



FAKULTA MATEMATIKY,
FYZIKY A INFORMATIKY
Univerzita Komenského
v Bratislave

Človek v pohybe okolo Slnka

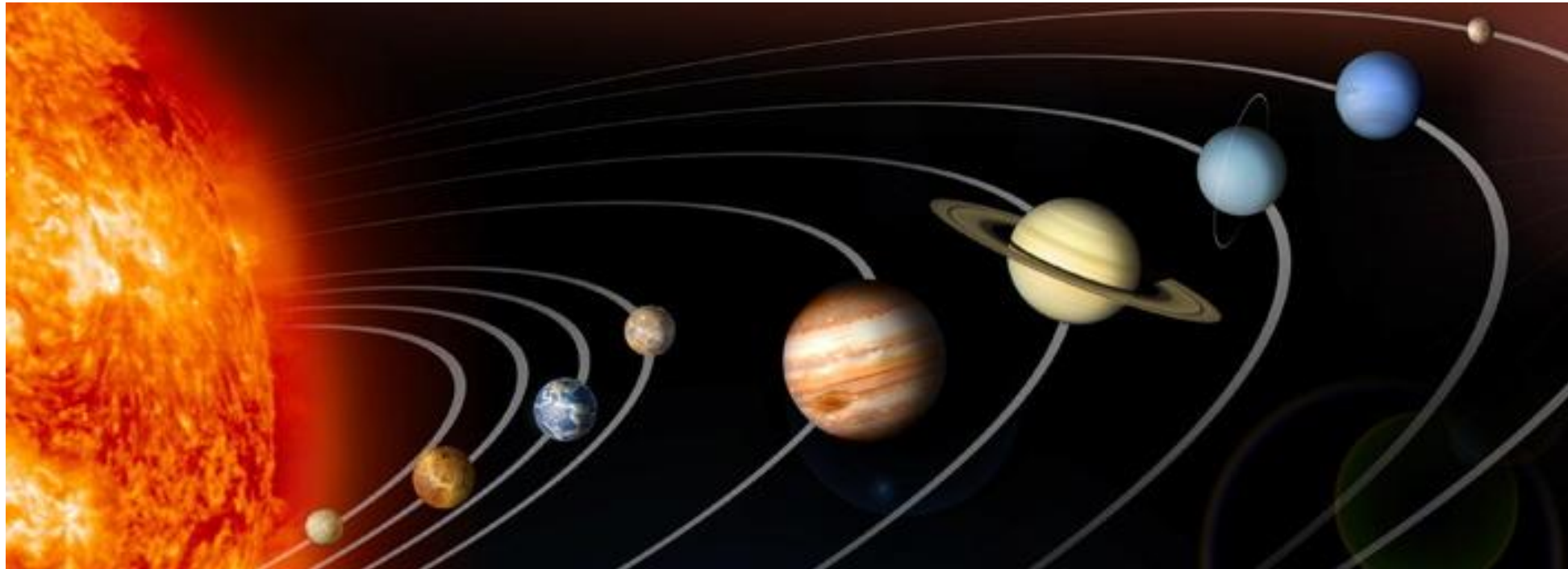
alebo odkiaľ vieme, že Zem obieha okolo Slnka
a aký rozdiel to znamená pre ľudí

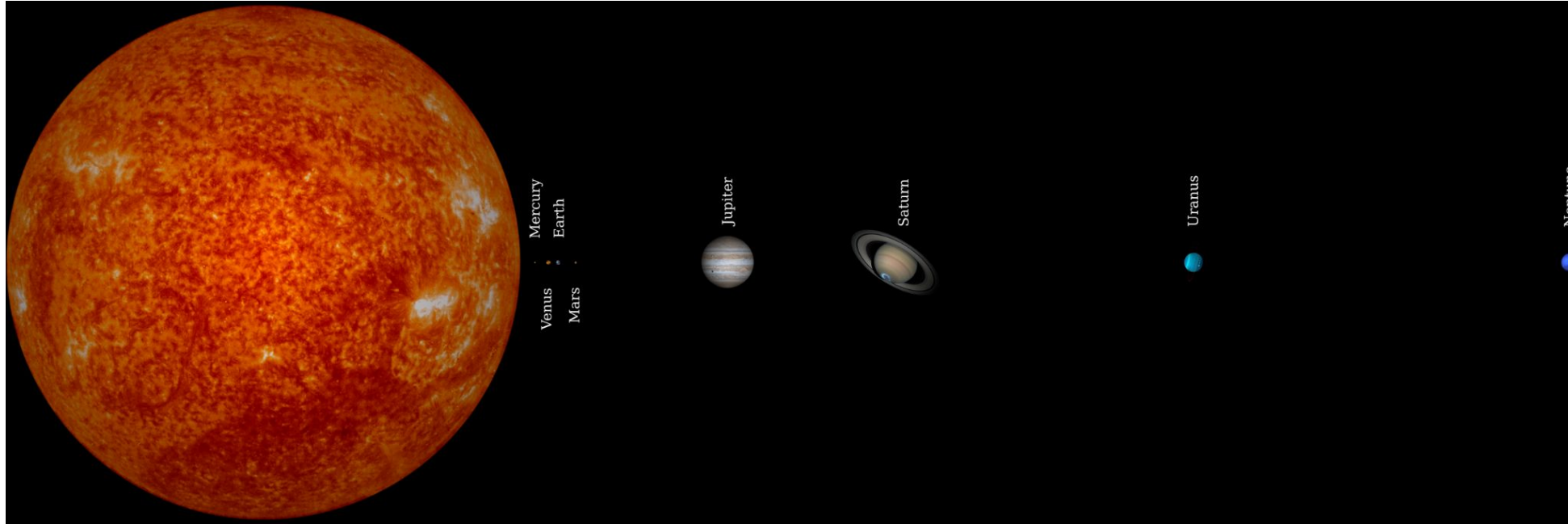
Juraj Tekel
Katedra teoretickej fyziky



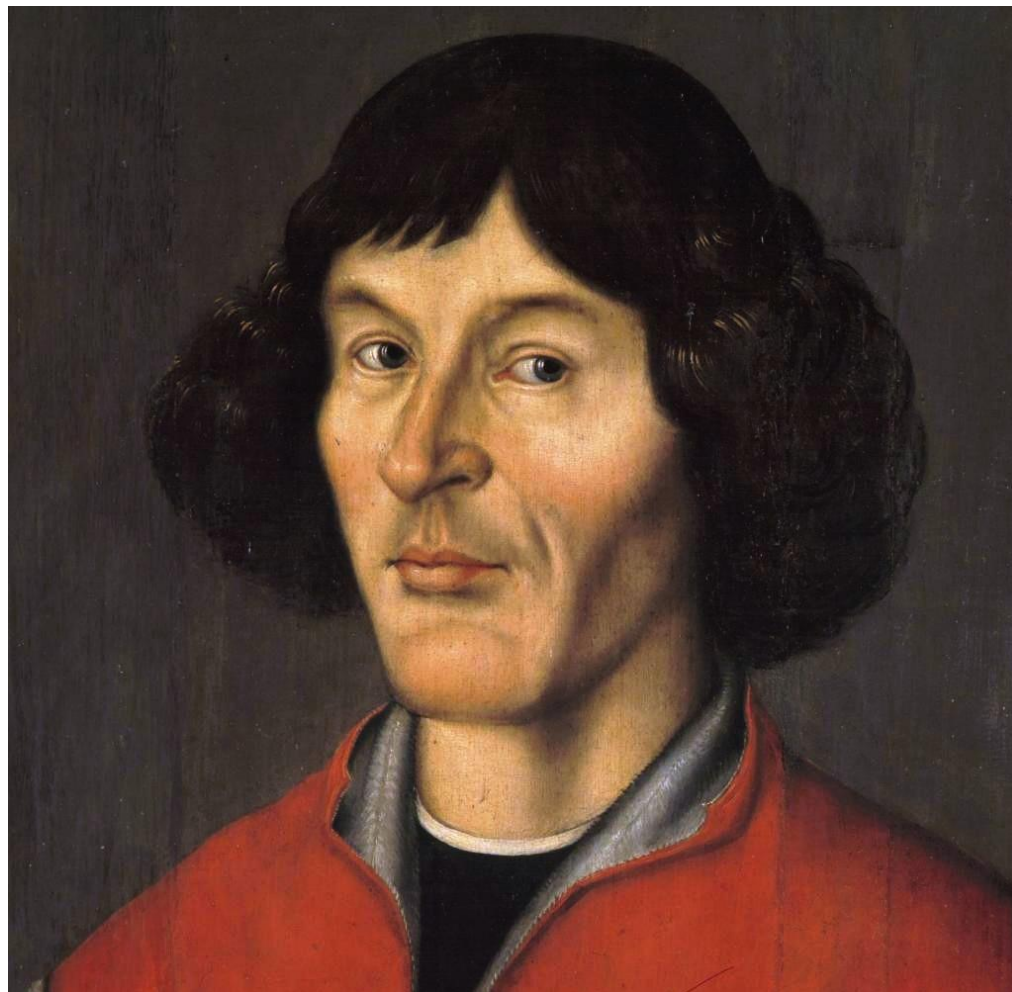
4. 11. 2023, Očami Štefánika, Elektrárňa Piešťany





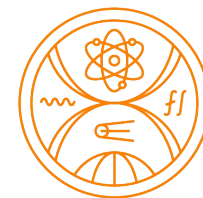


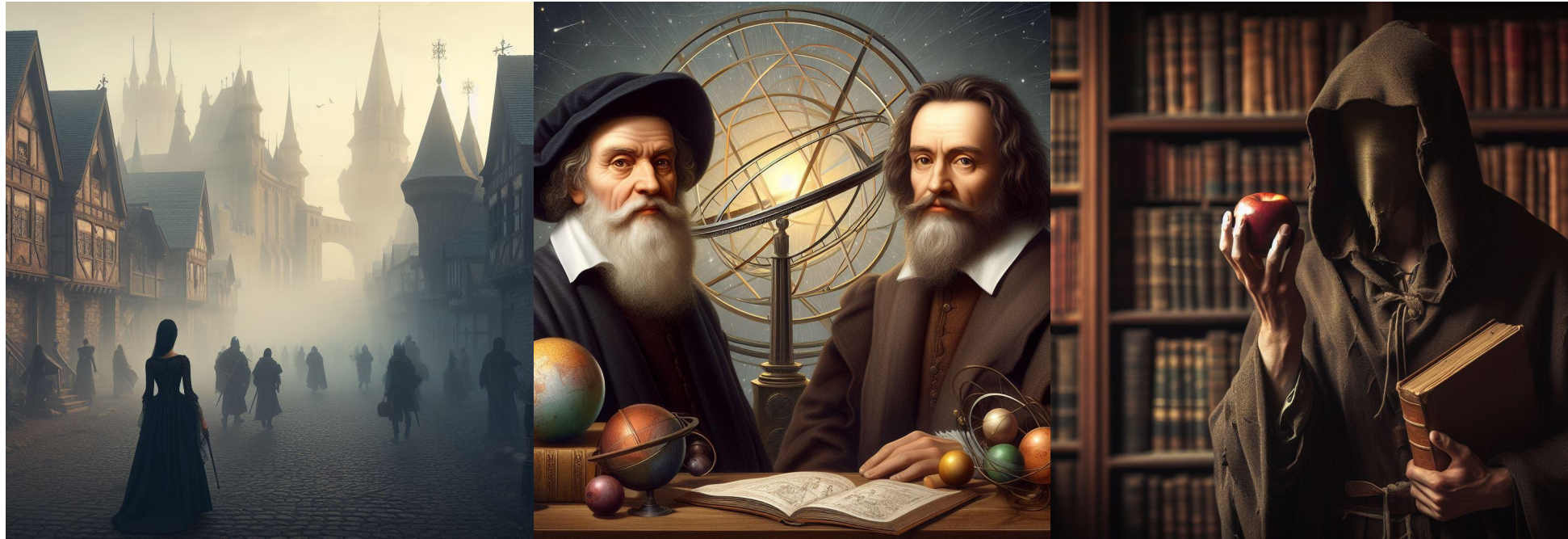




Mikuláš Kopernik

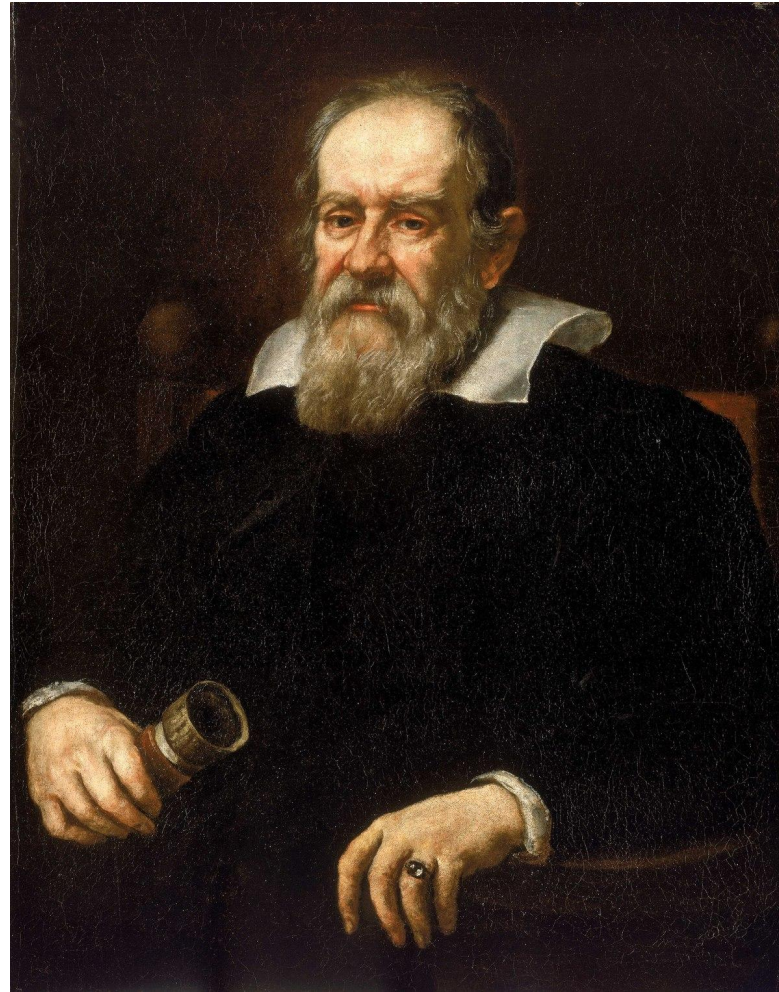
1473 – 1543







Johannes Kepler
1571 – 1630



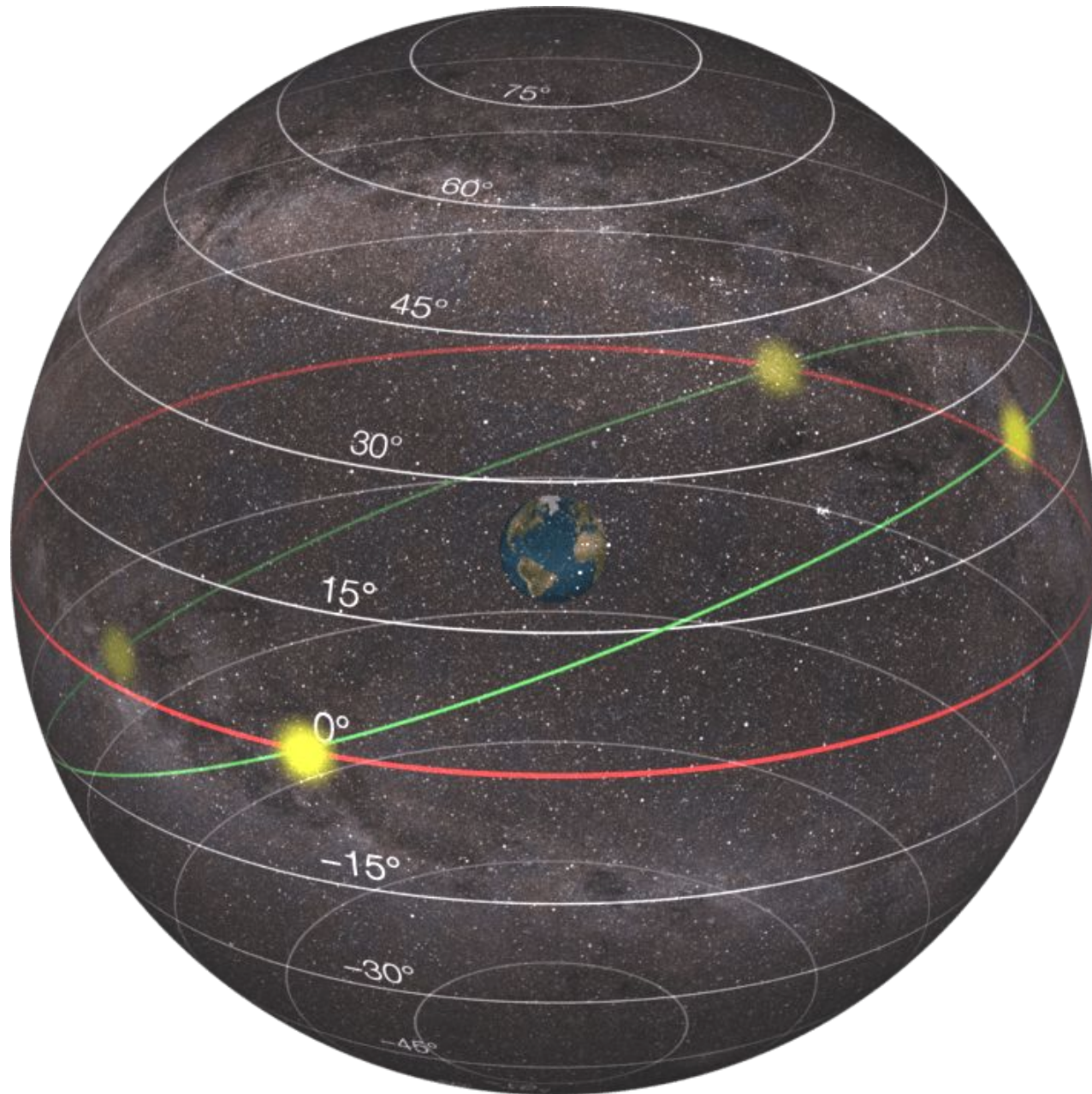
Galileo Galilei
1564 – 1642

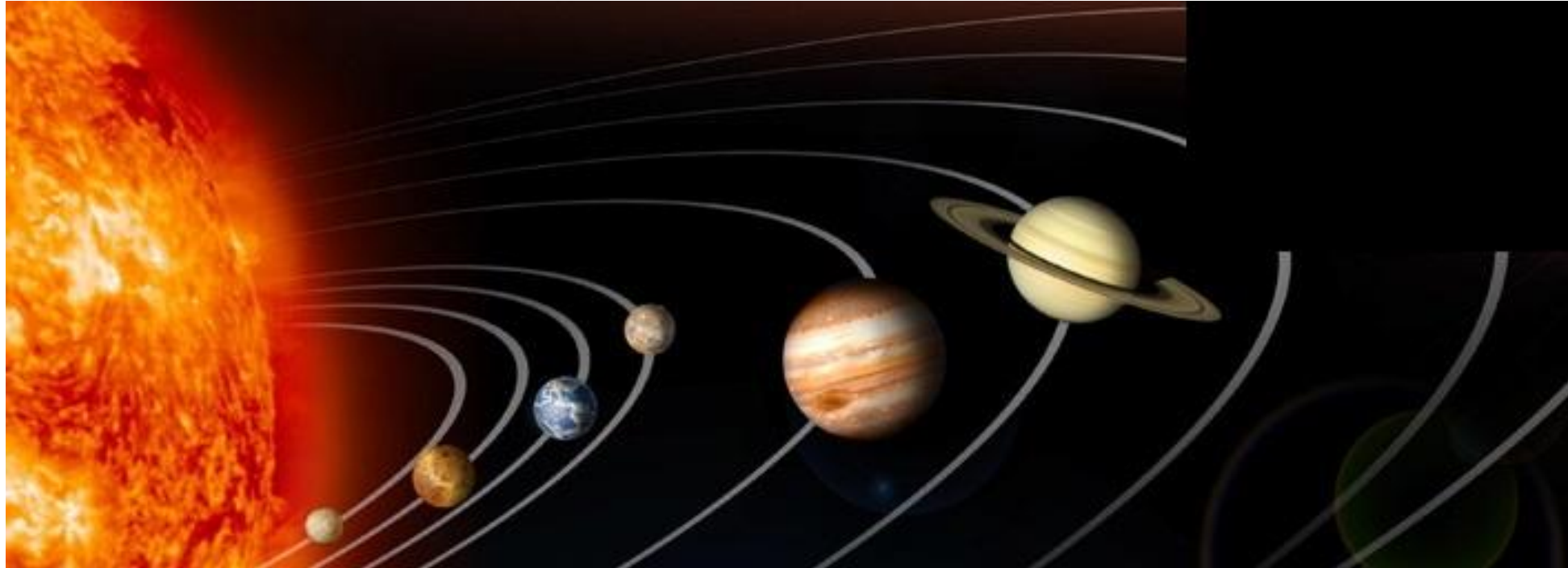




Čo vedeli o vesmíre v antických časoch?









Aristoteles
384 pred Kr. – 322 pred Kr.



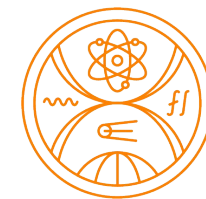
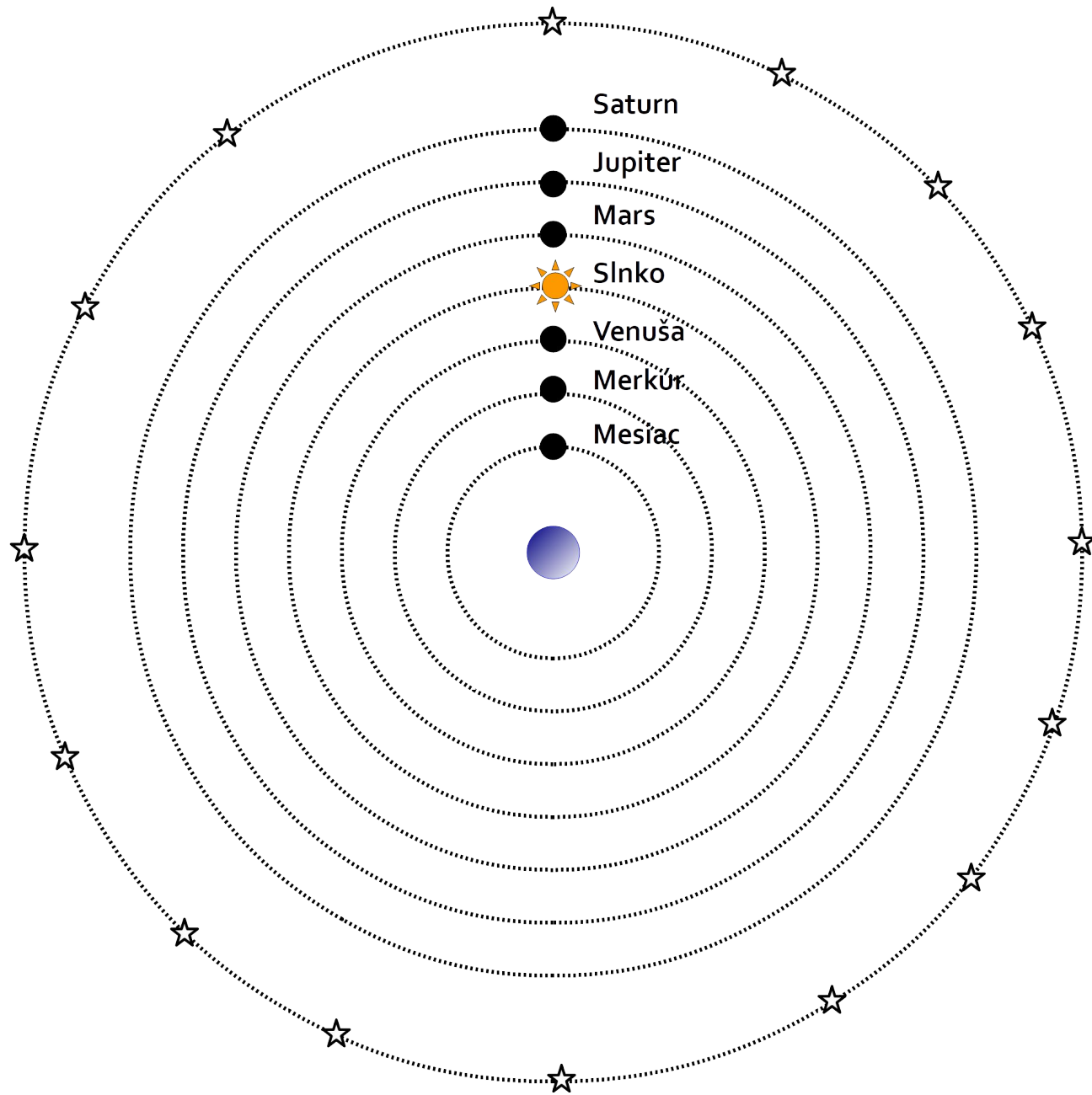
Aristotelovská fyzika



- Svet sa skladá zo sfér. Veci mimo sféry Zeme sú dokonalé.
- Kružnica a guľa sú dokonalé tvary.
- Sféra stálic je nemenná.

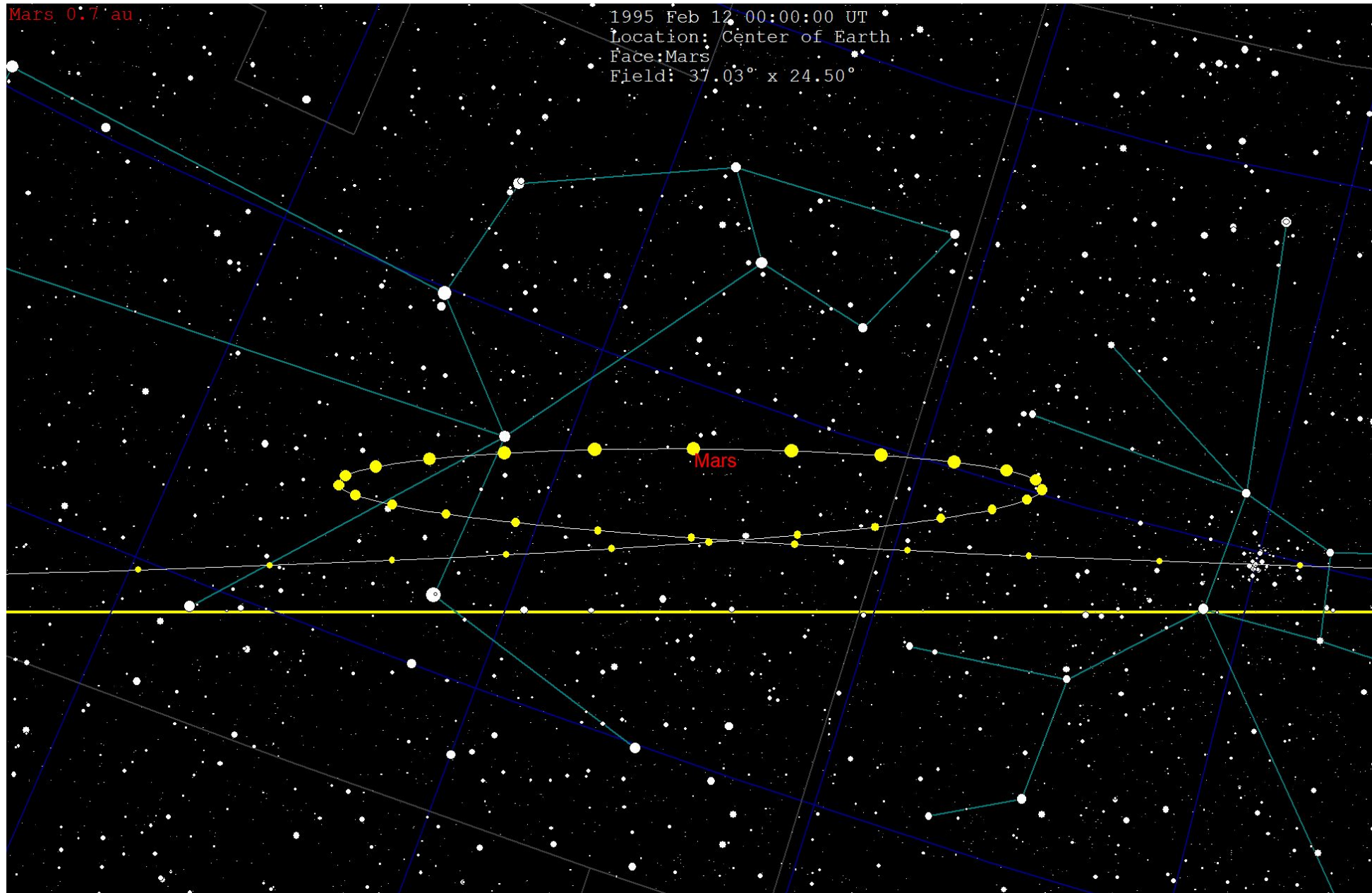
- Prirodzený stav telies je pokoj. Na pohyb treba hýbateľa.
- Prirodzené miesto telies je v strede vesmíru, ťažšie látky hlbšie.

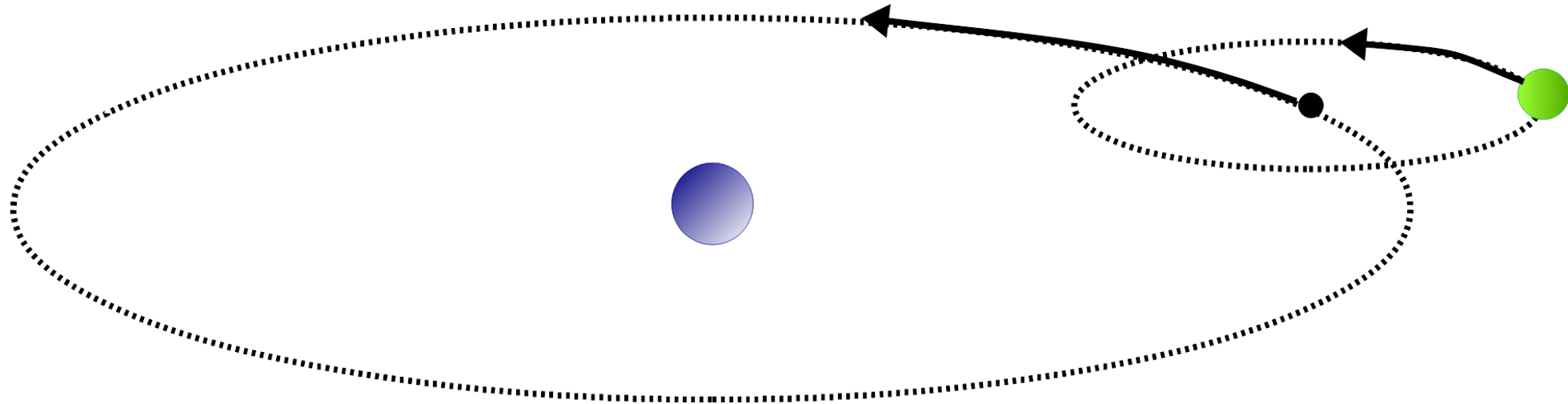




Mars 0.7 au

1995 Feb 12 00:00:00 UT
Location: Center of Earth
Face: Mars
Field: 37.03° x 24.50°



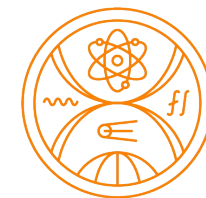


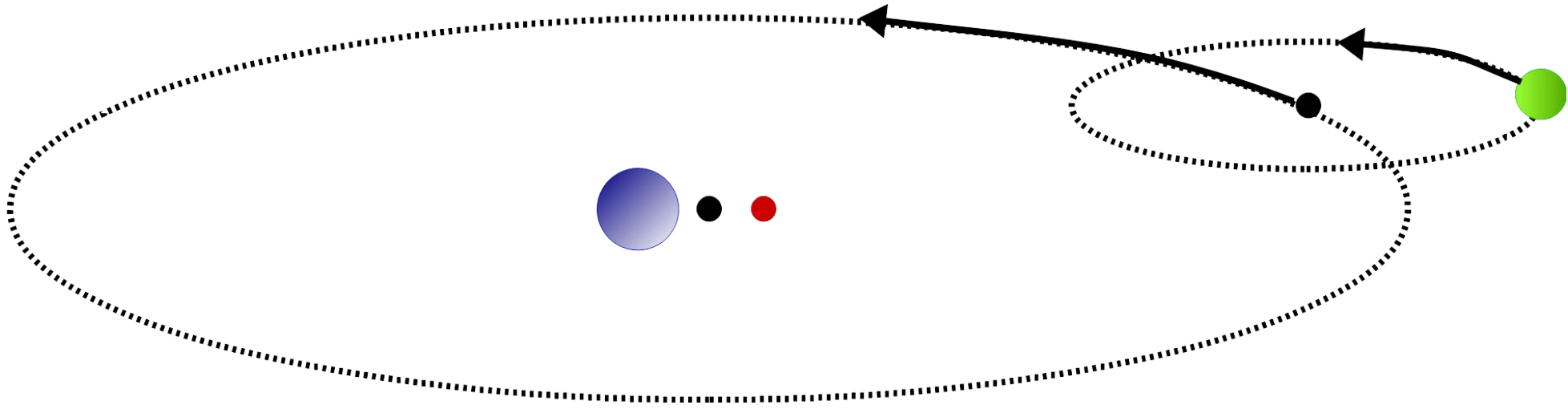
Ptolemaios

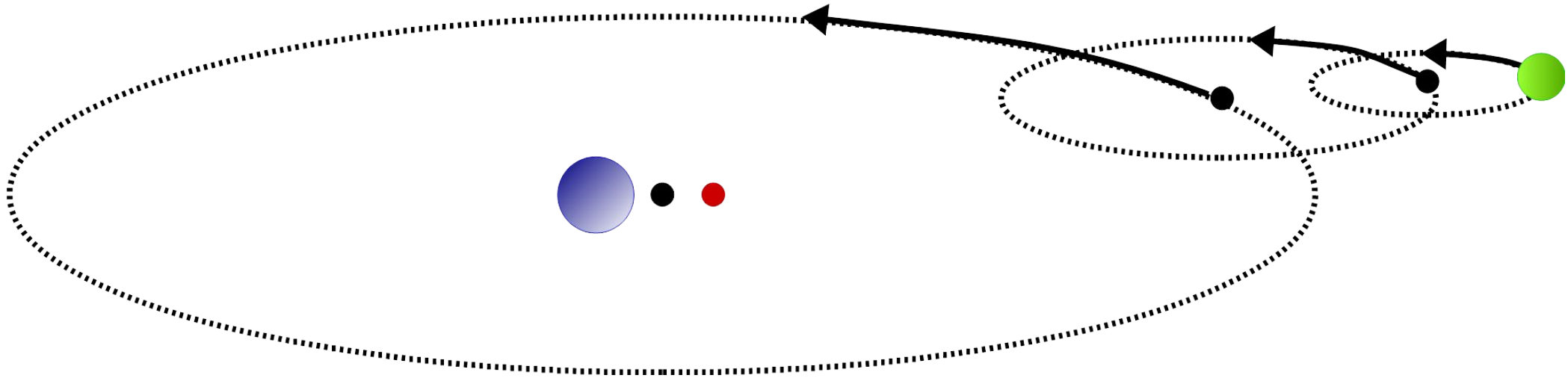


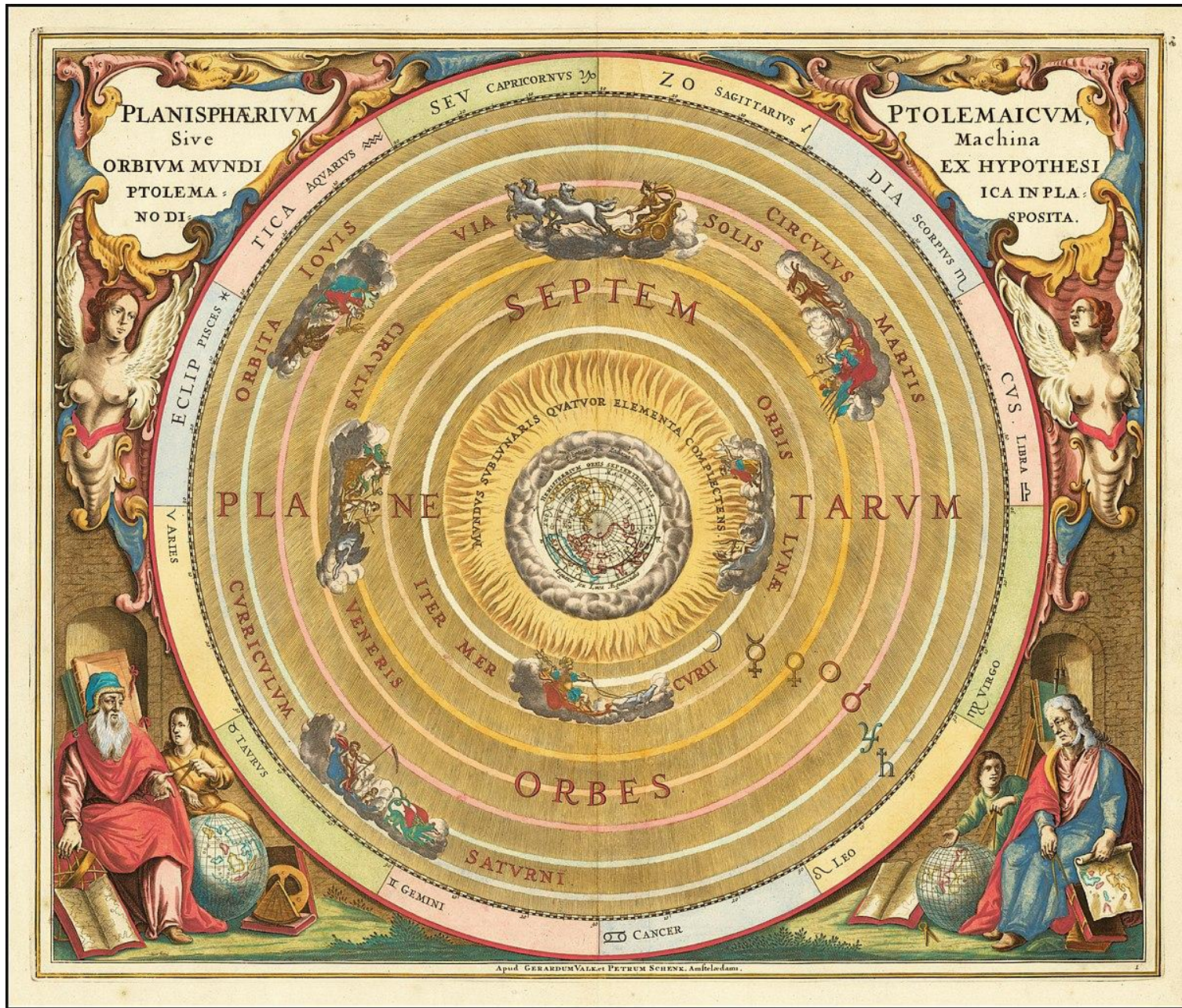


Klaudios Ptolemaios
85 – 165





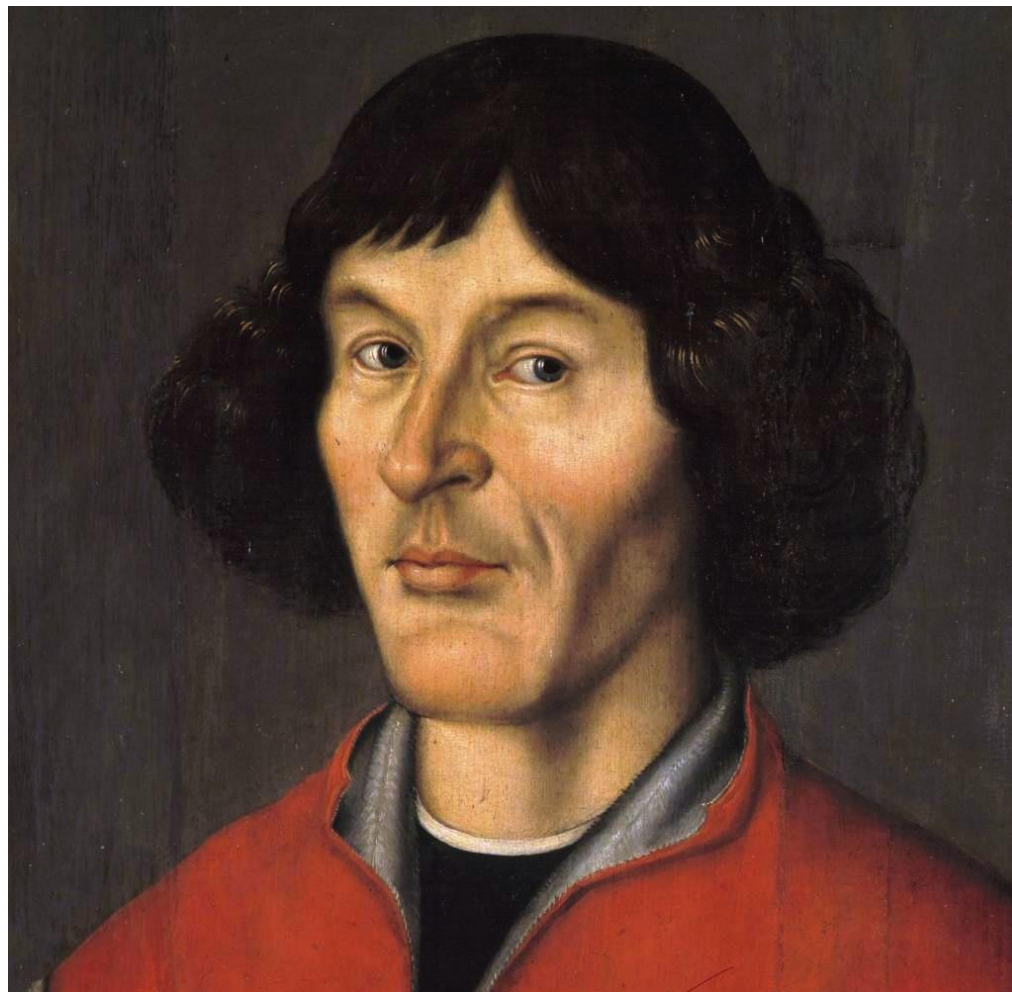






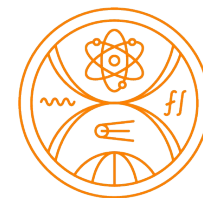
Kopernik

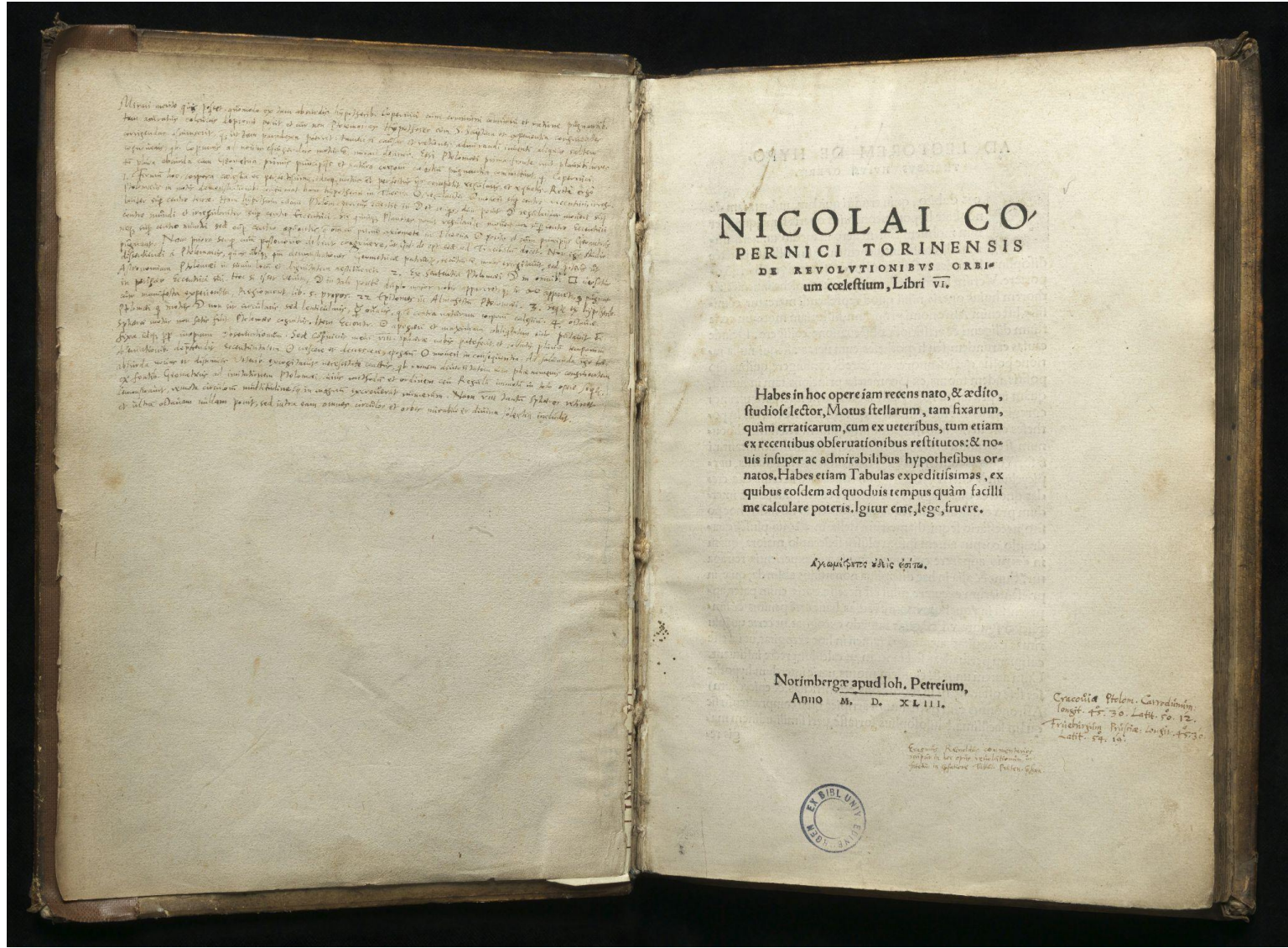




Mikuláš Kopernik

1473 – 1543

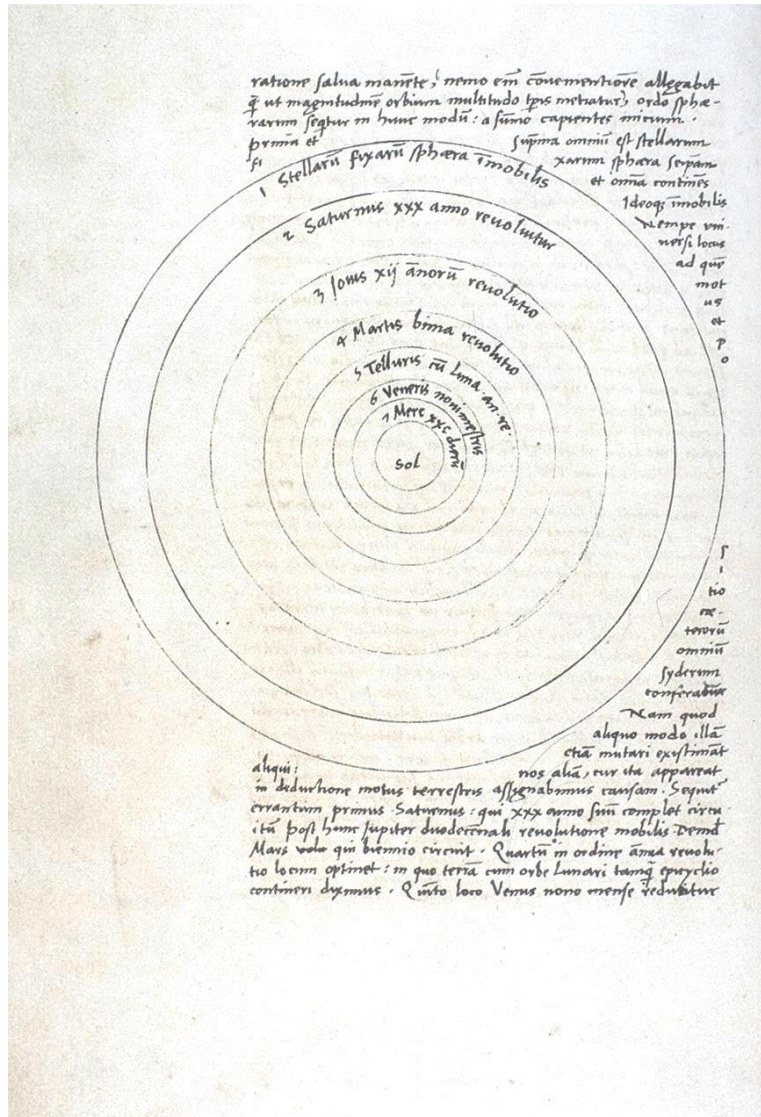




De revolutionibus orbium coelestium

1514, 1543





De revolutionibus orbium coelestium

1514, 1543



Kepler (a Brahe)





Johannes Kepler
1571 – 1630



Tycho Brahe
1546 – 1601



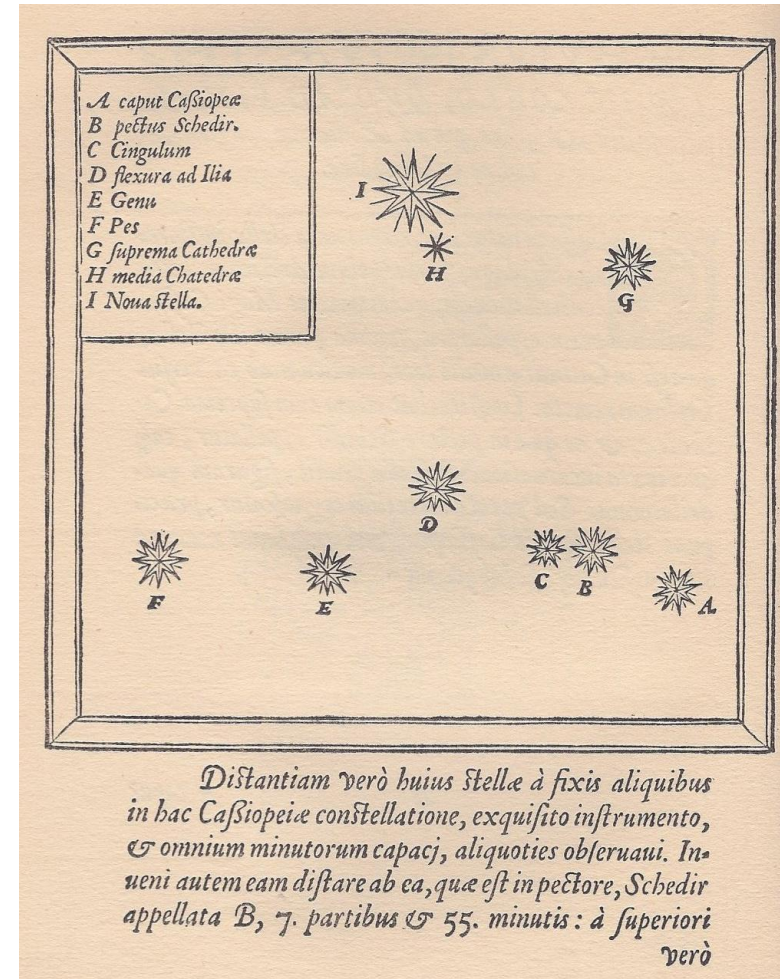


Tycho Brahe



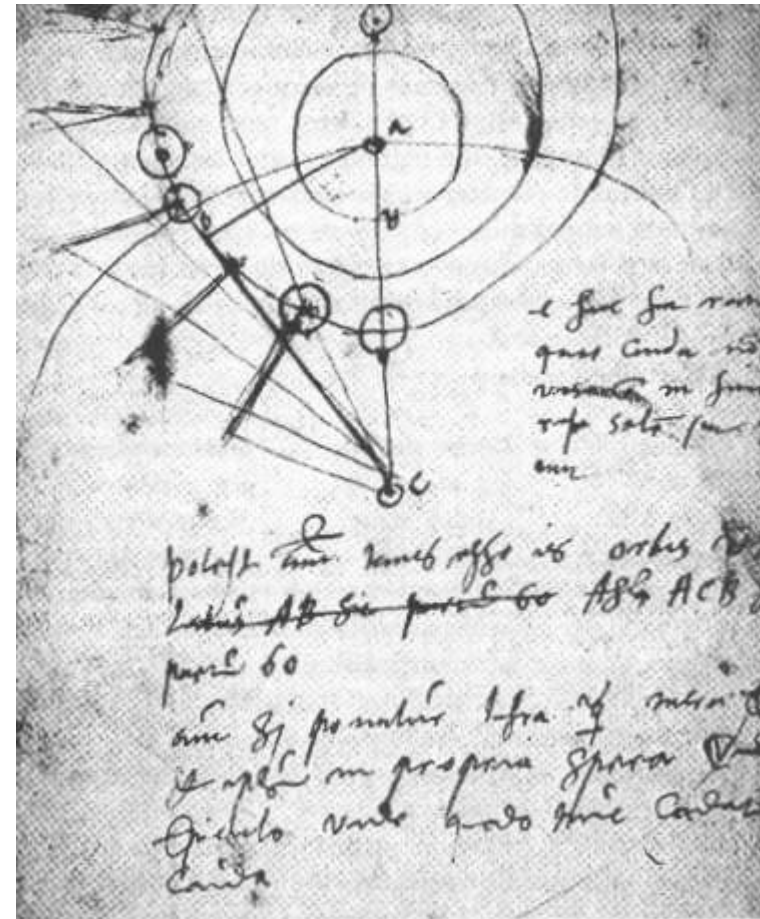
Tycho Brahe

- Pozoroval supernovu – 1572.



Tycho Brahe

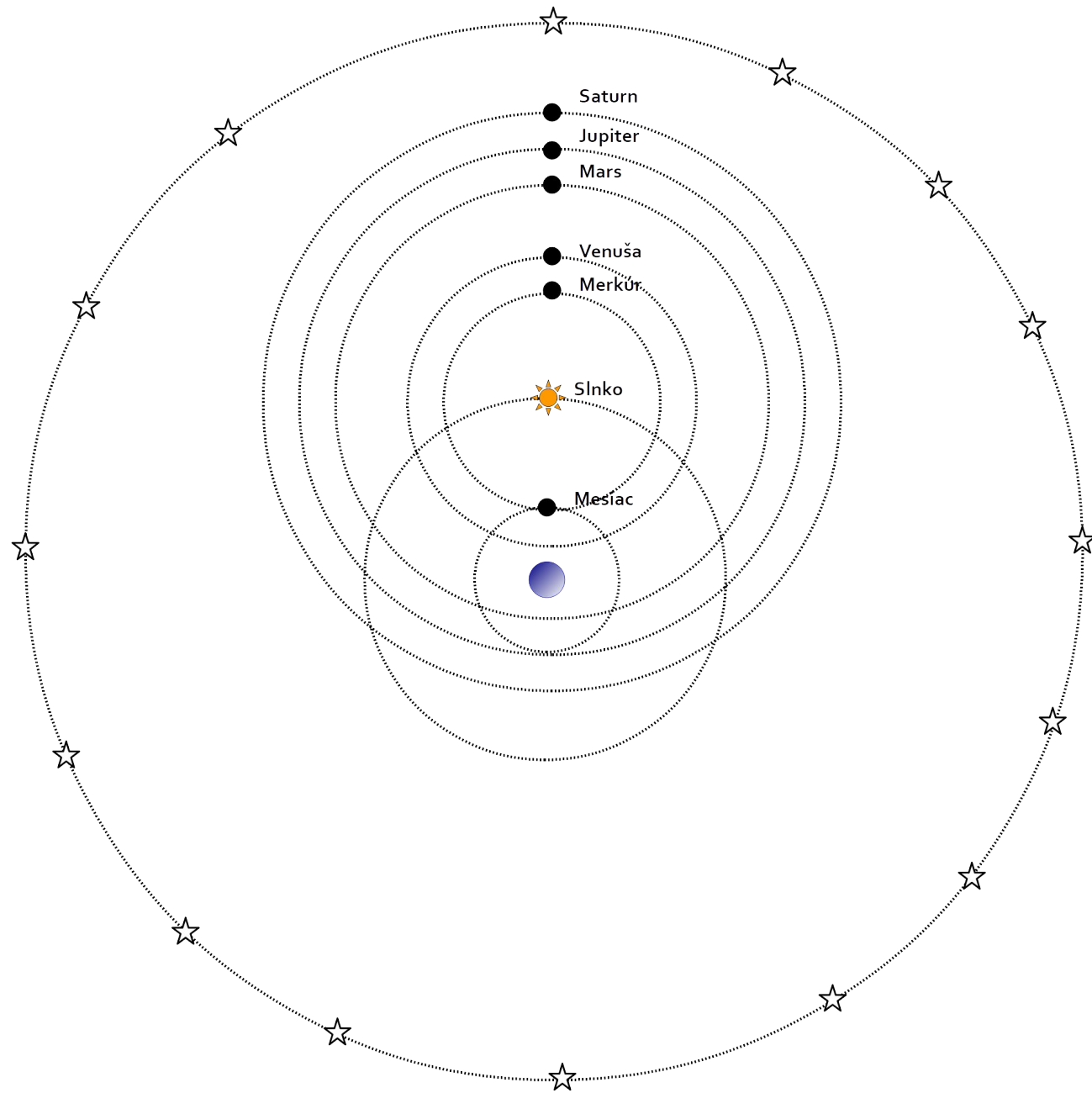
- Pozoroval supernovu – 1572.
- Pozoroval kométu – 1577.



Tycho Brahe

- Pozoroval supernovu – 1572.
- Pozoroval kométu – 1577.
- Famózne presné astronomické merania.





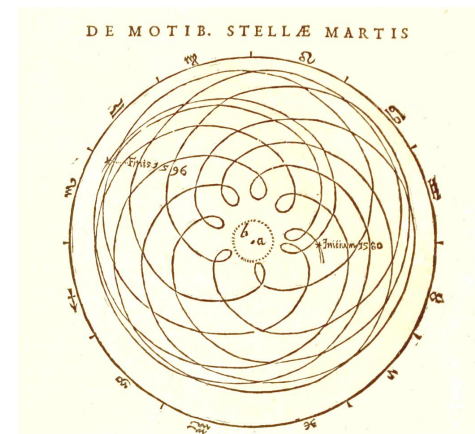
Johannes Kepler



Johannes Kepler

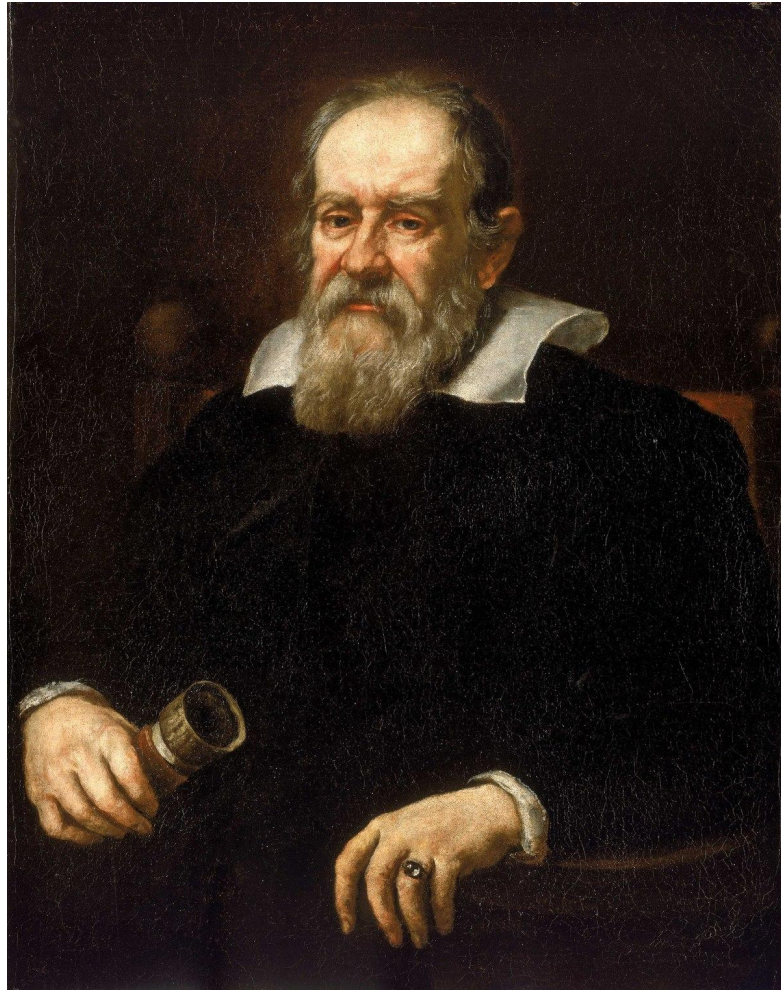


- Zákony planetárneho pohybu (1609):
 - Dráhy sú elipsy so spoločným ohniskom v Slnku.
 - Čosi o rýchlosti obiehania jednotlivých planét.
 - Čosi o vzťahu medzi obiehaním rôznych planét.



Galilei





Galileo Galilei
1564 – 1642



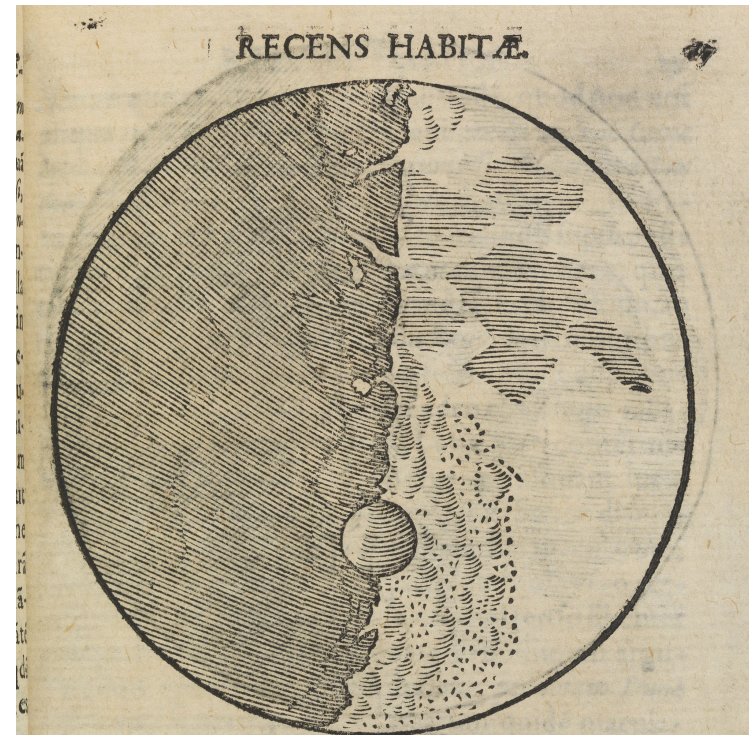
Galileo Galilei

- Ďalekohľad:



Galileo Galilei

- Ďalekohľad:
 - Mesiac má krajinu – 1609,



Galileo Galilei

- Ďalekohľad:
 - Mesiac má krajinu – 1609,
 - Jupiter má mesiace – 1610,



Galileo Galilei

- Ďalekohľad:
 - Mesiac má krajinu – 1609,
 - Jupiter má mesiace – 1610,
 - Venuša má fázy – 1610.



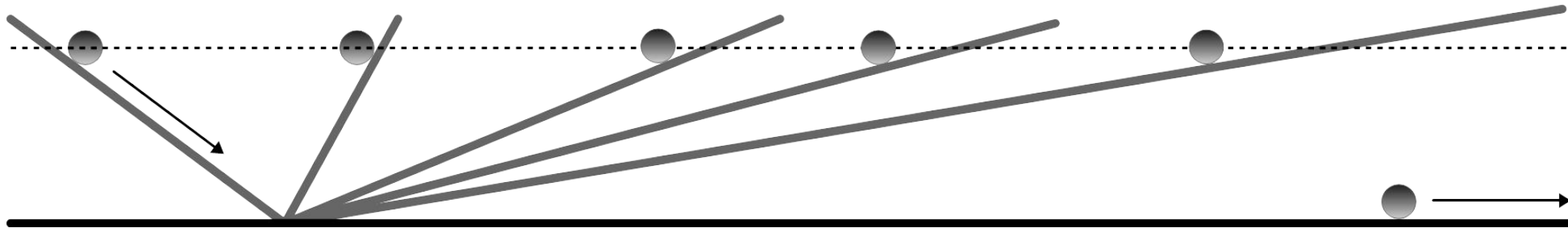
Galileo Galilei

- Ťažšie telesá nepadajú rýchlejšie ako ľahšie – 1589.



Galileo Galilei

- Ťažšie telesá nepadajú rýchlejšie ako ľahšie.
- Zákon zotrvačnosti.

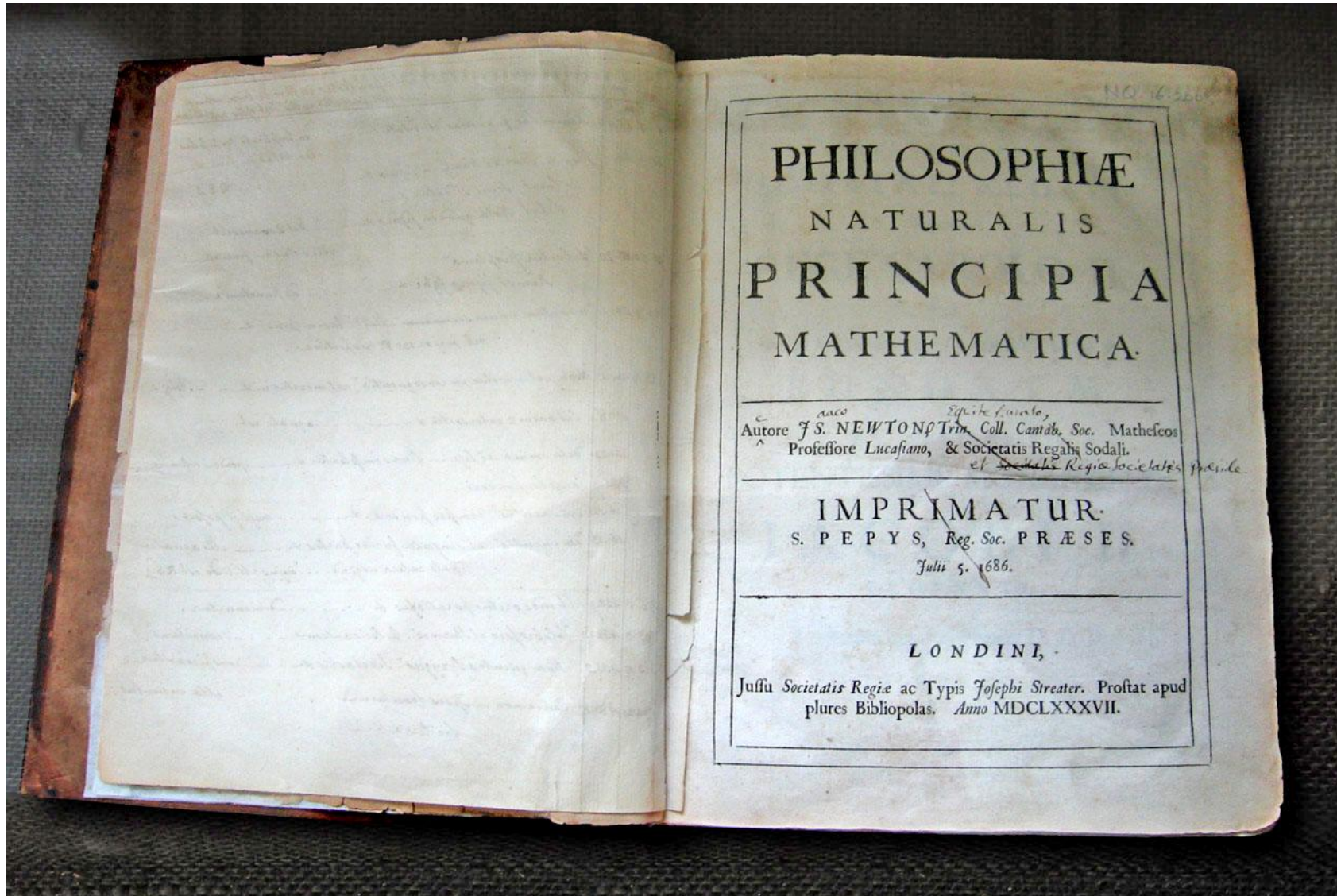






Philosophiæ Naturalis Principia Mathematica





PHILOSOPHIÆ
NATURALIS
PRINCIPIA
MATHEMATICA.

Autore ^{nao} J. S. NEWTON ^{Equitis Cantab.} Trin. Coll. Cantab. Soc. Matheseos
Professore ^{Lucasiano,} & Societatis Regiæ Sodali.
~~et Societatis Regiæ Societatis præside~~

IMPRIMATUR.
S. PEPYS, Reg. Soc. PRÆSES.
Julii 5. 1686.

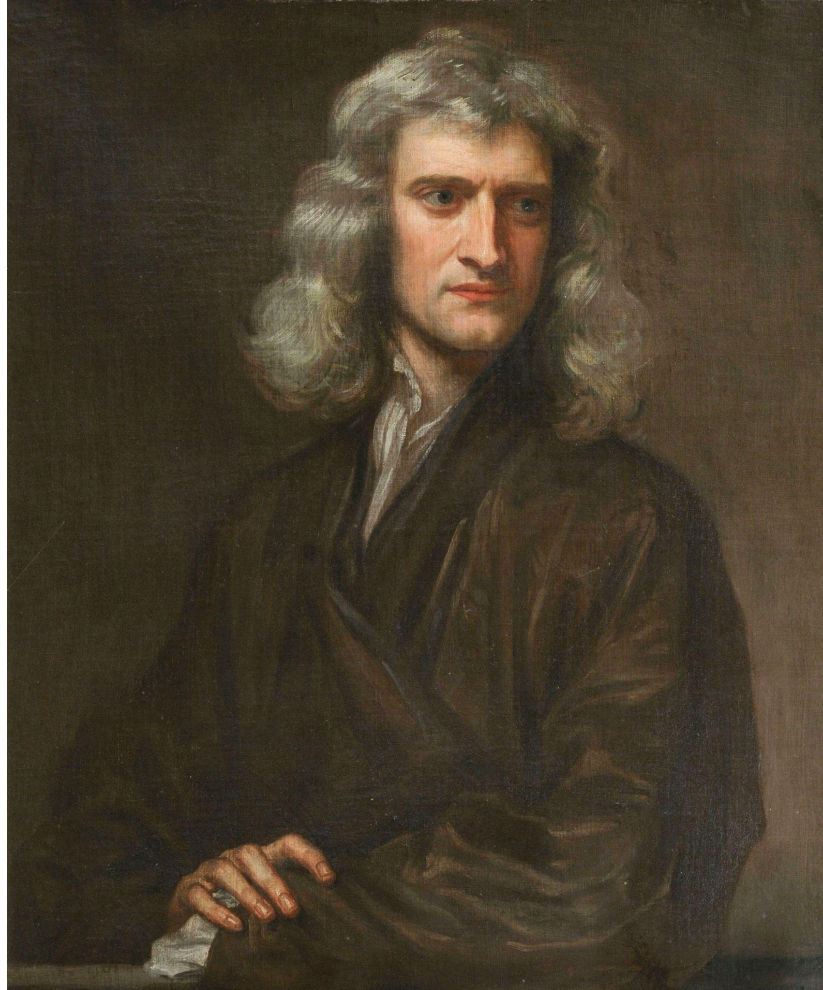
LONDINI,

Jussu Societatis Regiæ ac Typis Josephi Streater. Prostat apud
plures Bibliopolas. Anno MDCLXXXVII.



Philosophiæ Naturalis Principia Mathematica

1687



Isaac Newton
1642 – 1727

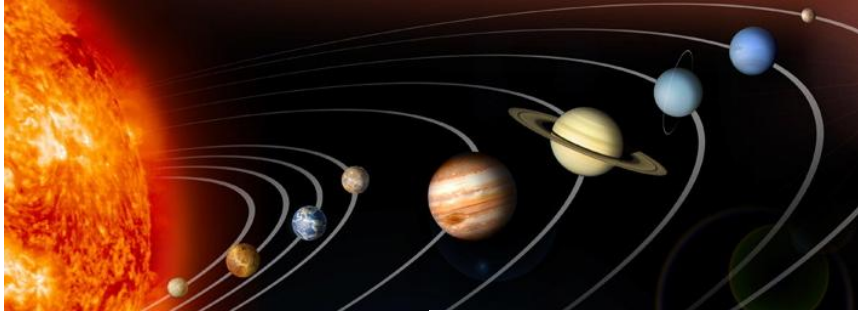




$$\vec{F} = \frac{Gm_1m_2}{r^2} \frac{\vec{r}}{r}$$

$$\vec{F} = m\vec{a}$$

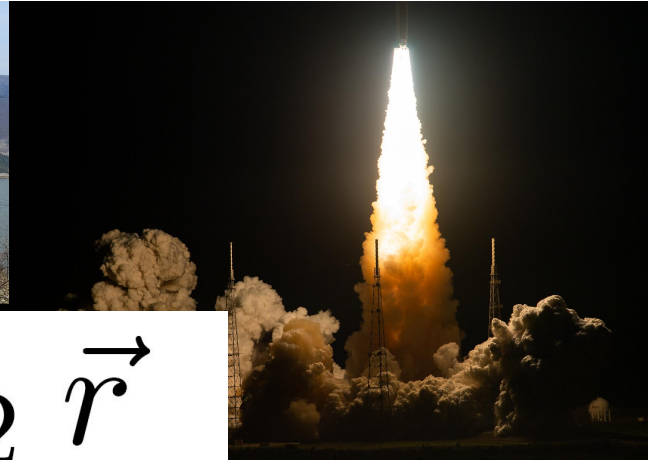




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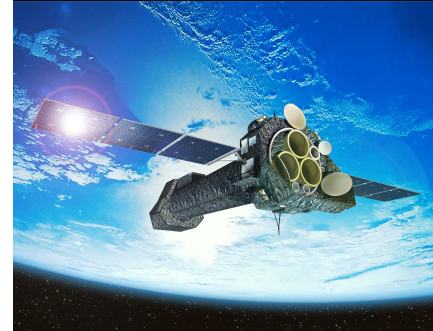




$$\vec{F} = \frac{Gm_1m_2}{r^2} \frac{\vec{r}}{r}$$



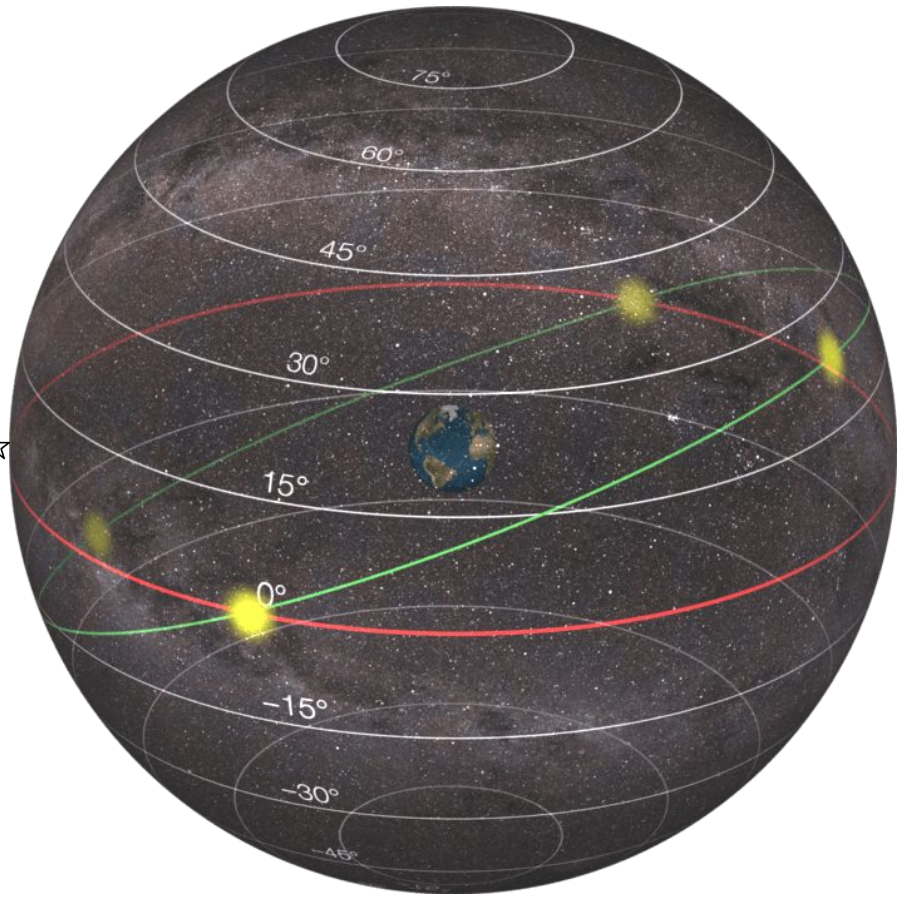
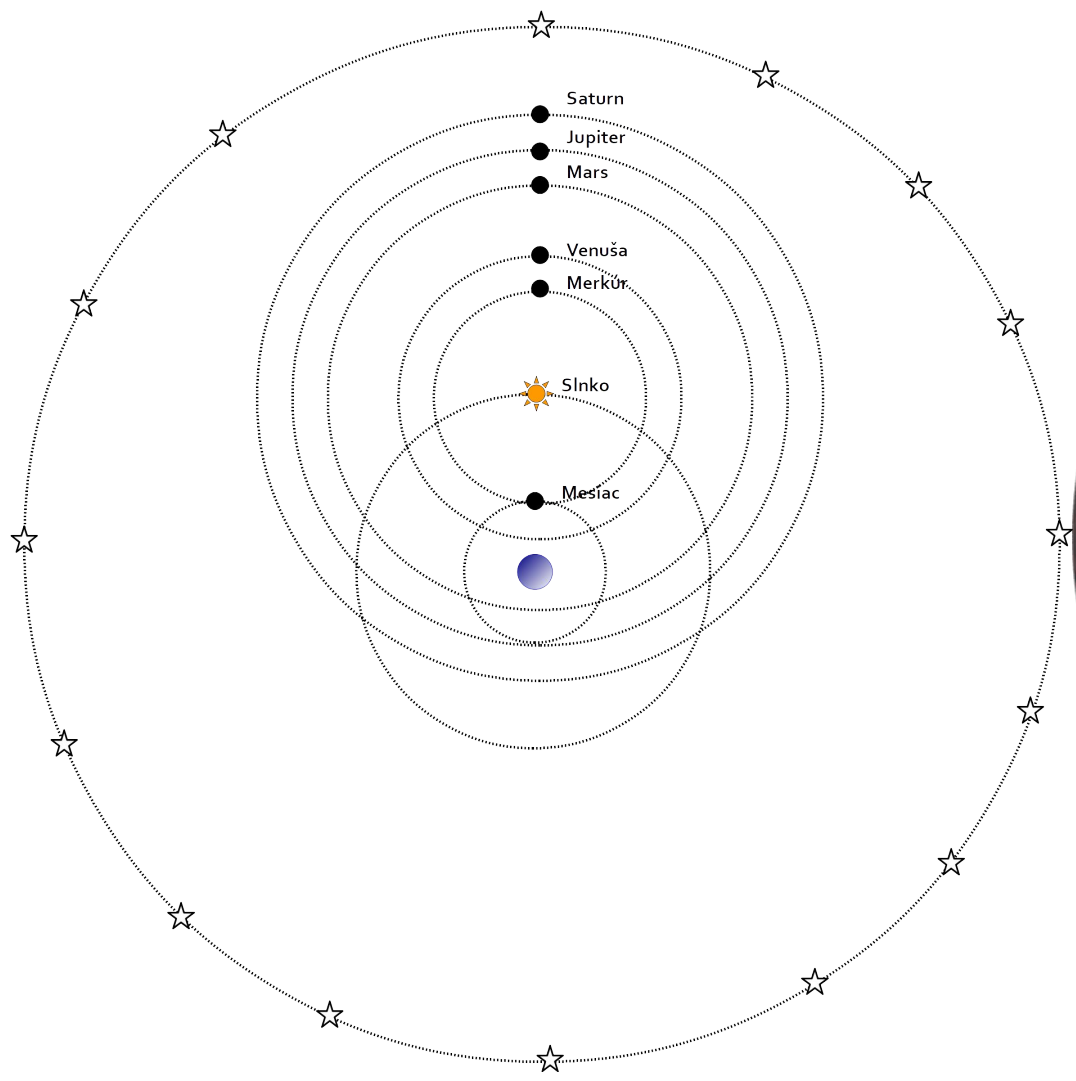
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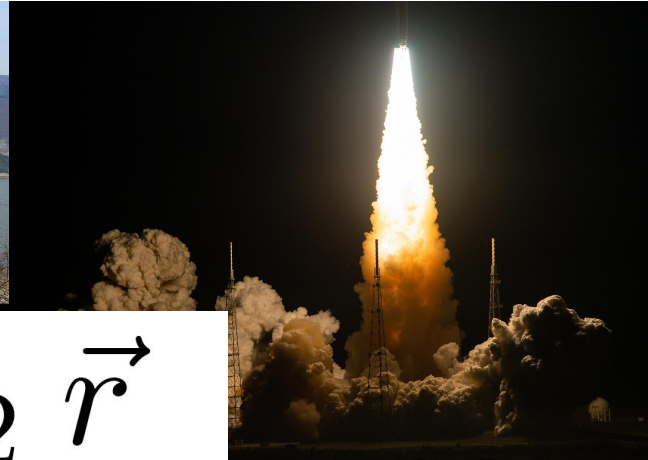
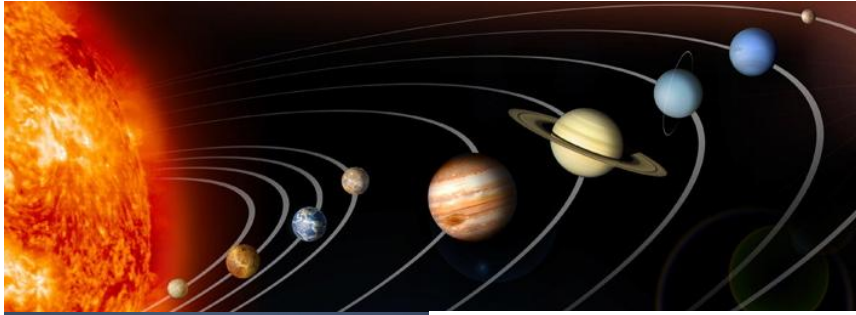


Inerciálne a neinerciálne vzťažné sústavy



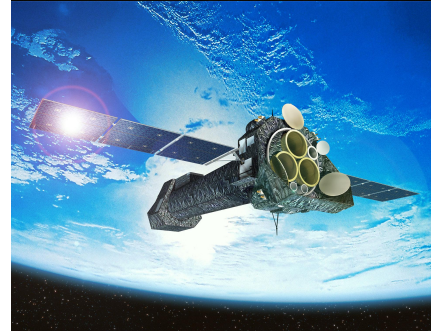


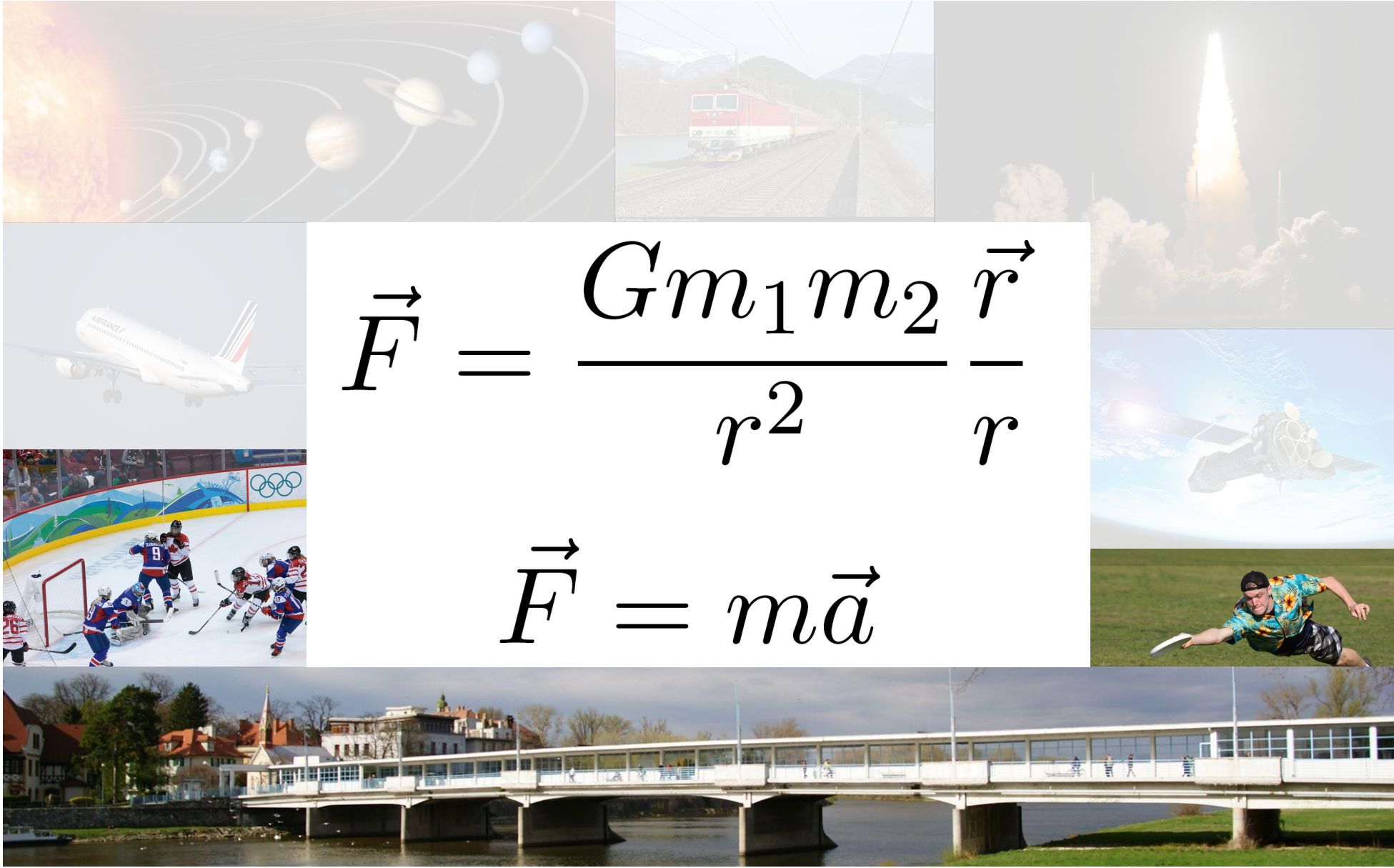




$$\vec{F} = \frac{Gm_1m_2}{r^2} \frac{\vec{r}}{r}$$

$$\vec{F} = m\vec{a}$$

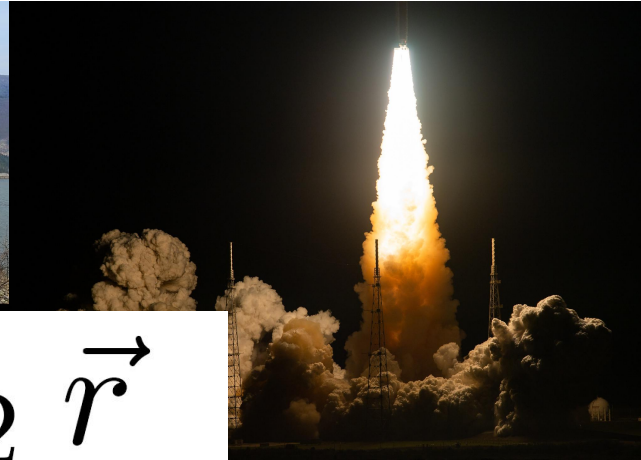
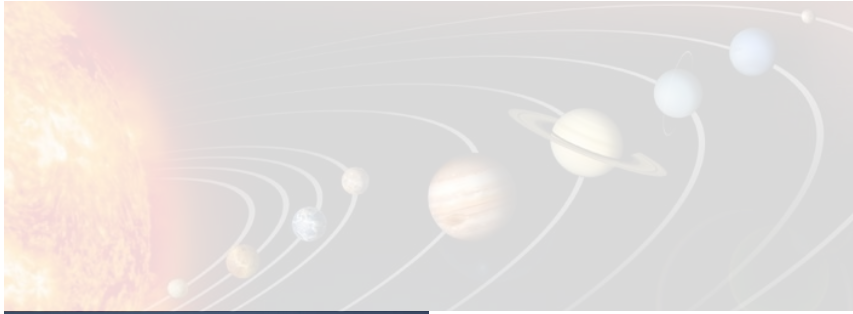




$$\vec{F} = \frac{Gm_1m_2}{r^2} \frac{\vec{r}}{r}$$

$$\vec{F} = m\vec{a}$$



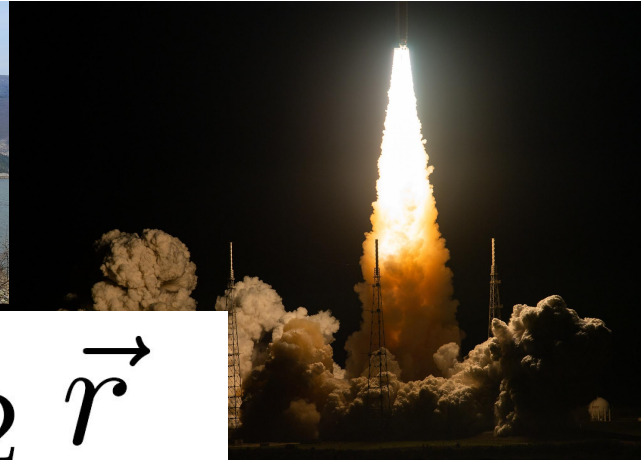
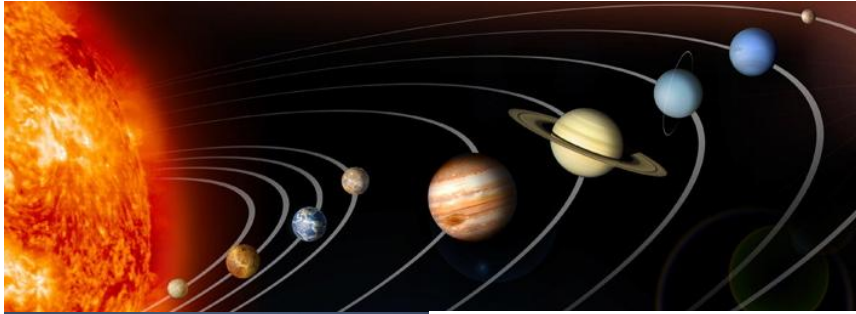


$$\vec{F} = \frac{Gm_1m_2}{r^2} \frac{\vec{r}}{r}$$



$$\vec{F} = m\vec{a}$$



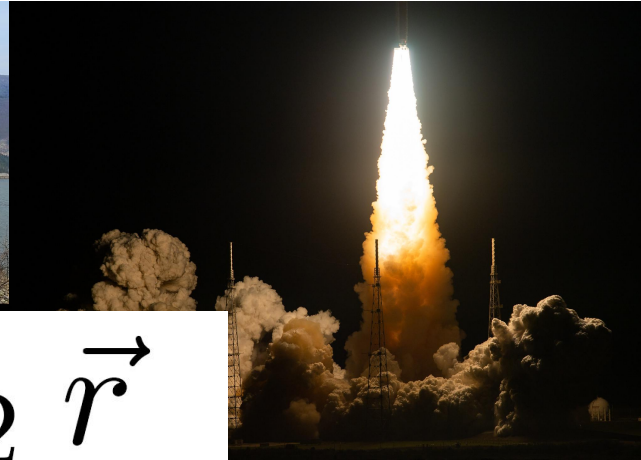
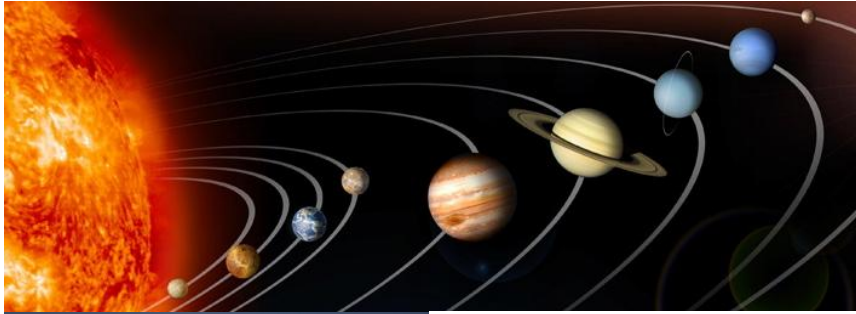


$$\vec{F} = \frac{Gm_1m_2}{r^2} \frac{\vec{r}}{r}$$



$$\vec{F} = m\vec{a}$$





$$\vec{F} = \frac{Gm_1m_2}{r^2} \frac{\vec{r}}{r}$$



$$\vec{F} = m\vec{a}$$



Reklama

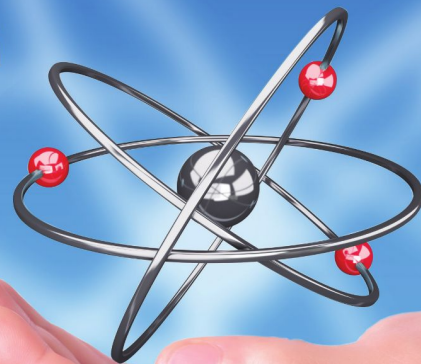


Quark

Magazín o vede a technike

2/2019
1,89 €

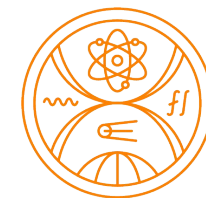
Talent má
každý



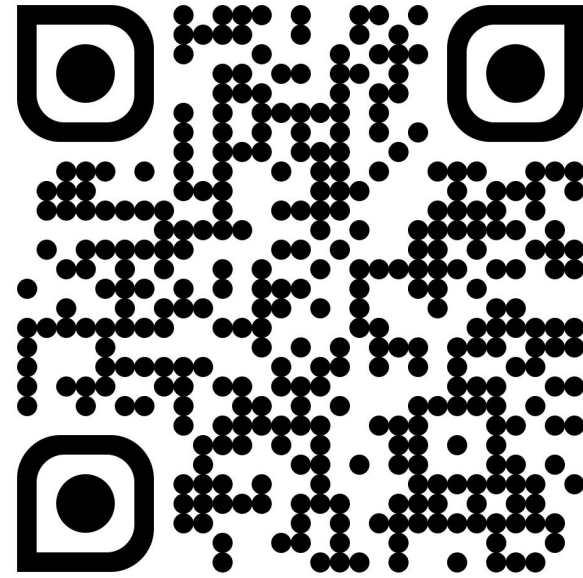
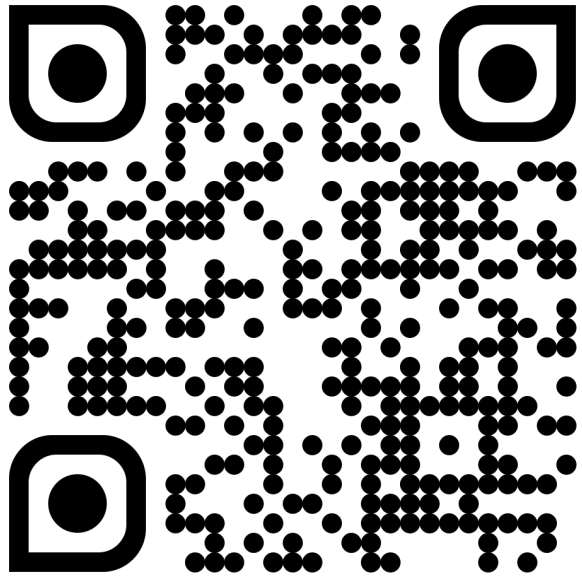
Predkovia
z výšok

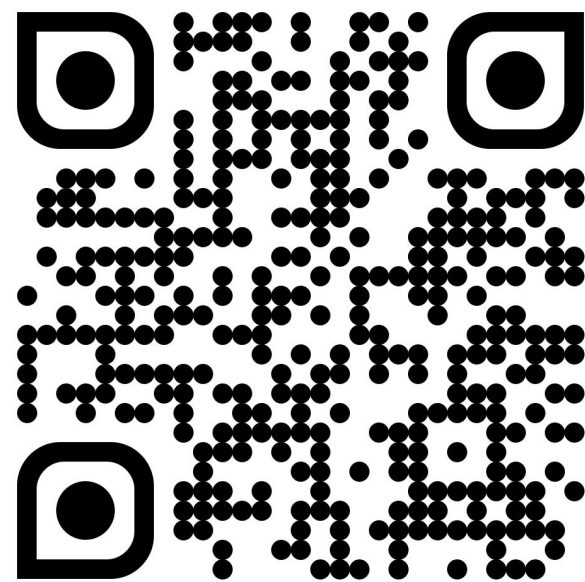
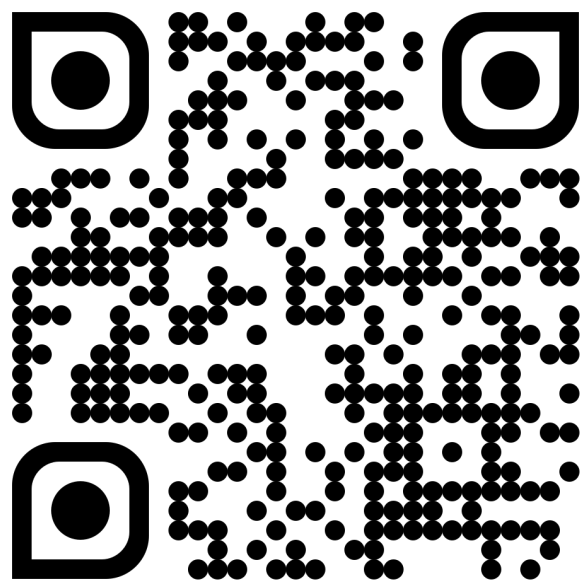
Krajina
vytvorená
Váhom

DELITEĽNOSŤ
NEDELITEĽNÝCH









Ďakujem za
pozornosť!

