atterraggio di *Pasteur*

Agenzie: ESA / Roscosmos

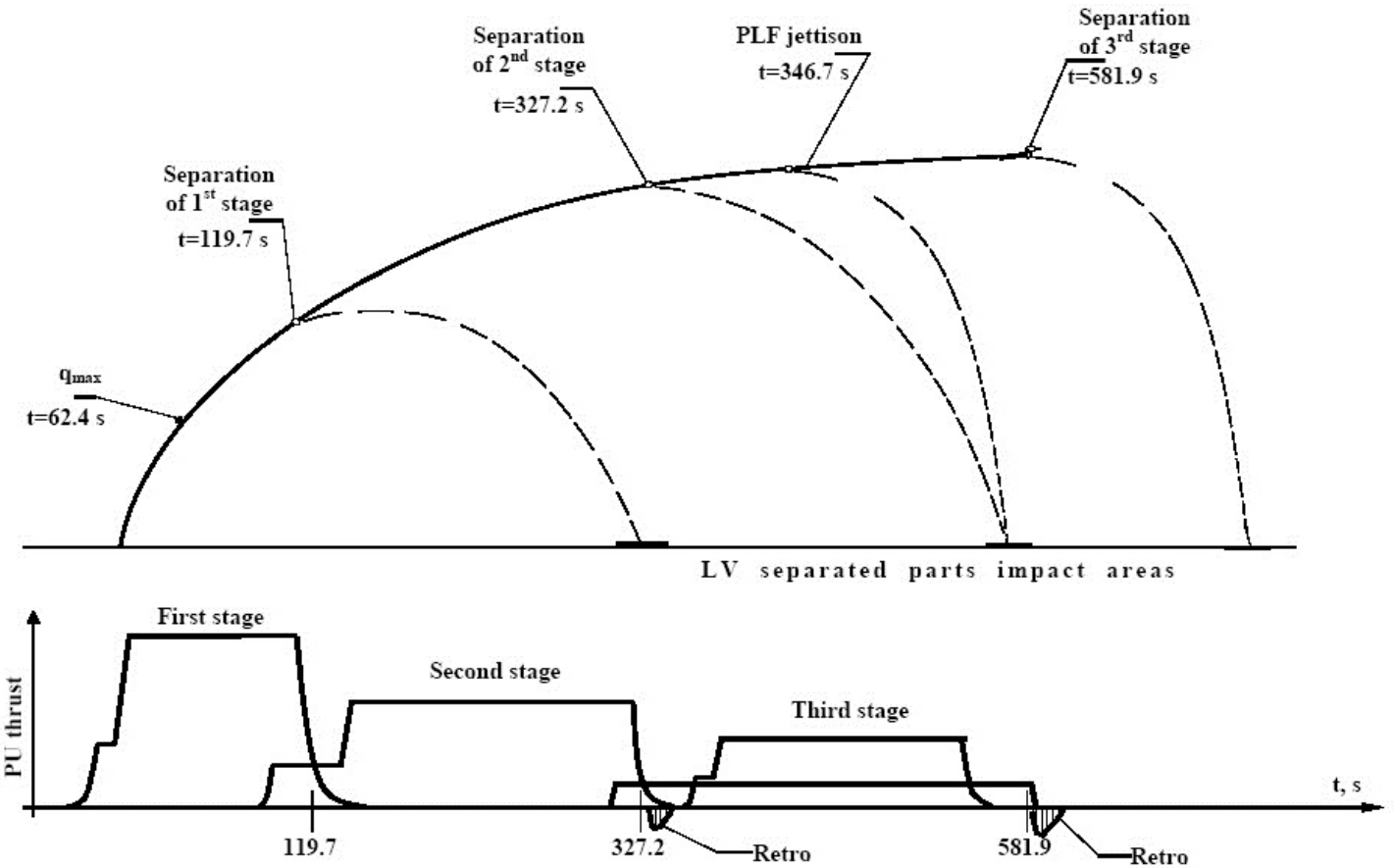
Forte contributo INAF e ASI

Gli stadi del razzo di ExoMARS

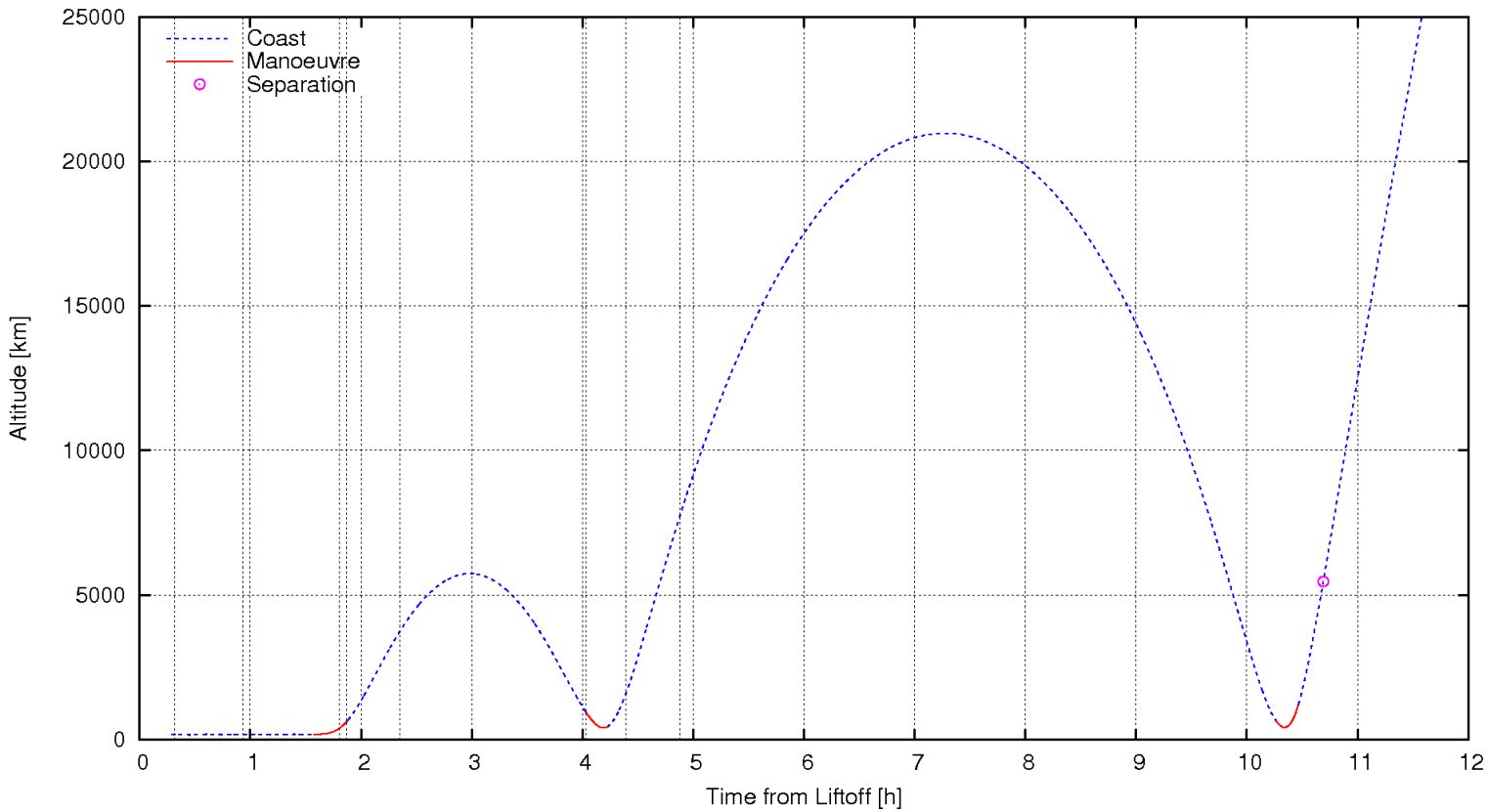
	1.o stadio	2.o stadio	3.o stadio	totale
massa (kg)	30600	11000	3500	95100
carburante (kg)	428300	157300	46562	632162
spinta (N)	$10 \cdot 10^6$	$2.4 \cdot 10^6$	$583 \cdot 10^3$	
tempo (s)	120	210	240	



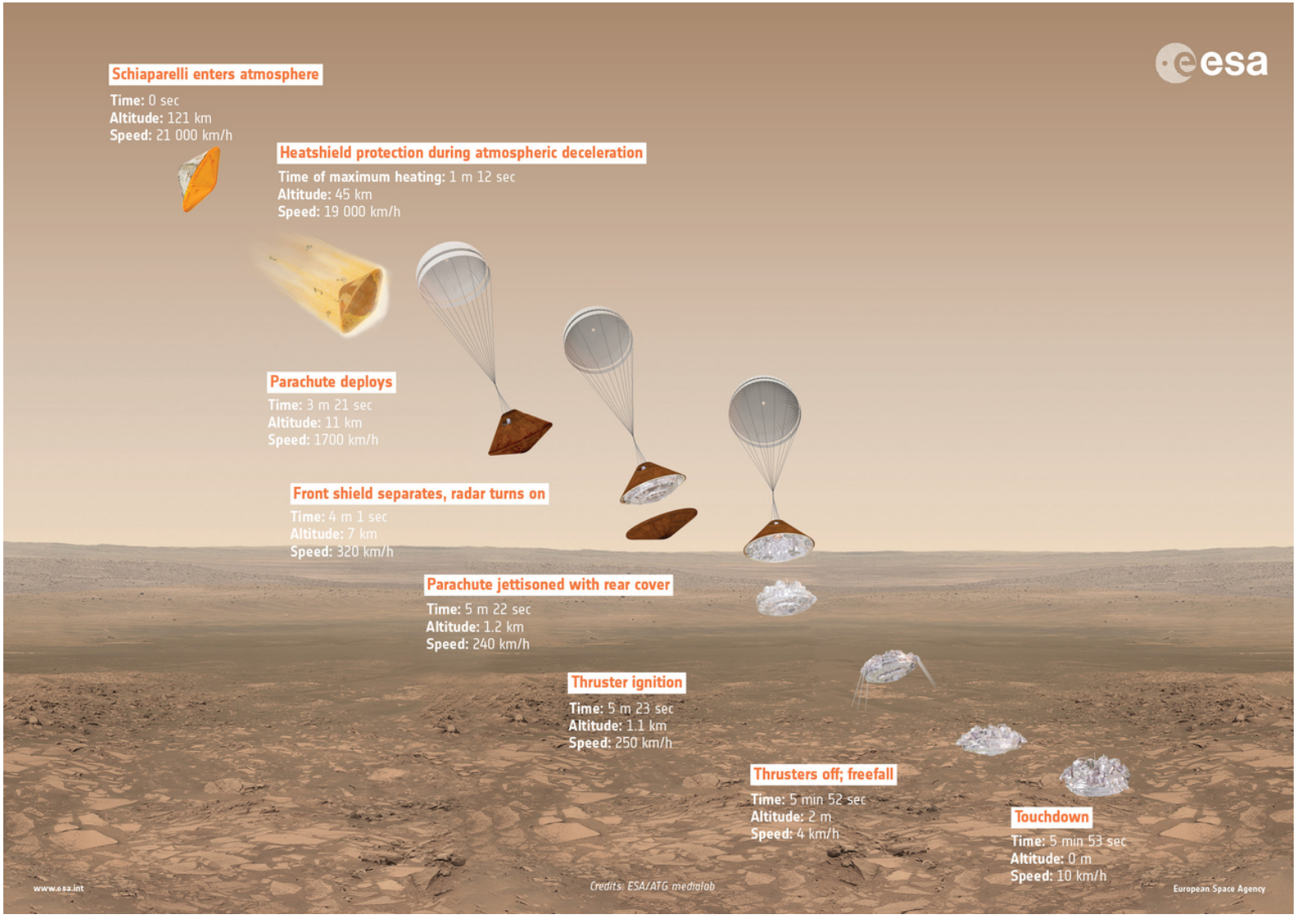
Lo stacco degli stadi



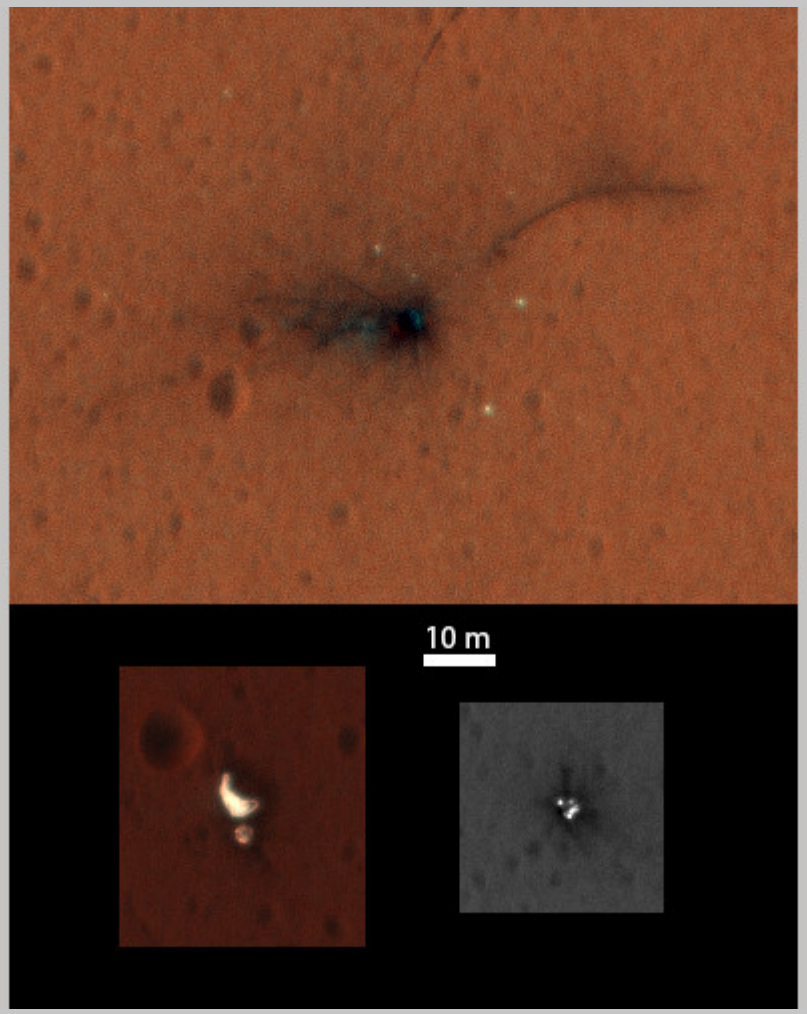
Accensione dei motori



La discesa di Schiaparelli



La fine di Schiaparelli



Ritorno su Marte

ExoMars 2020

Ritorno su Marte

ExoMars 2020

Rosalind Franklin

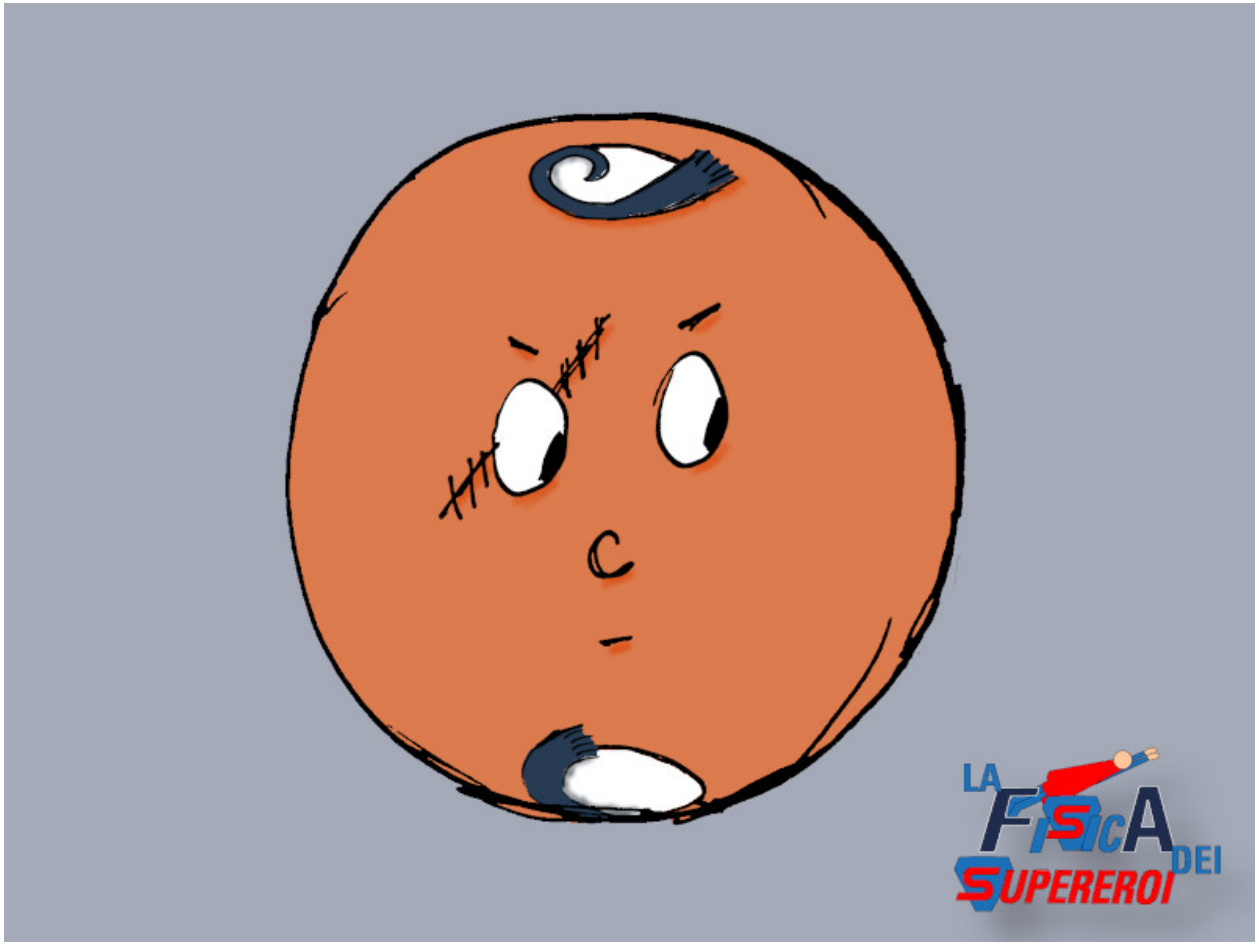
Ritorno su Marte

Mars 2020

Ritorno su Marte

Mars 2020

Mars Elicopter Scout


C
LA FISICA DEI SUPEREROI