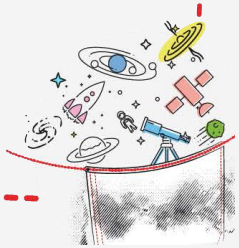
11 maggio 2020

Stelle e galassie

ma anche buchi neri, nebulose e…
oroscopi

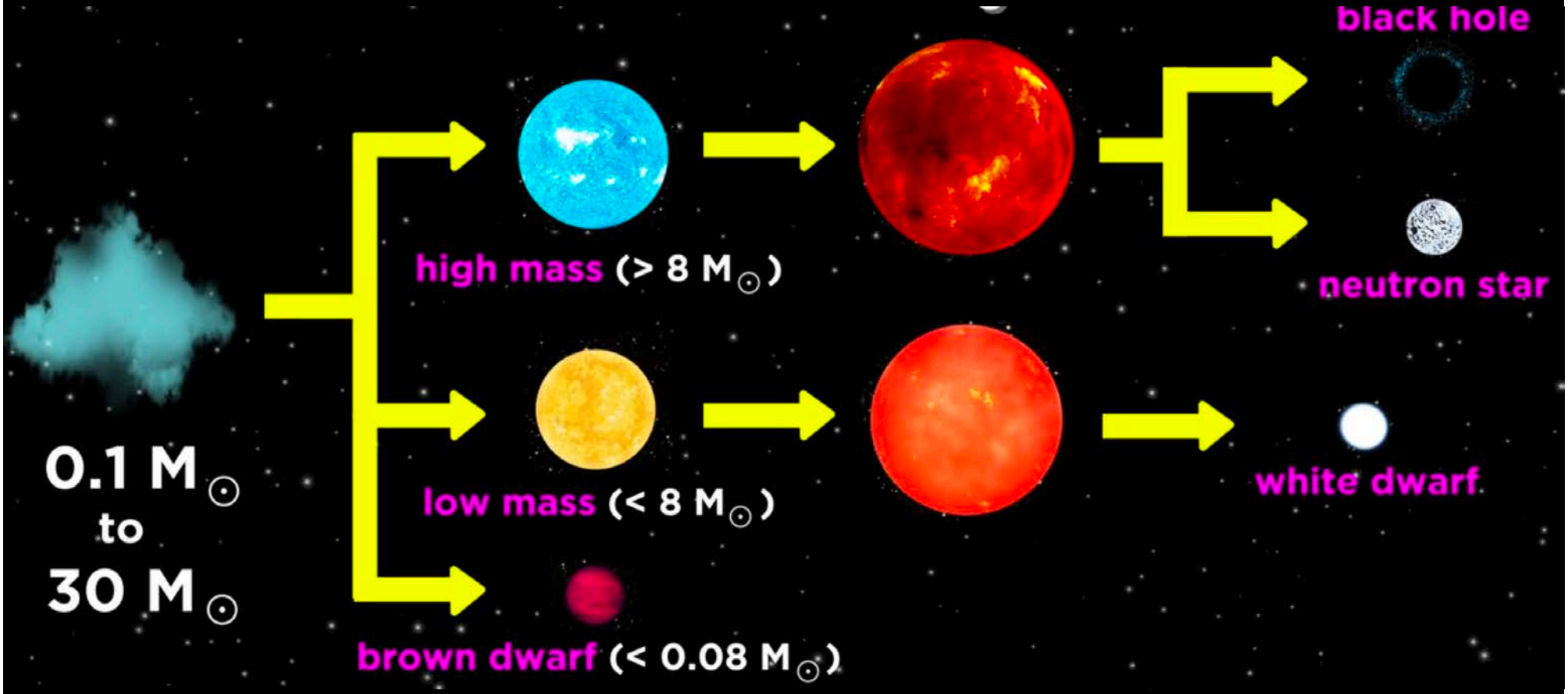


Istituto Nazionale di Fisica Nucleare
LABORATORI NAZIONALI DI FRASCATI

Barbara Sciascia

Vita da stelle

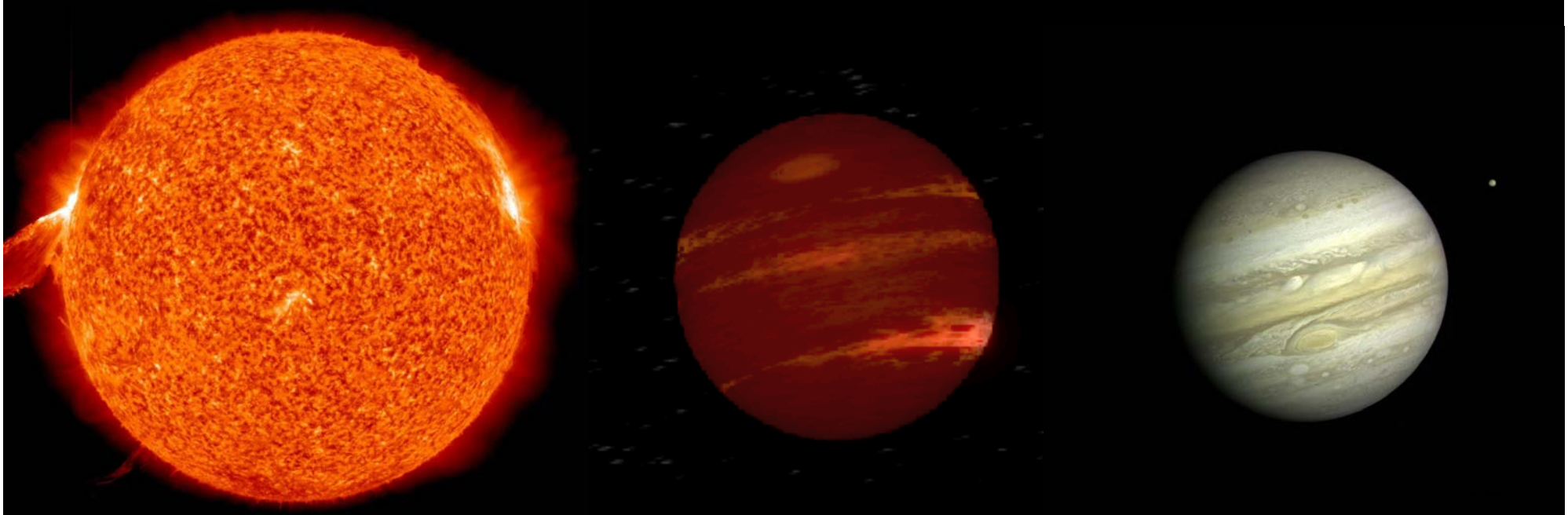
$M_\odot$: massa del Sole



[Credits: https://www.youtube.com/channel/UC0cd_-e49hZpWLH3UIwoWRA]

Nane brune

[NASA/JPL]

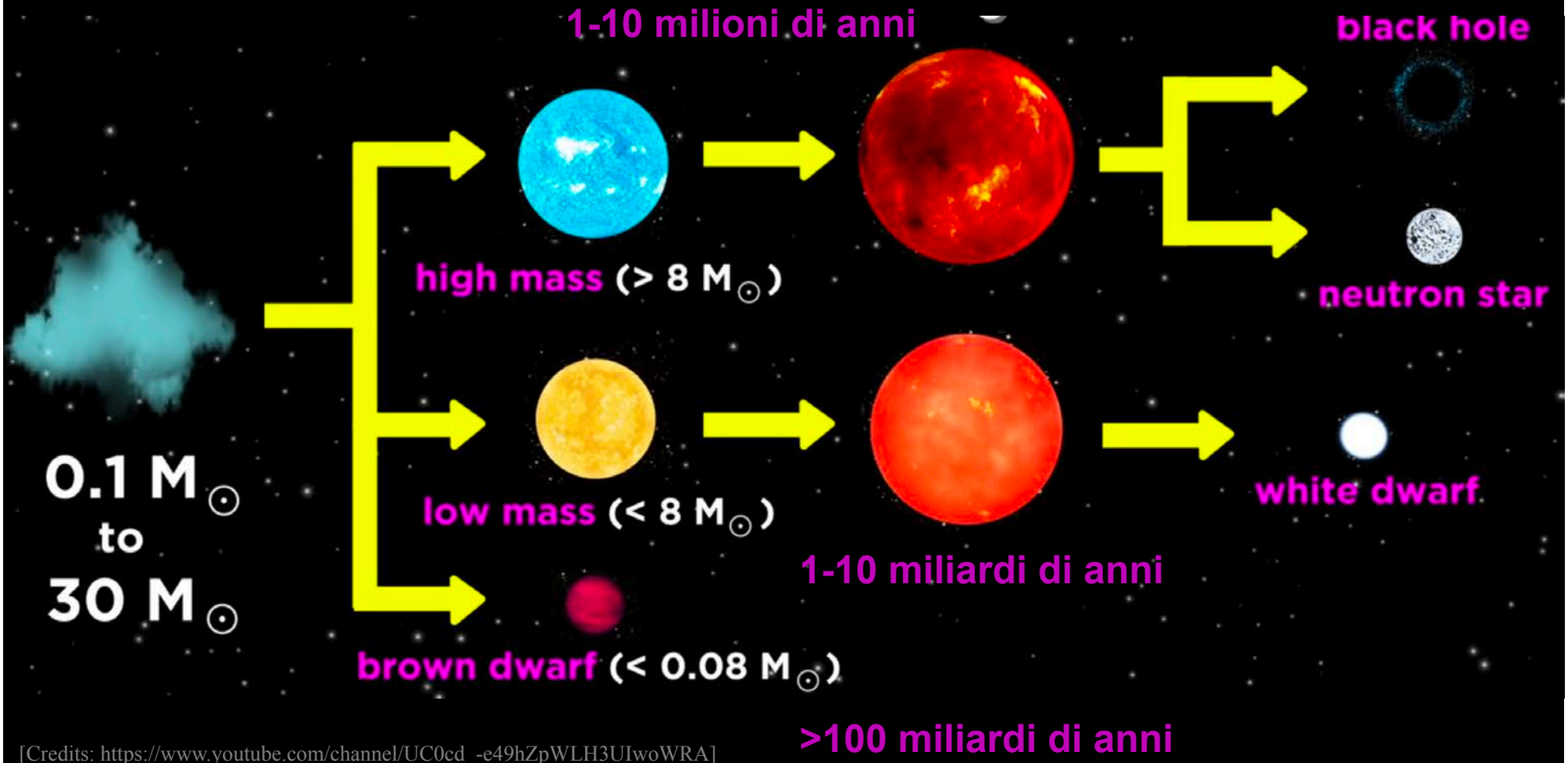


Stella (Sole)

Pianeta gassoso (Giove)

Vita da stelle

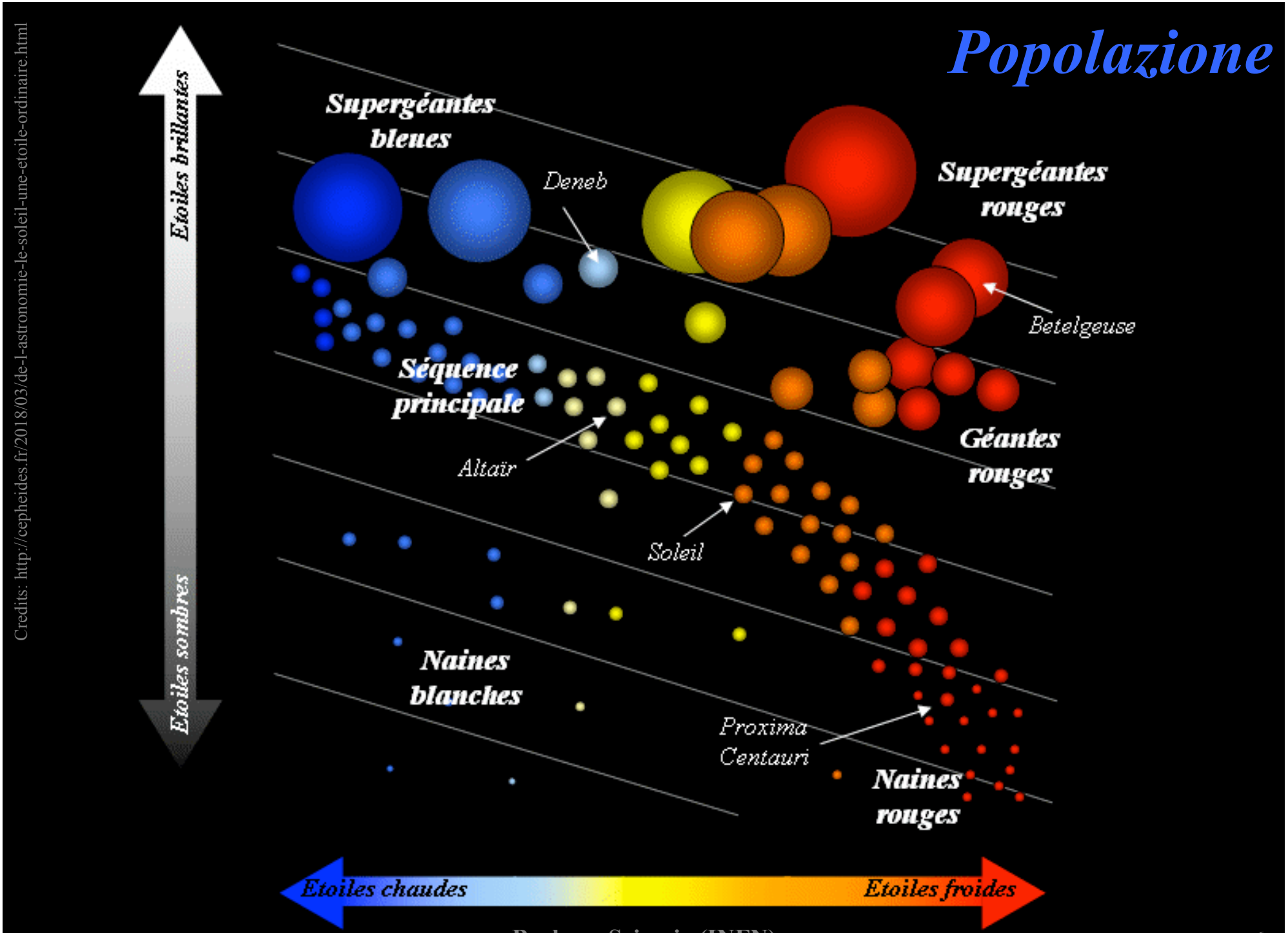
$M_\odot$: massa del Sole



[Credits: https://www.youtube.com/channel/UC0cd_-e49hZpWLH3UIwoWRA]

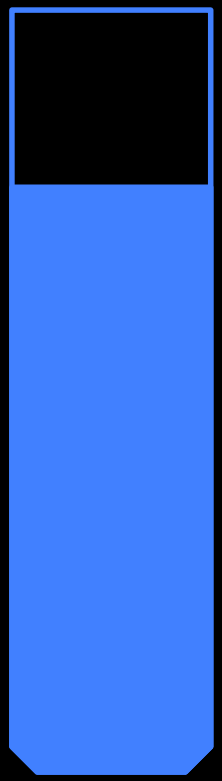
Popolazione

Popolazione

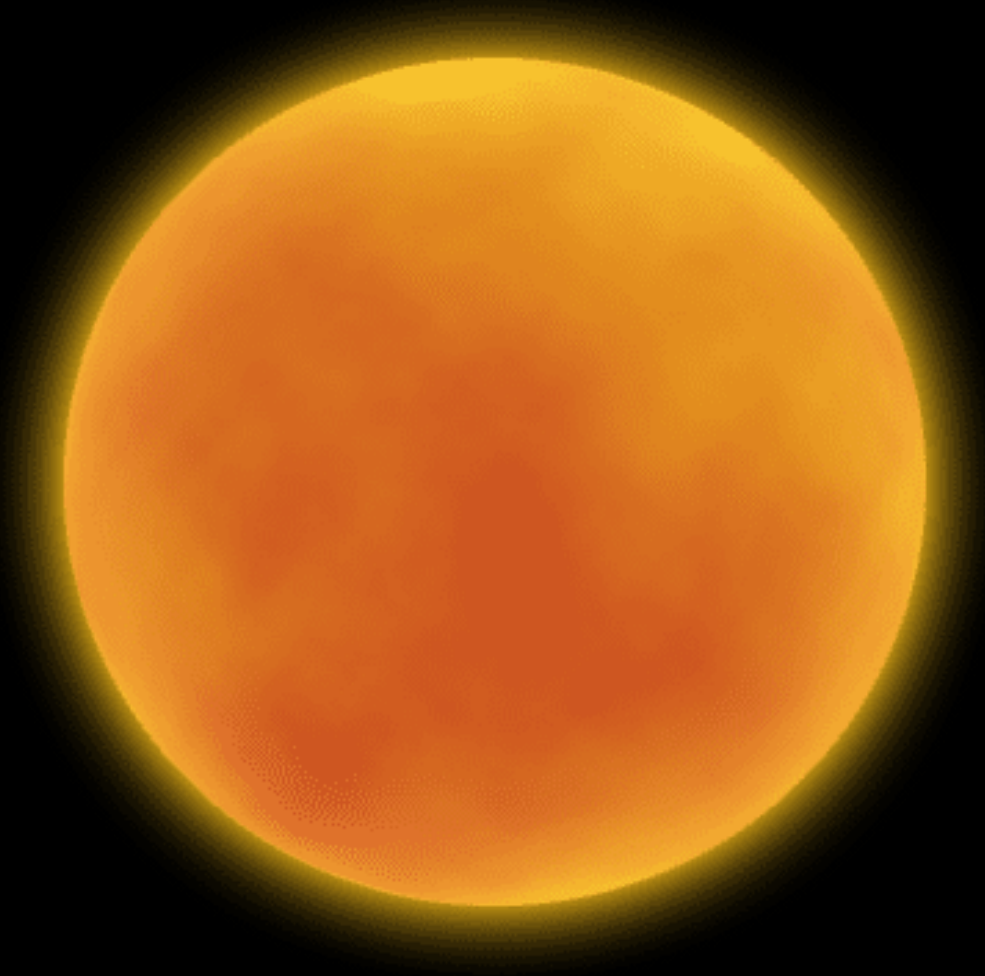


Credits: http://cepheides.fr/2018/03/de-l-astronomie-le-soleil-une-etoile-ordinaire.html

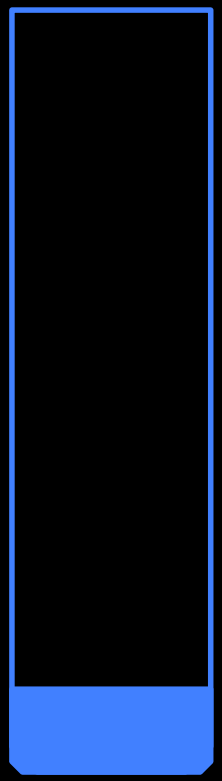
Fornaci stellari



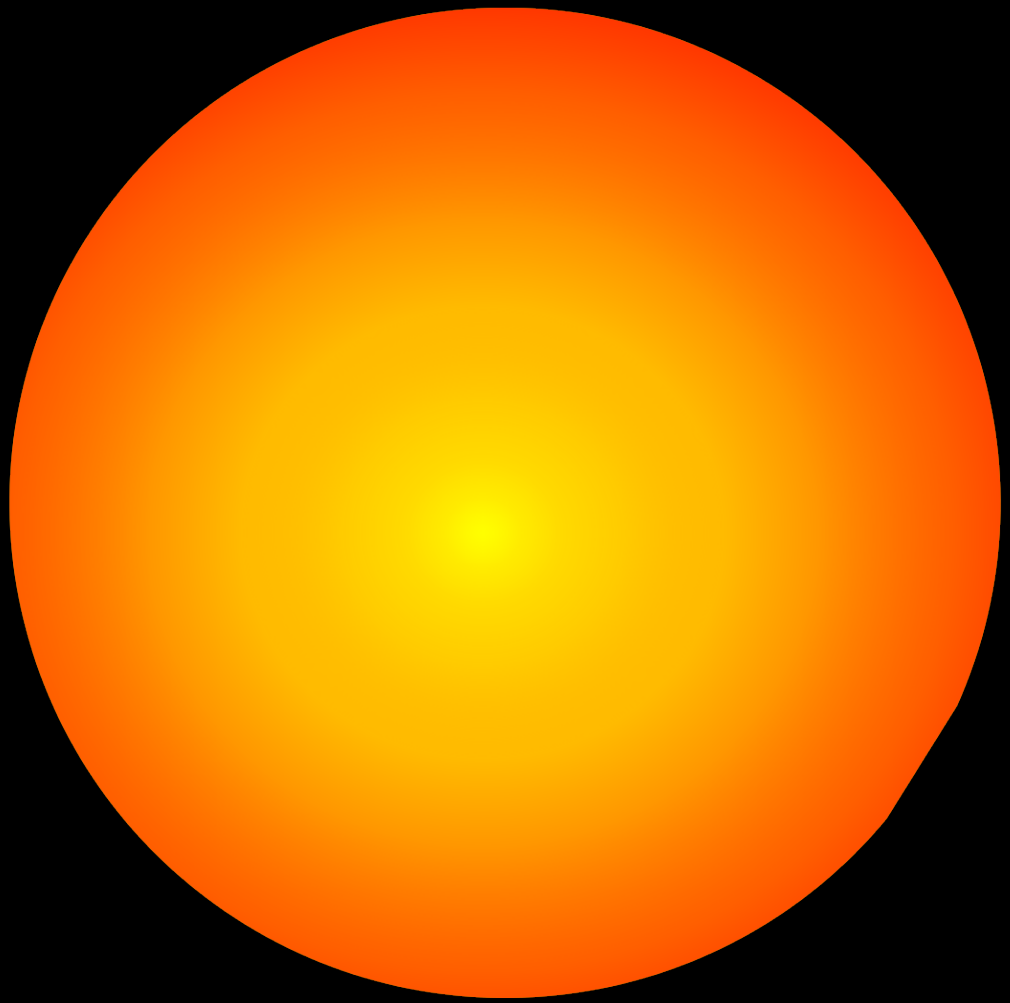
H
(idrogeno)



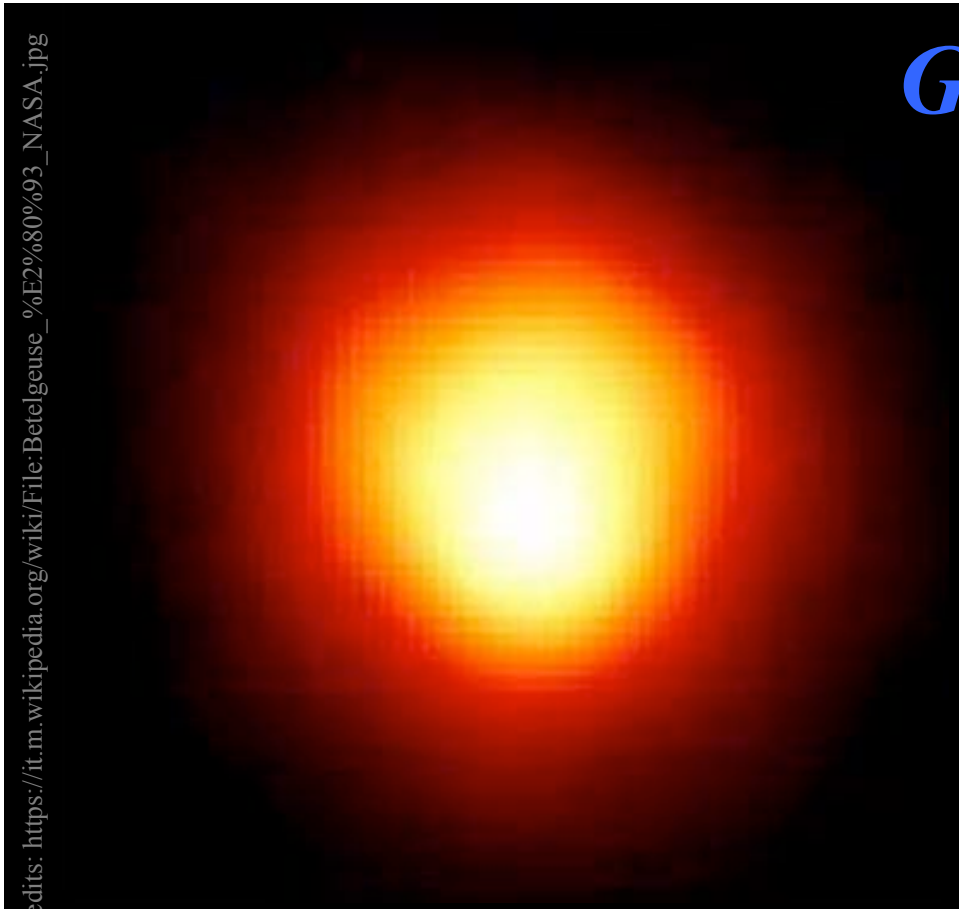
Fornaci stellari



H
(idrogeno)



Giganti rosse (Betelgeuse)

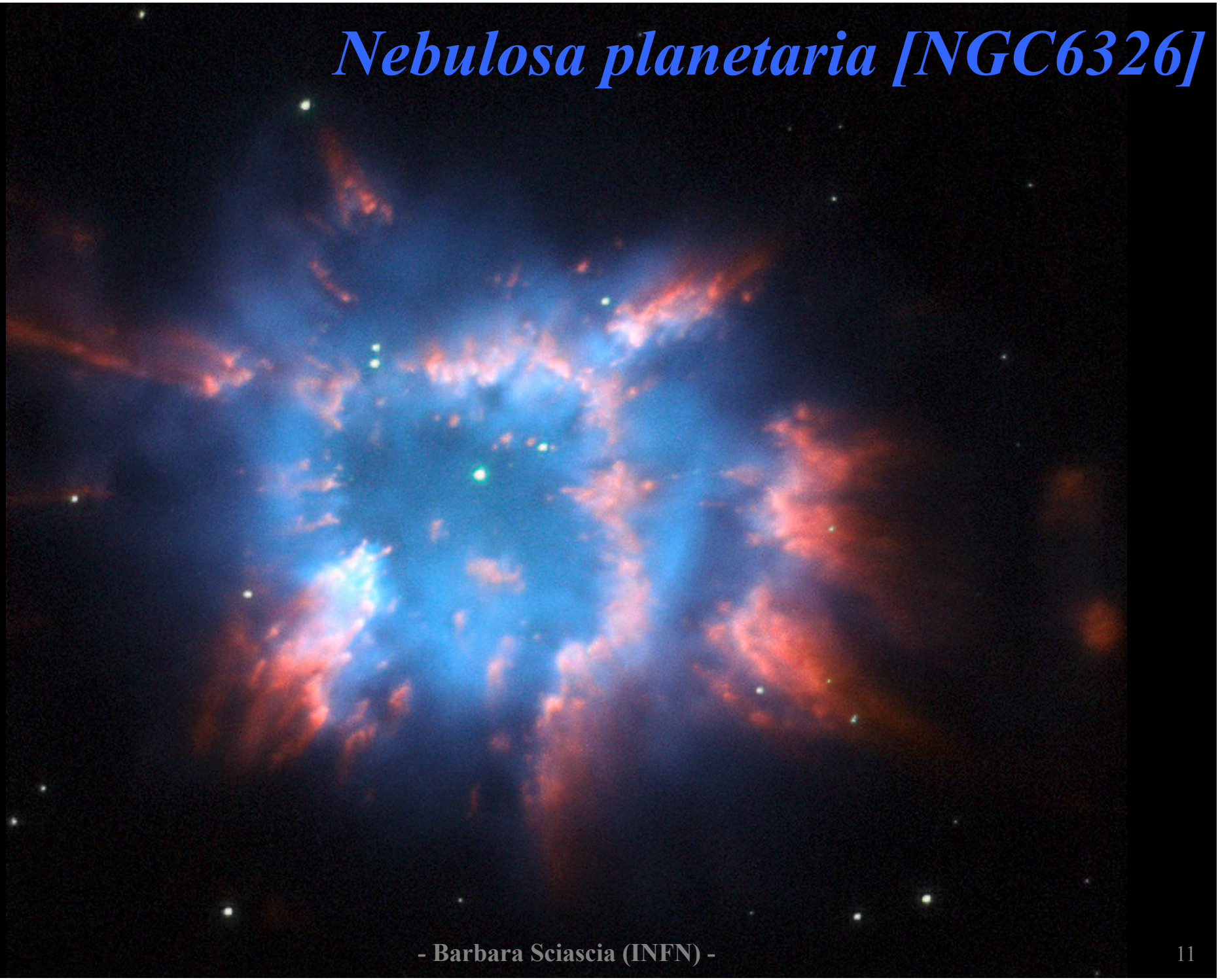


Credits: https://it.m.wikipedia.org/wiki/File:Betelgeuse_%E2%80%93_NASA.jpg

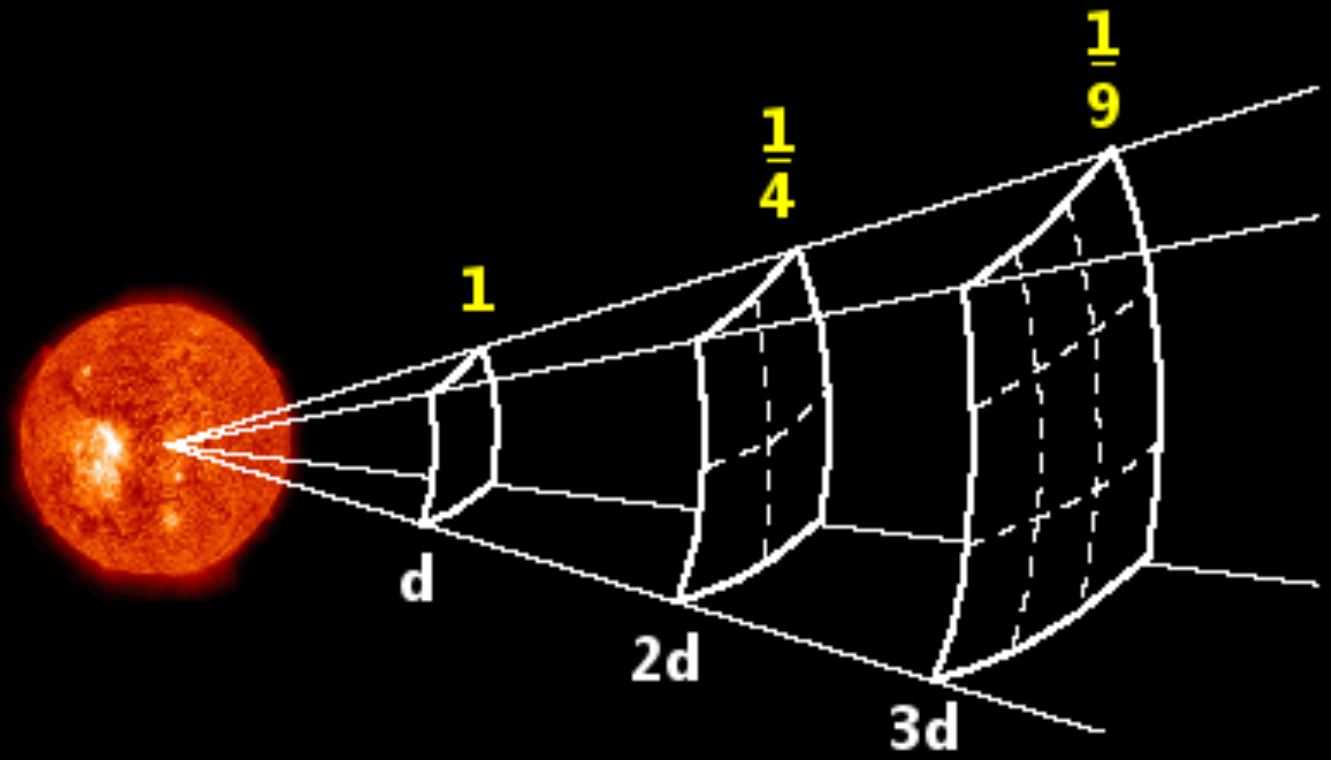
Nebulosa planetaria [NGC7293]

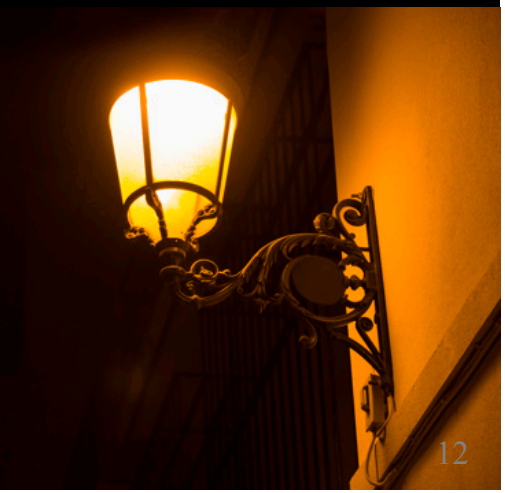
Credits: The HST data , https://commons.wikimedia.org/w/index.php?curid=1721117

Nebulosa planetaria [NGC6326]

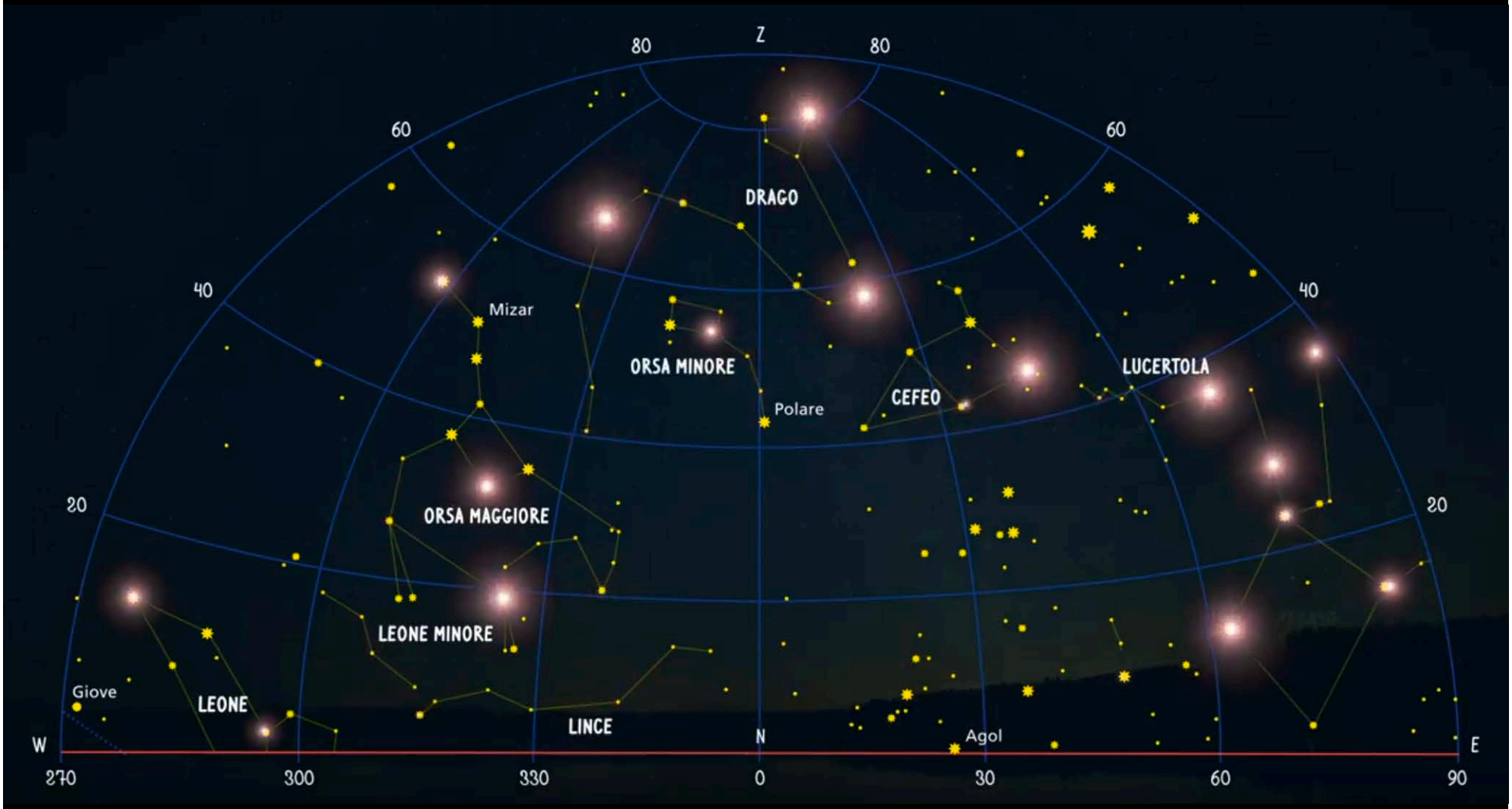


Intermezzo: costellazioni





Intermezzo: costellazioni



Di oroscopi e di mucche

Problema: data una mucca e un pianeta/stella di distanza e massa noti, ***calcolare la distanza*** *a cui la mucca e il pianeta/stella esercitano su di te la stessa forza. (usare* m_{MUCCA} *= 1000 Kg)*

m_1 = tu
m_2 = pianeta/stella
r = distanza pianeta/stella

$$F_g = G \frac{m_1 m_2}{r^2}$$

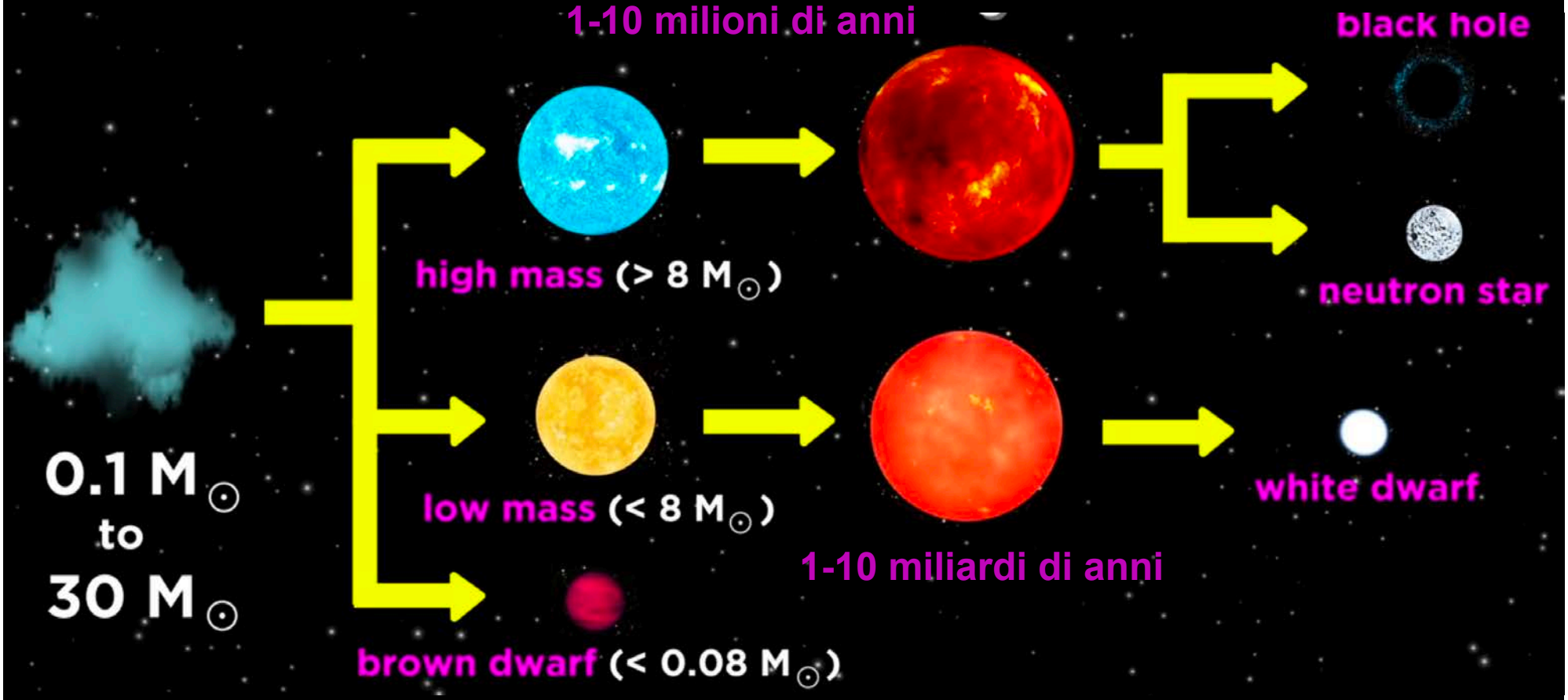
m_1 = tu
m_2 = la mucca
r = ?

Risposte:

Pianeta/ stella	Distanza da una mucca
Jupiter	0.57 m
Venus	2.45 m
Mars	10.06 m
Regulus	7.81 km
Alpha Centauri	28.70 km

Vita da stelle

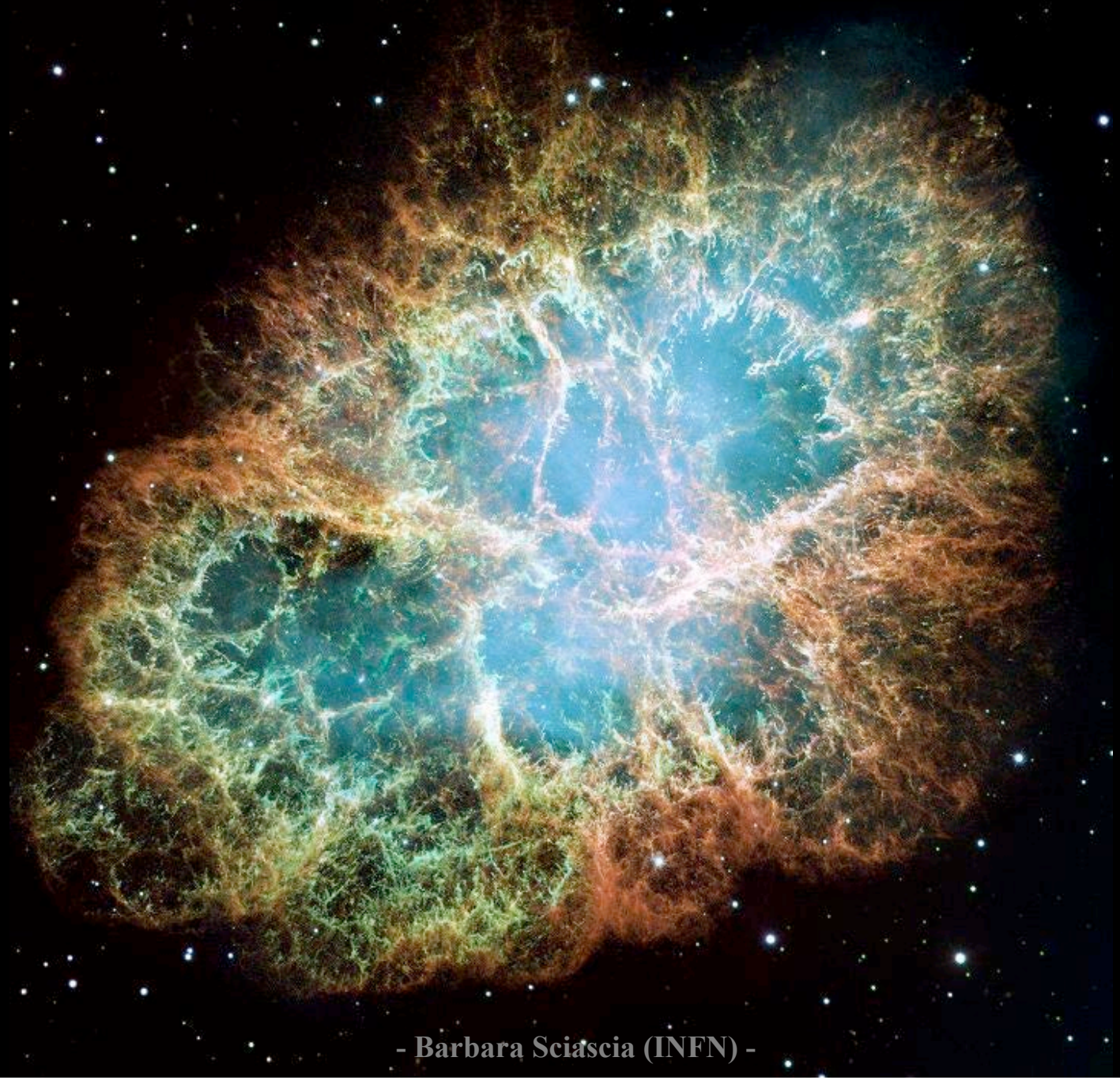
$M_\odot$: massa del Sole



[Credits: https://www.youtube.com/channel/UC0cd_-e49hZpWLH3UIwoWRA]

Supernova [SN1994D]

Nebulosa del Granchio, SN1054



Credits: Di NASA, ESA, J. Hester and A. Loll (Arizona State University) - HubbleSite: gallery, release., Pubblico dominio, https://commons.wikimedia.org/w/index.php?curid=516106

Nebulosa del Granchio e Betelgeuse

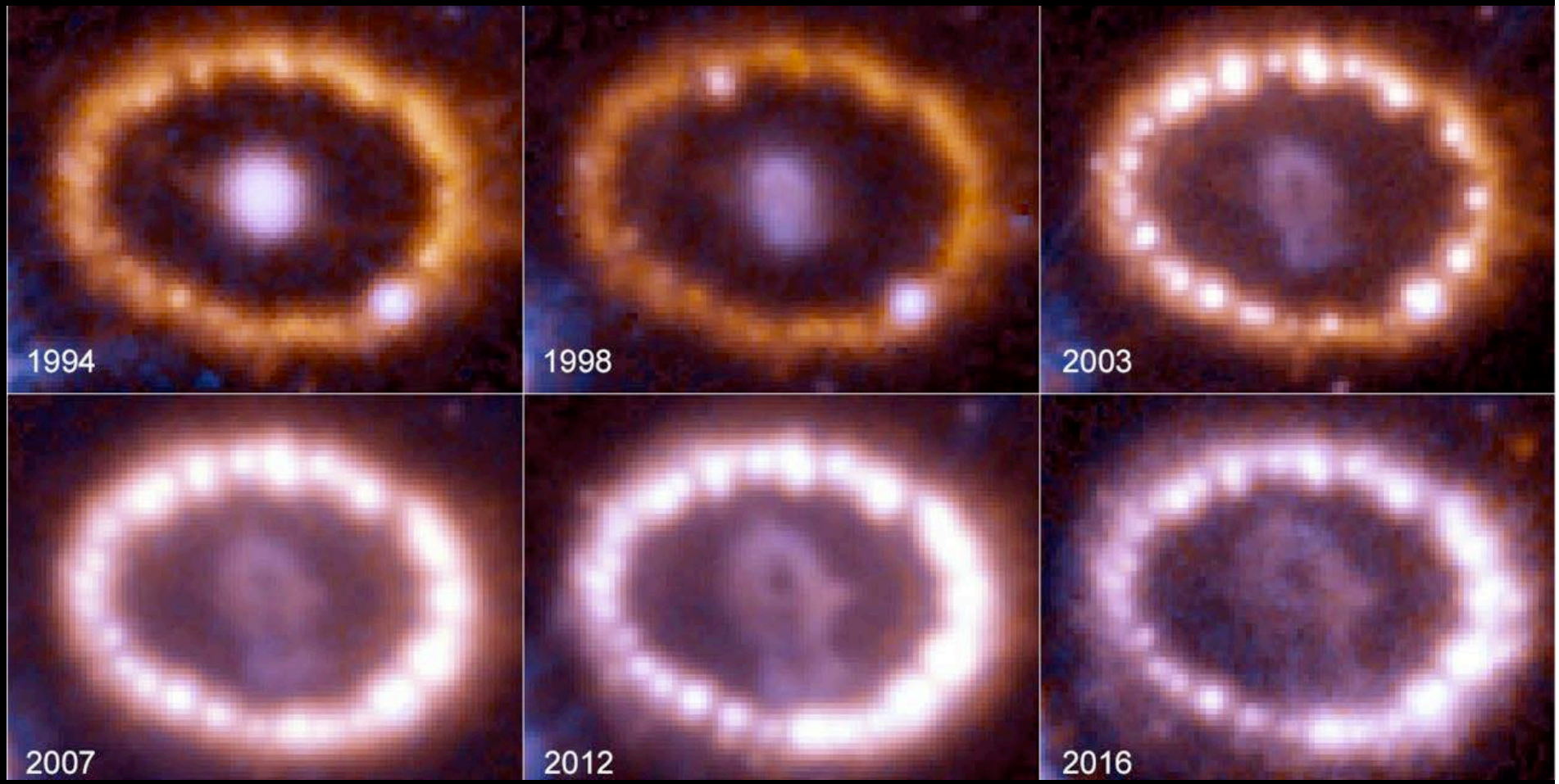
Credits: https://stellarium.org/

SN 1987 A [Sanduleak]

Fonte: Serge Brunier, "Majestic Universe: Views from Here to Infinity", 1998

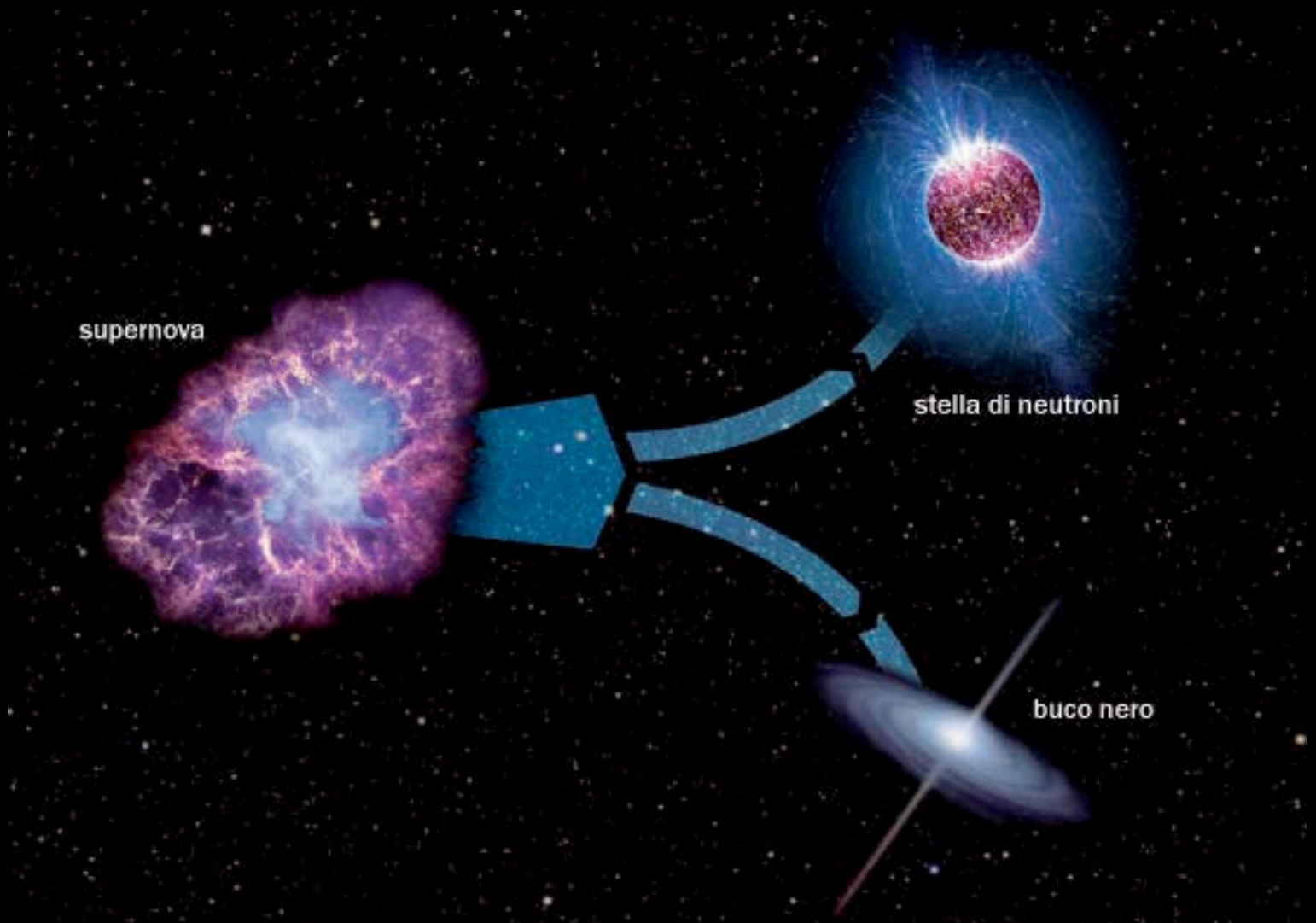
Fonte: Serge Brunier, "Majestic Universe. Views from Here to Infinity", 1998

SN 1987 A



Credits: NASA, ESA, and R. Kirshner (Harvard-Smithsonian Center for Astrophysics and Gordon and Betty Moore Foundation), and P. Challis (Harvard-Smithsonian Center for Astrophysics).

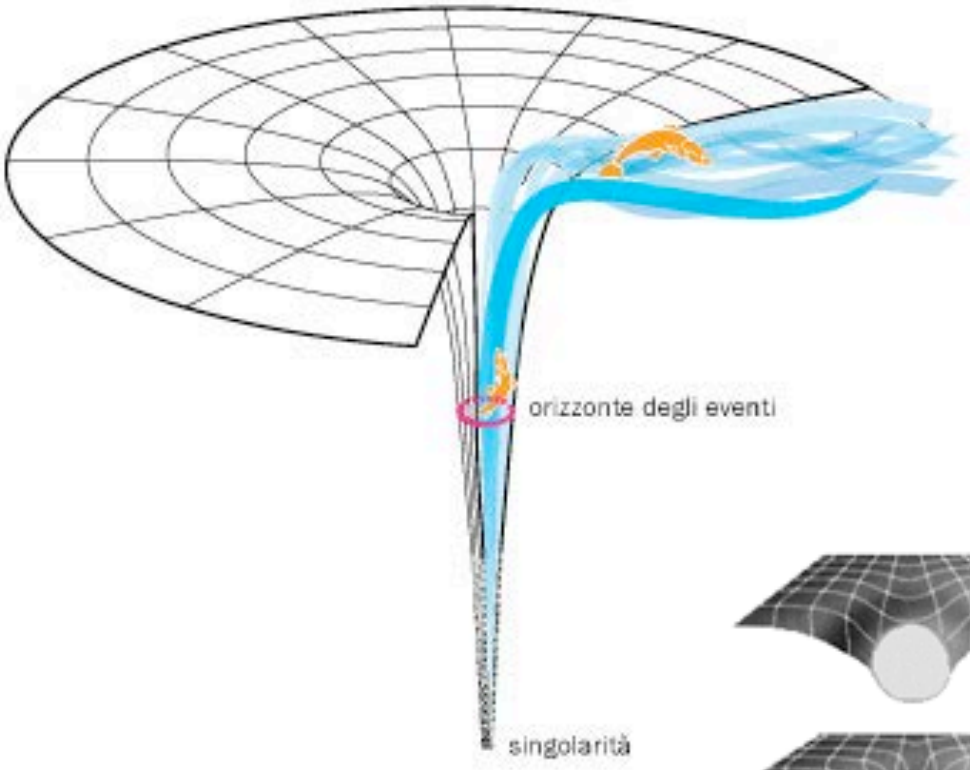
Quel che resta

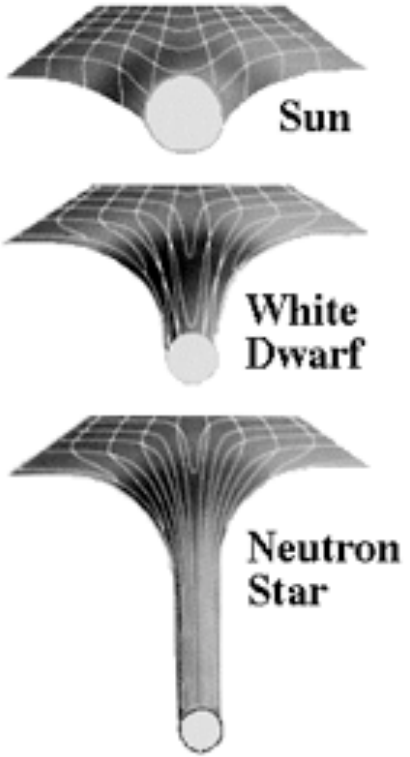


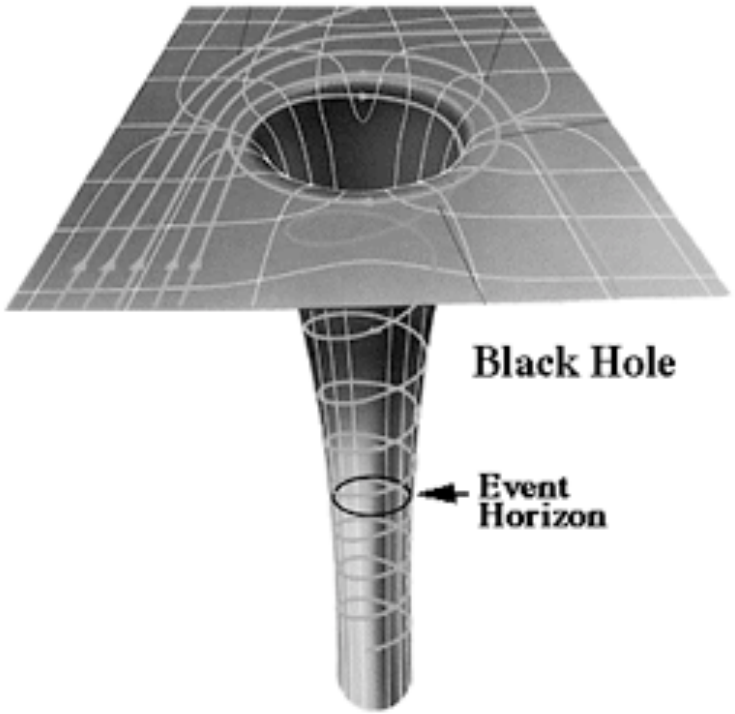
Credits: Asimmetrie

Buchi neri

Credits: Asimmetrie

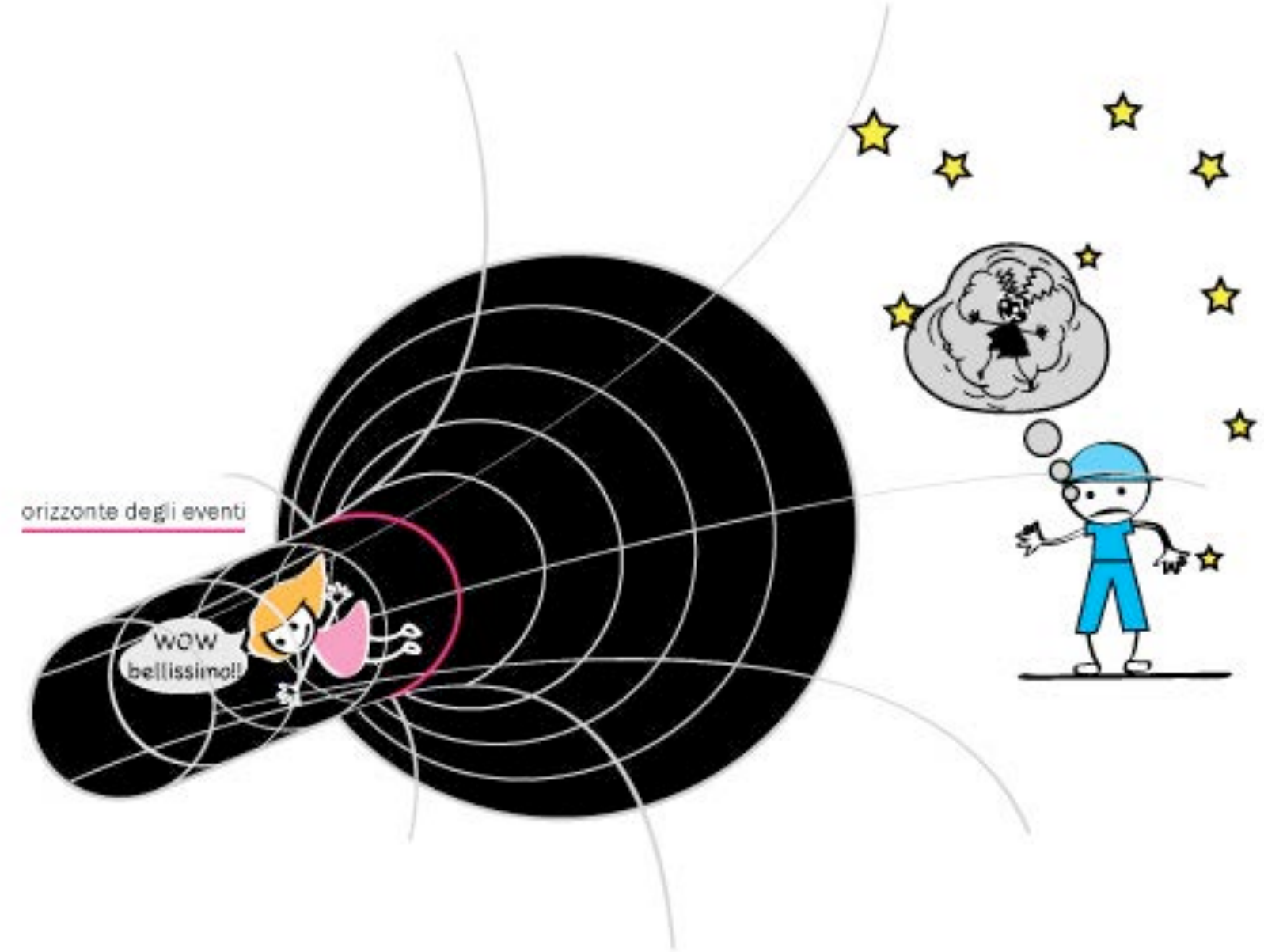




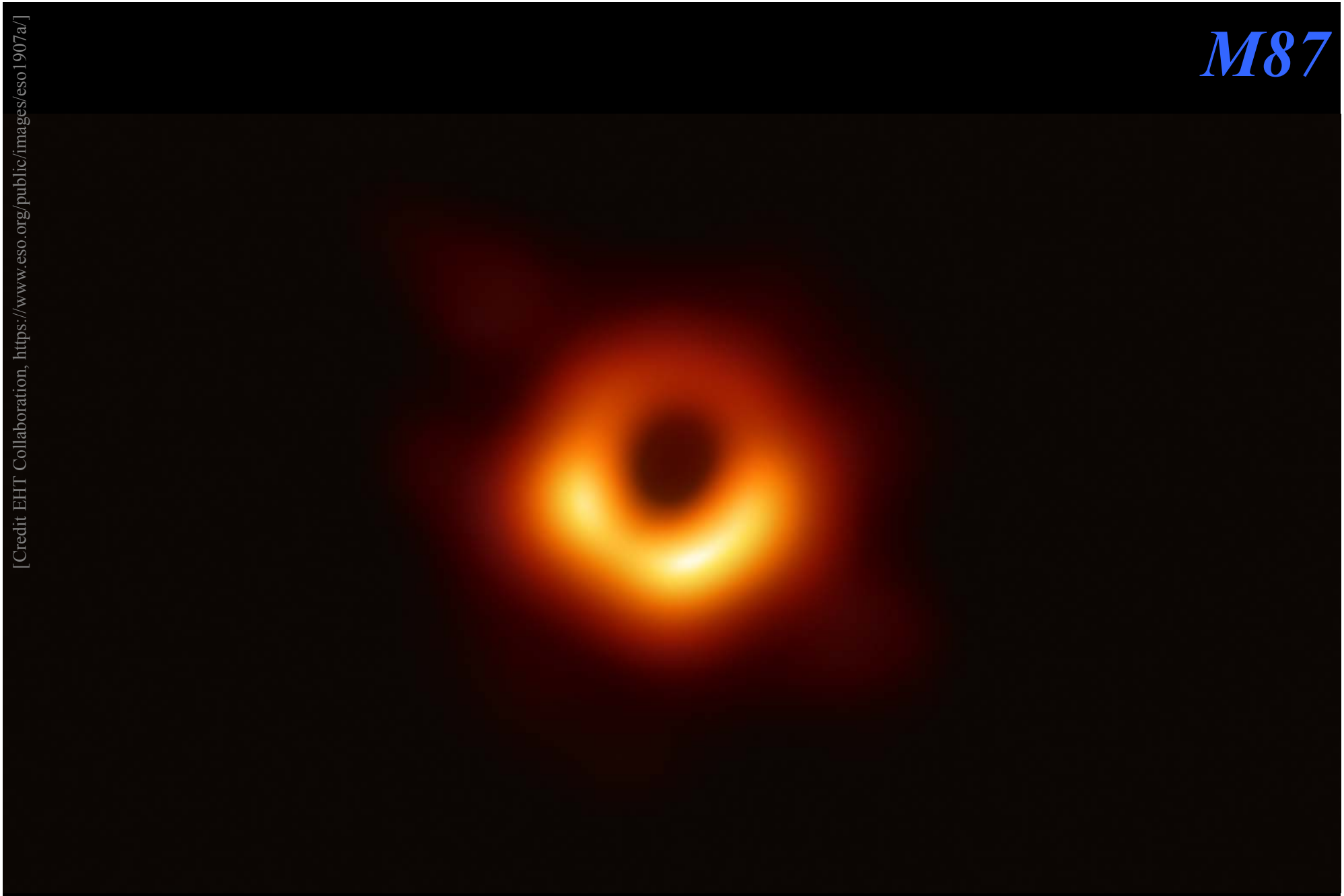


Credits: Asimmetrie

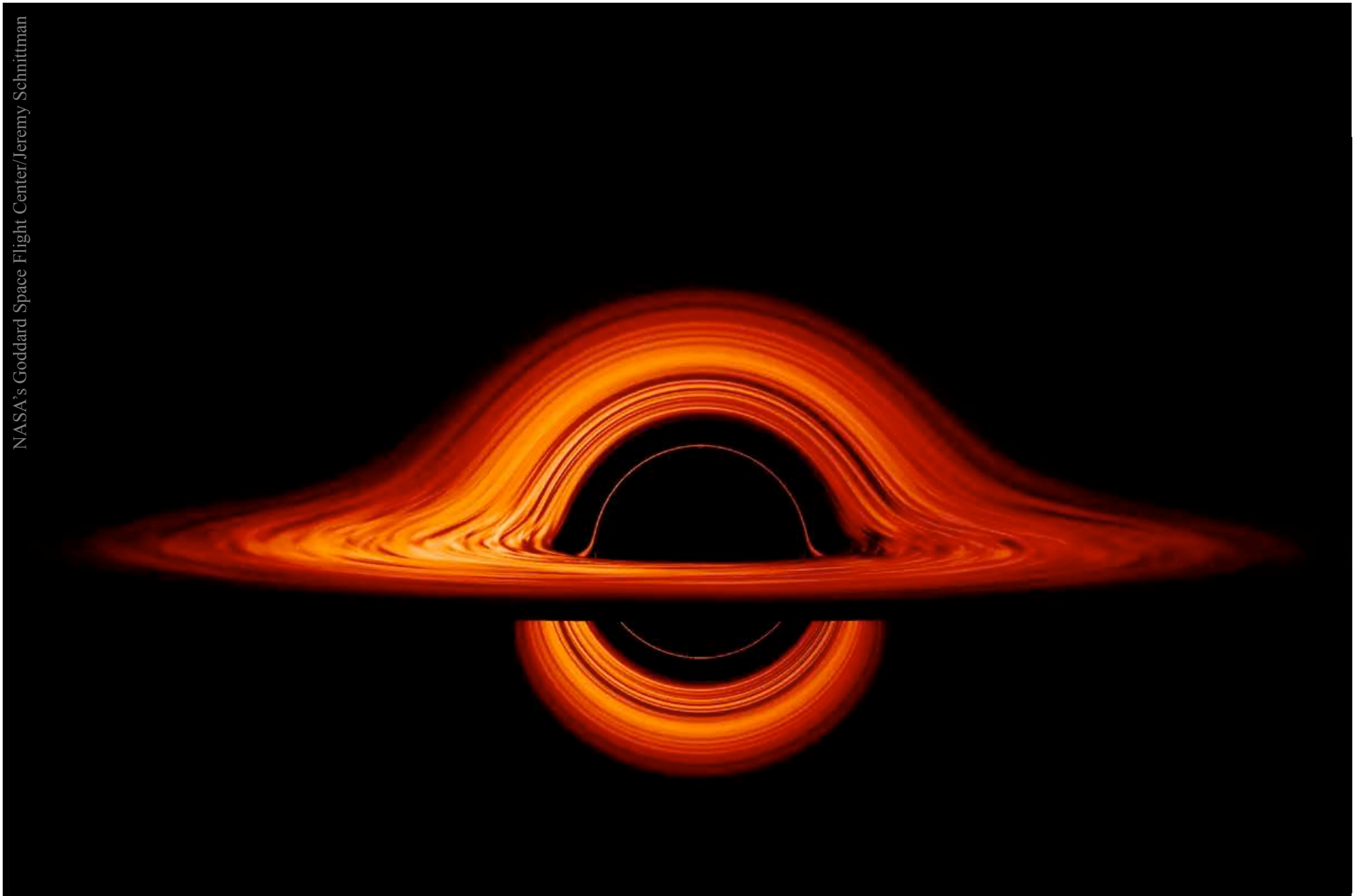
Buchi neri



M87



[Credit EHT Collaboration, https://www.eso.org/public/images/eso1907a/]



NASA's Goddard Space Flight Center/Jeremy Schnittman

Film: Interstellar

Formazione di galassie

https://www.flickr.com/photos/26365906@N08/15239953423

Formazione di galassie

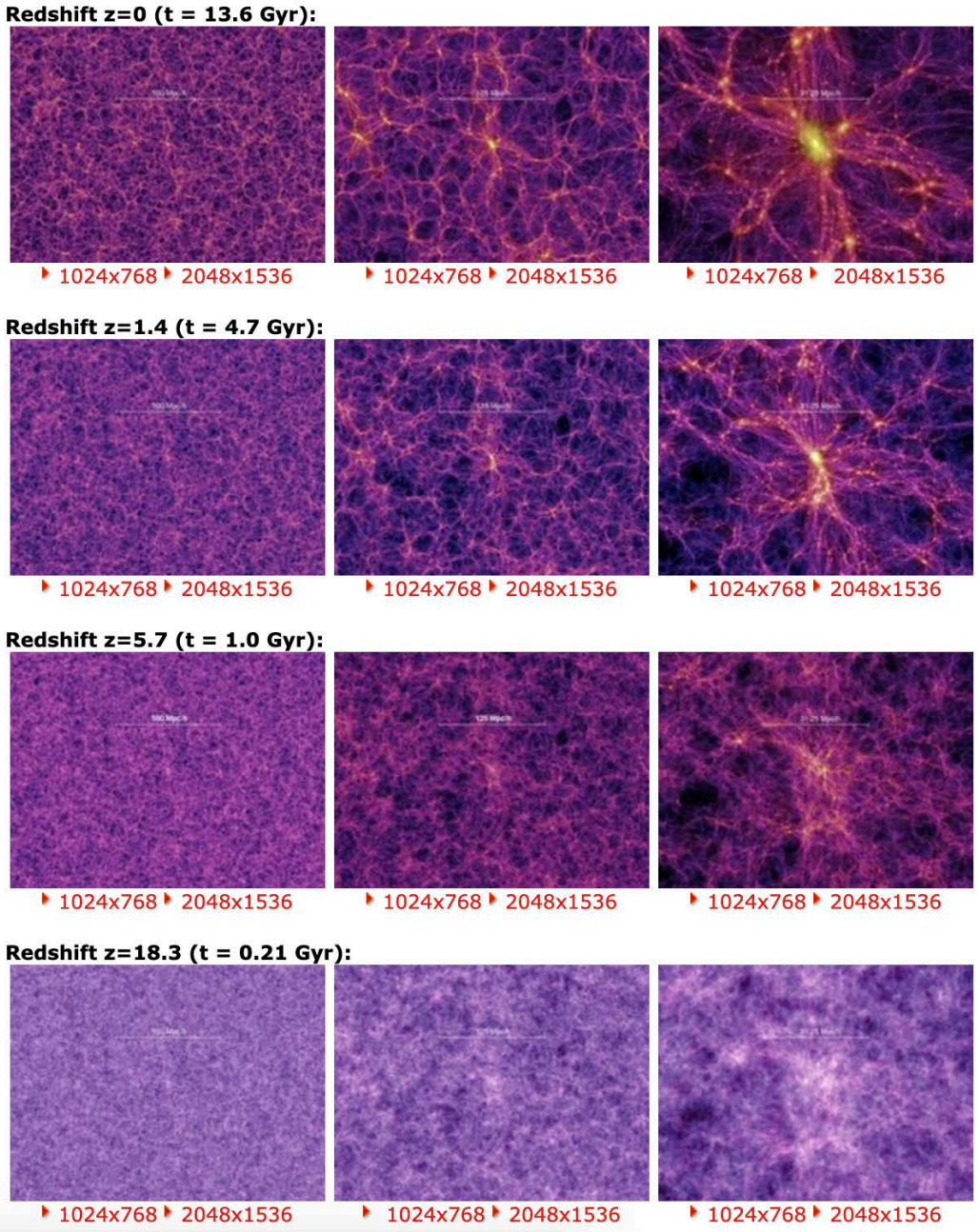
Età universo:

[oggi]
13.6 miliardi di anni

4.7 miliardi di anni

1.5 miliardi di anni

210 milioni di anni

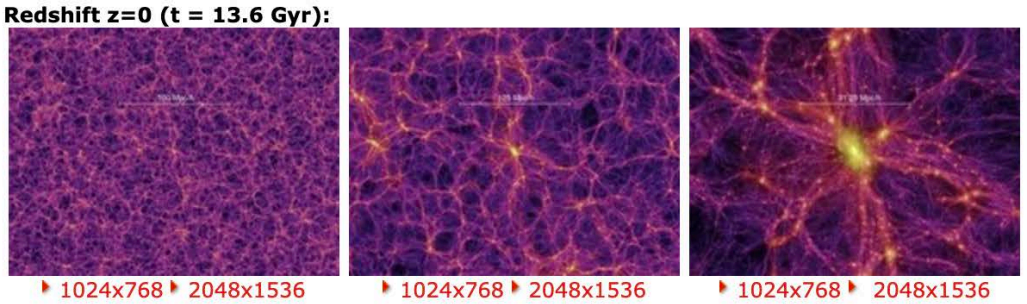


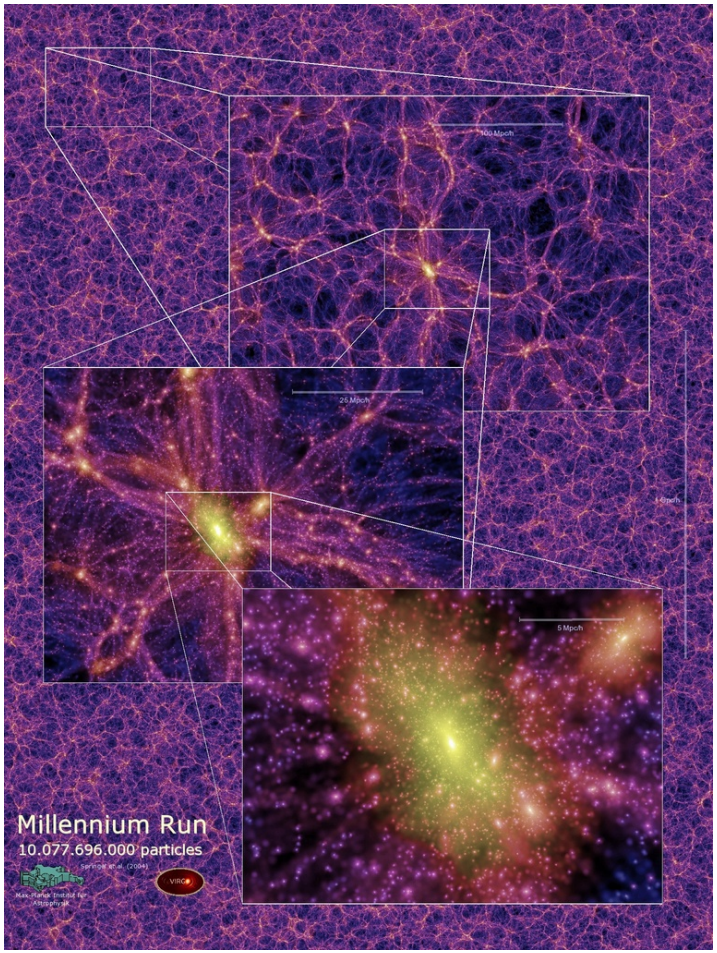
https://wwwmpa.mpa-garching.mpg.de/galform/virgo/millennium/

Formazione di galassie

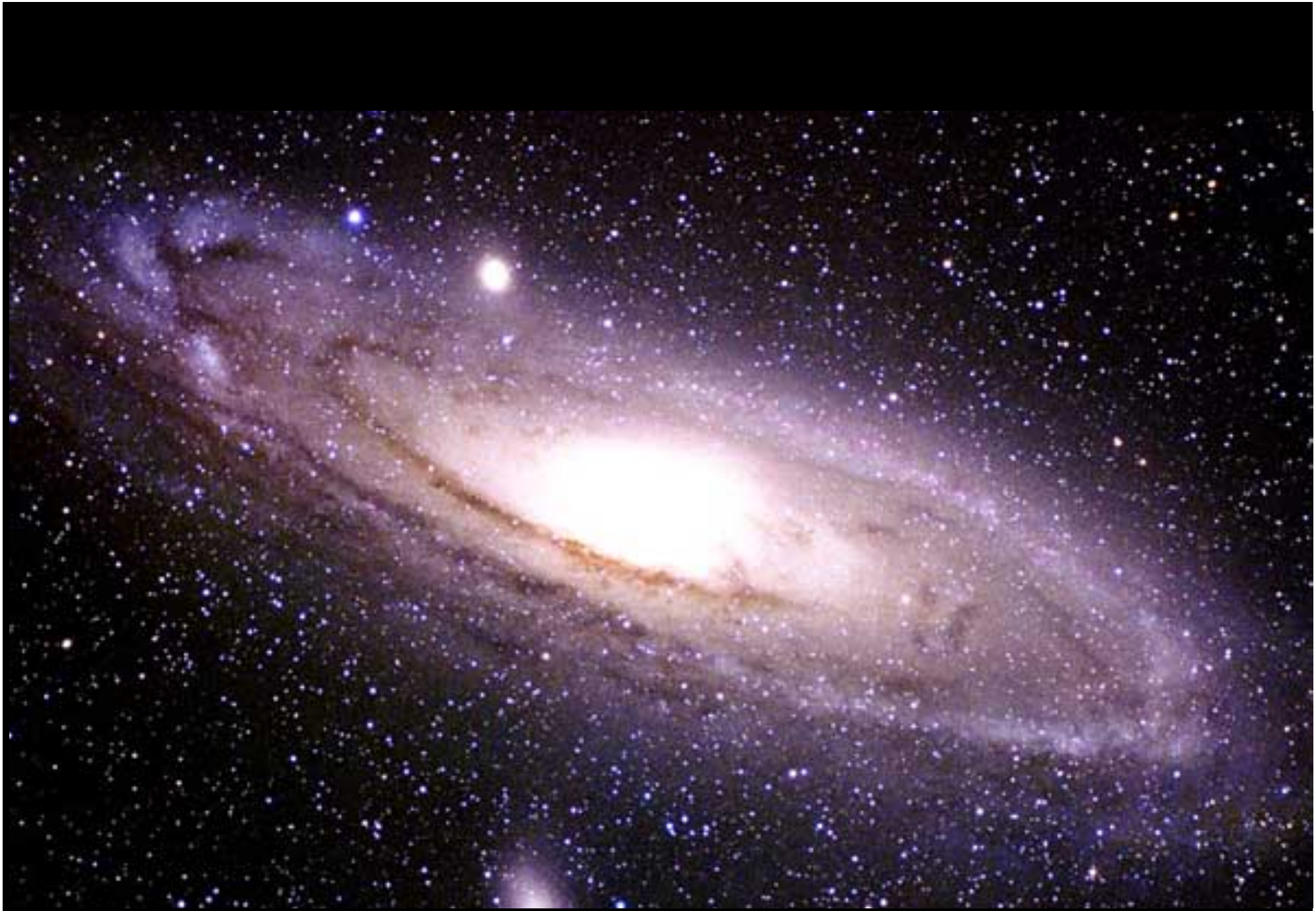
Età universo:

[oggi]
13.6 miliardi di anni

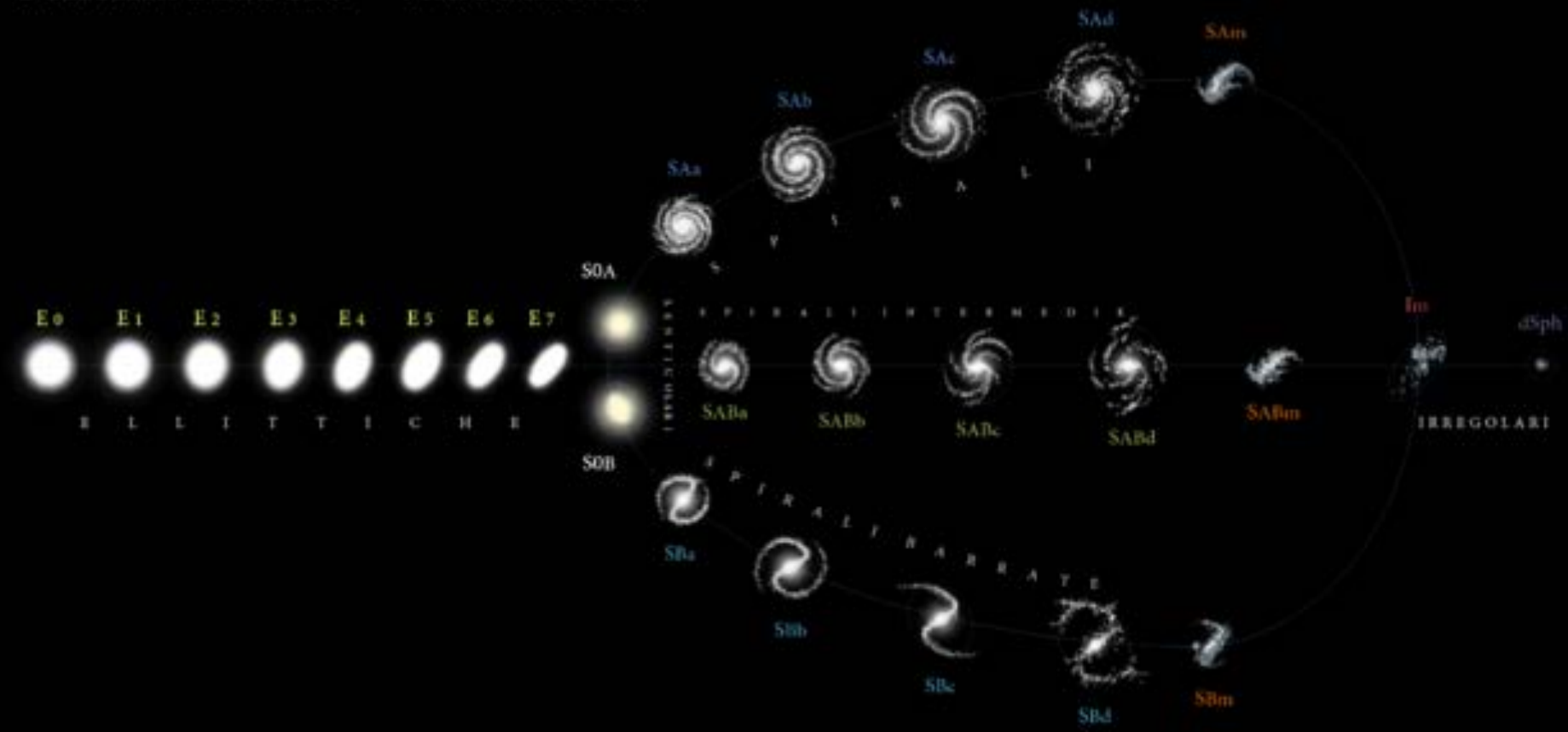




https://wwwmpa.mpa-garching.mpg.de/galform/virgo/millennium/



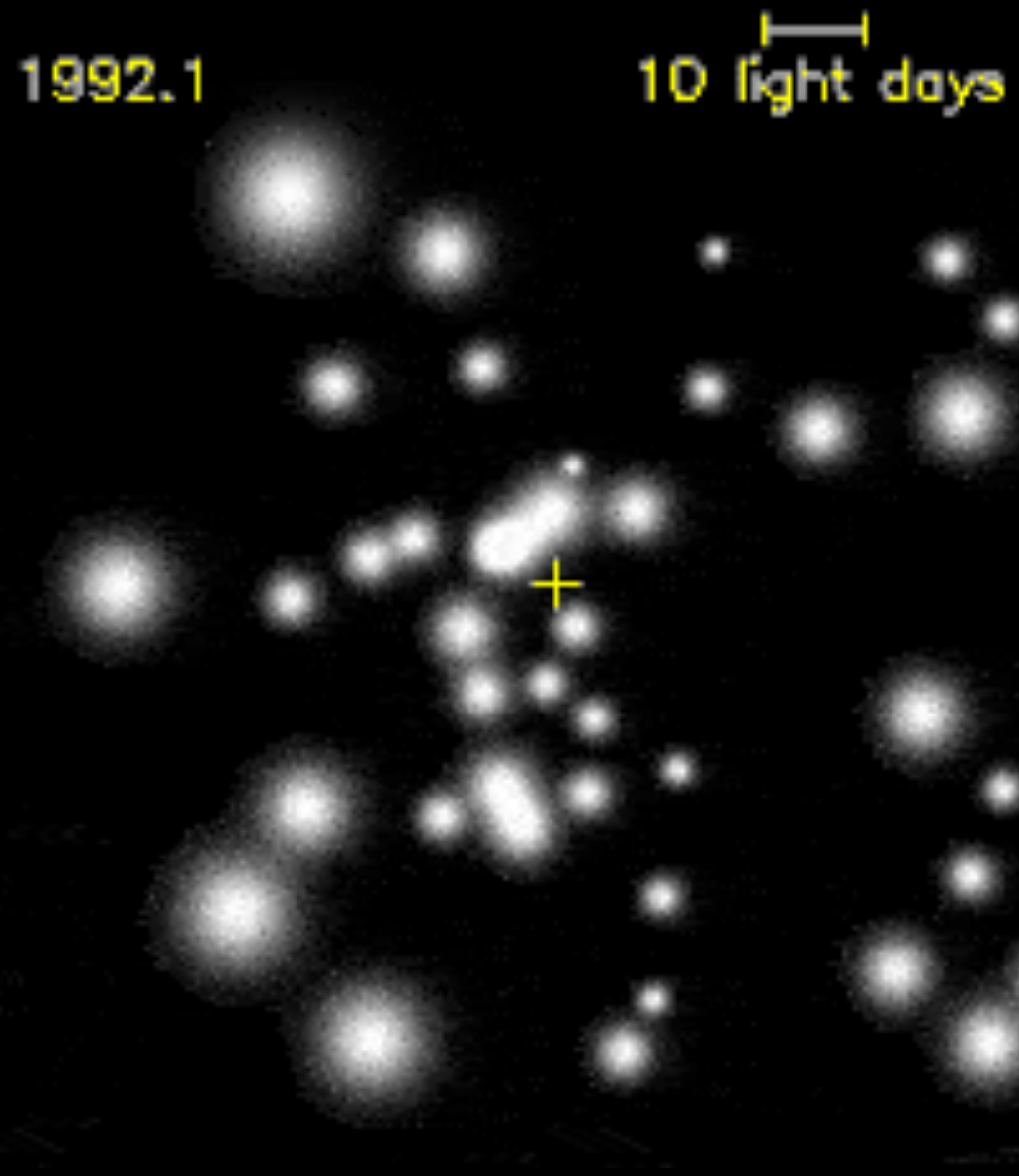
Galassie



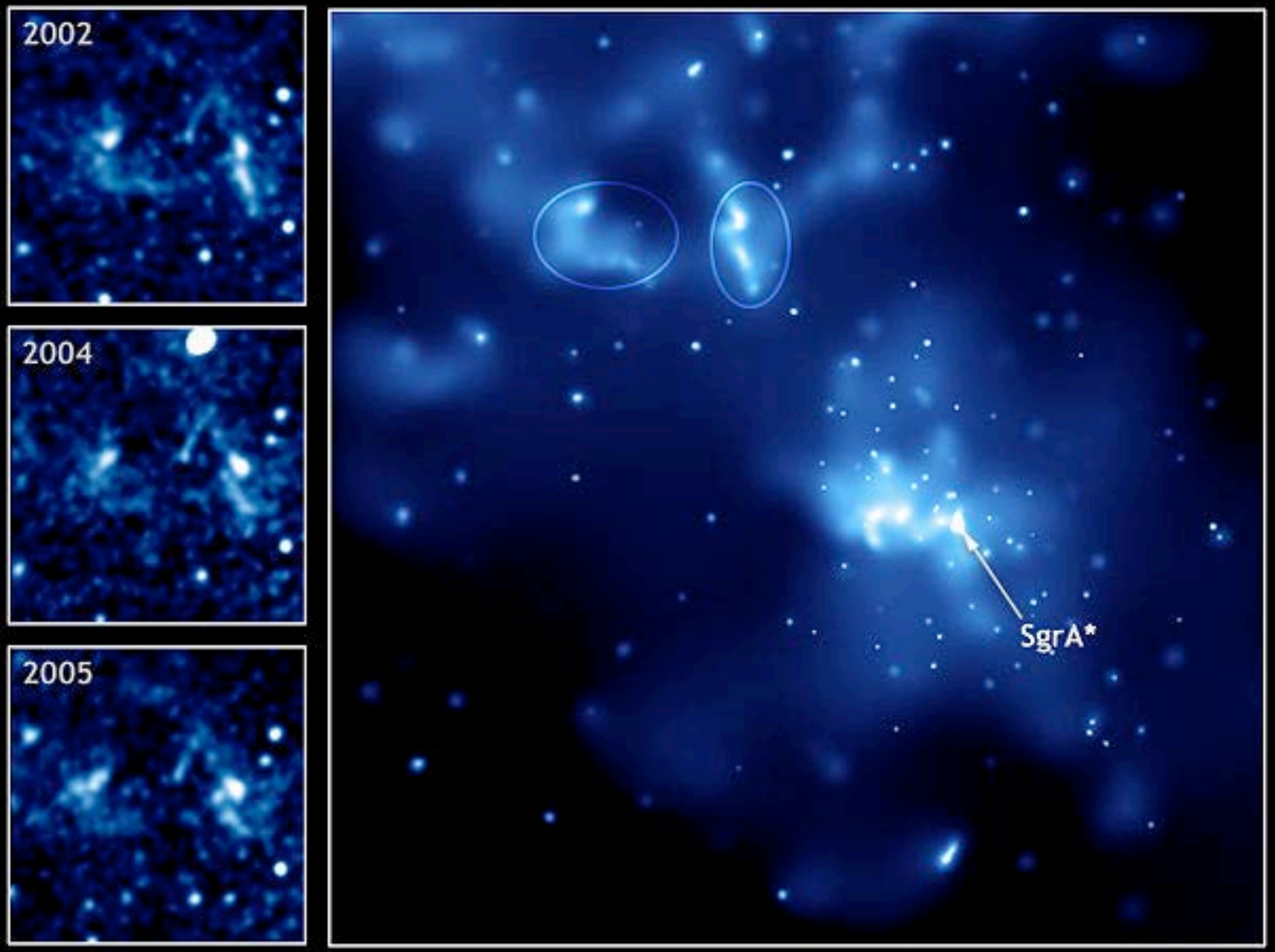
https://it.wikipedia.org/wiki/Gruppo_Locale

Galaxy Zoo: https://www.zooniverse.org/projects/zookeeper/galaxy-zoo/

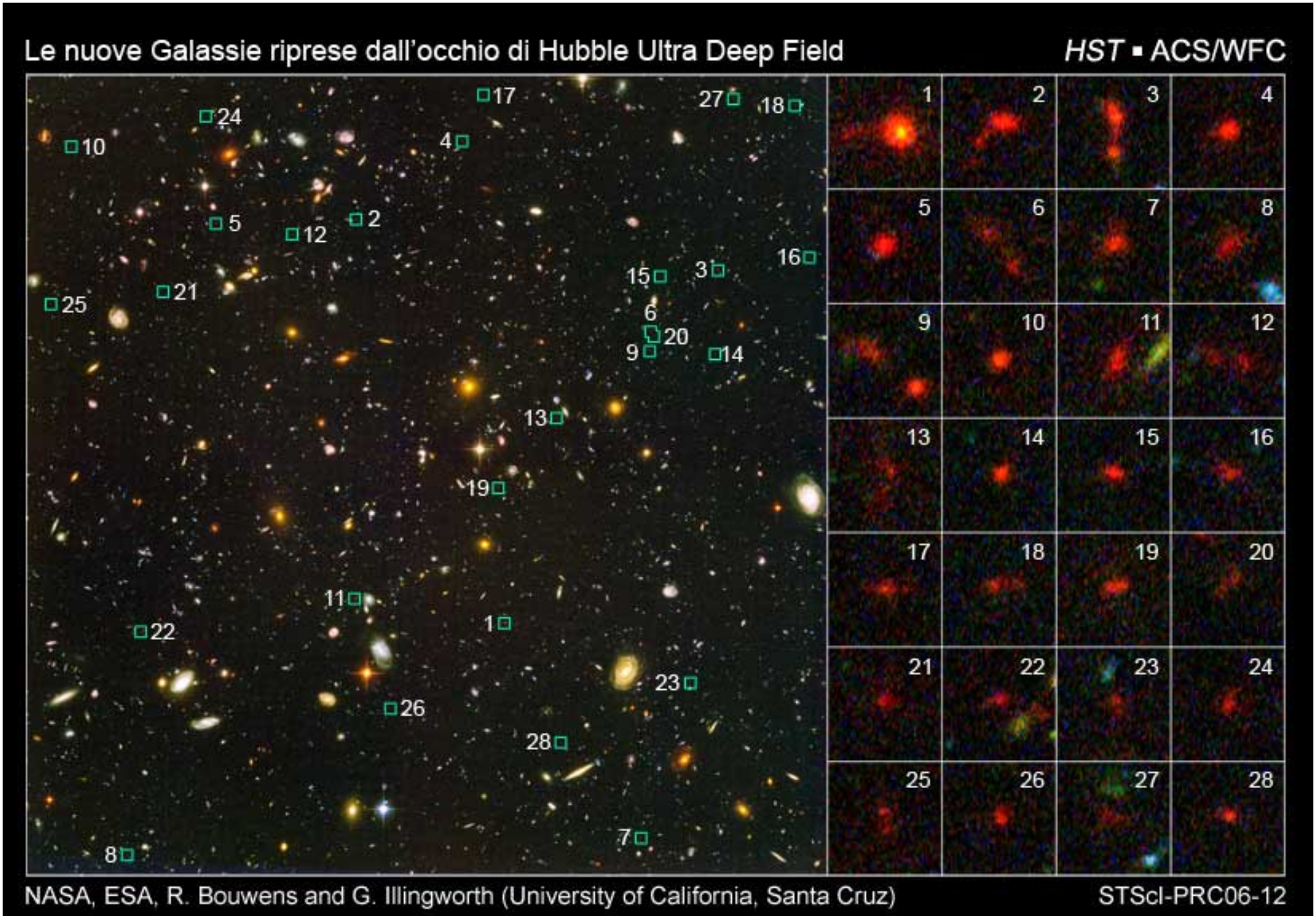
Al centro della Galassia



*Sagittarius A**



Credit: NASA/CXC/Caltech/M.Muno et al.


Le nuove Galassie riprese dall'occhio di Hubble Ultra Deep Field
HST ▪ ACS/WFC
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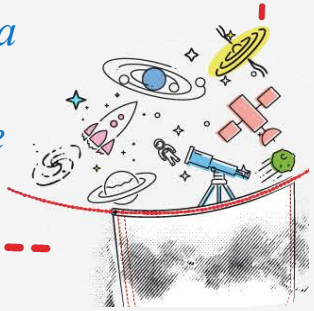
NASA, ESA, R. Bouwens and G. Illingworth (University of California, Santa Cruz)
STScI-PRC06-12

Approfondimenti:

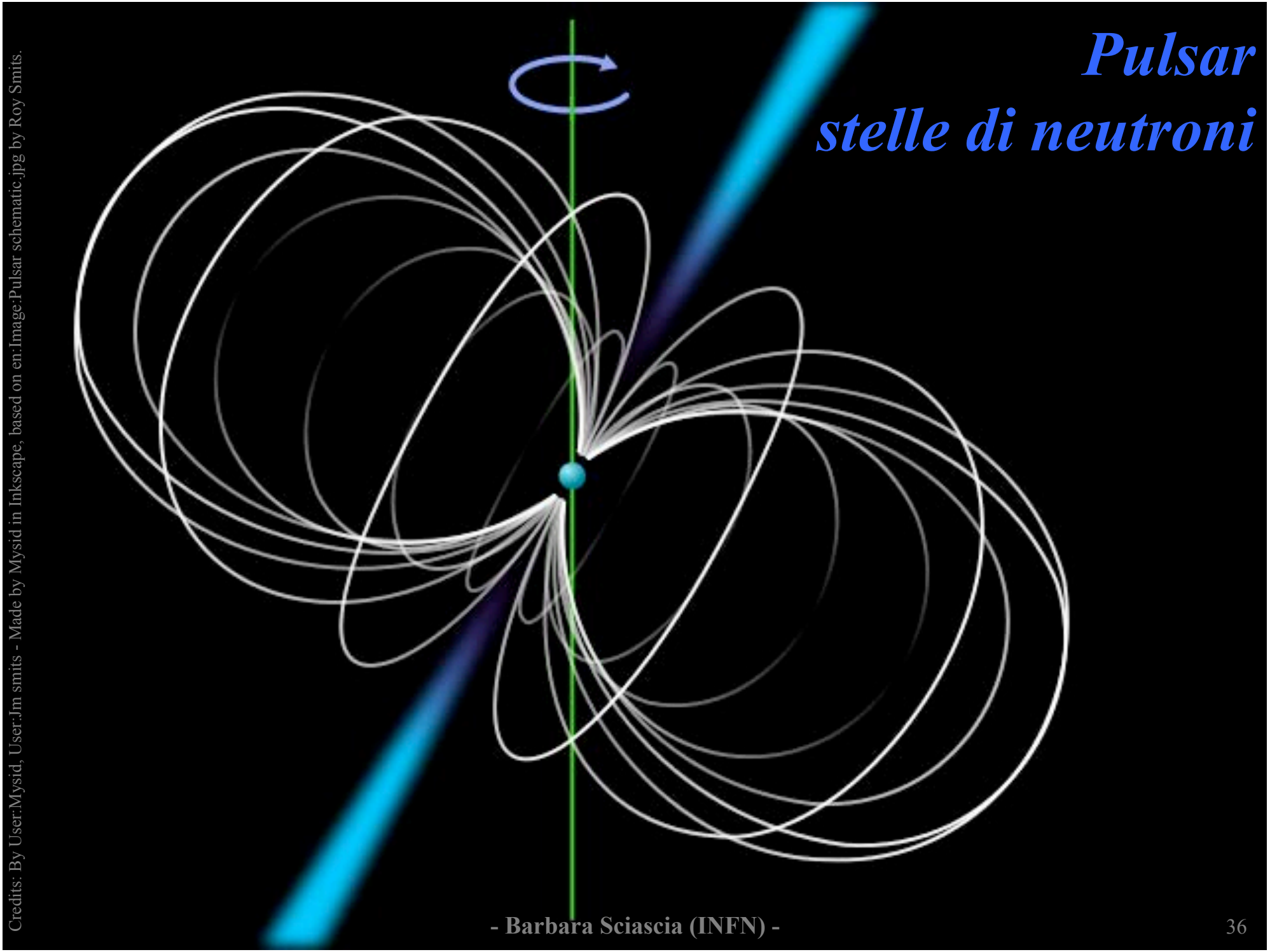
- *Giocare con la via Lattea*
  http://media.skysurvey.org/interactive360/index.html
- *Viaggio stellare*
  http://stars.chromeexperiments.com/
- *Informazioni e curiosità sui buchi neri (Amedeo Balbi)*
  https://www.youtube.com/watch?v=R0EPLEuA4U0&list=PLhhIH8RzamP6x_aw_eaxdz-obPBDR5N-p

Ringraziamenti: *alle professoresse Amalia Contessini e Fabiana Di Pasquale e agli alunni delle classi III [AS 2018/2019 e 2019/2020] della scuola media D. Bramante, IC S. Pio V, Roma, per i tanti spunti e suggerimenti per raccontare meglio la scienza difficile.*

Disclaimer: *alcune delle immagini contenute in questa presentazione sono tratte da internet e sono ritenute di pubblico dominio o con licenza libera d'uso. L'eventuale utilizzo di immagini protette è dipeso dall'impossibilità di individuare l'autore, che può rivolgersi al seguente indirizzo comedu@lnf.infn.it per la rimozione.*

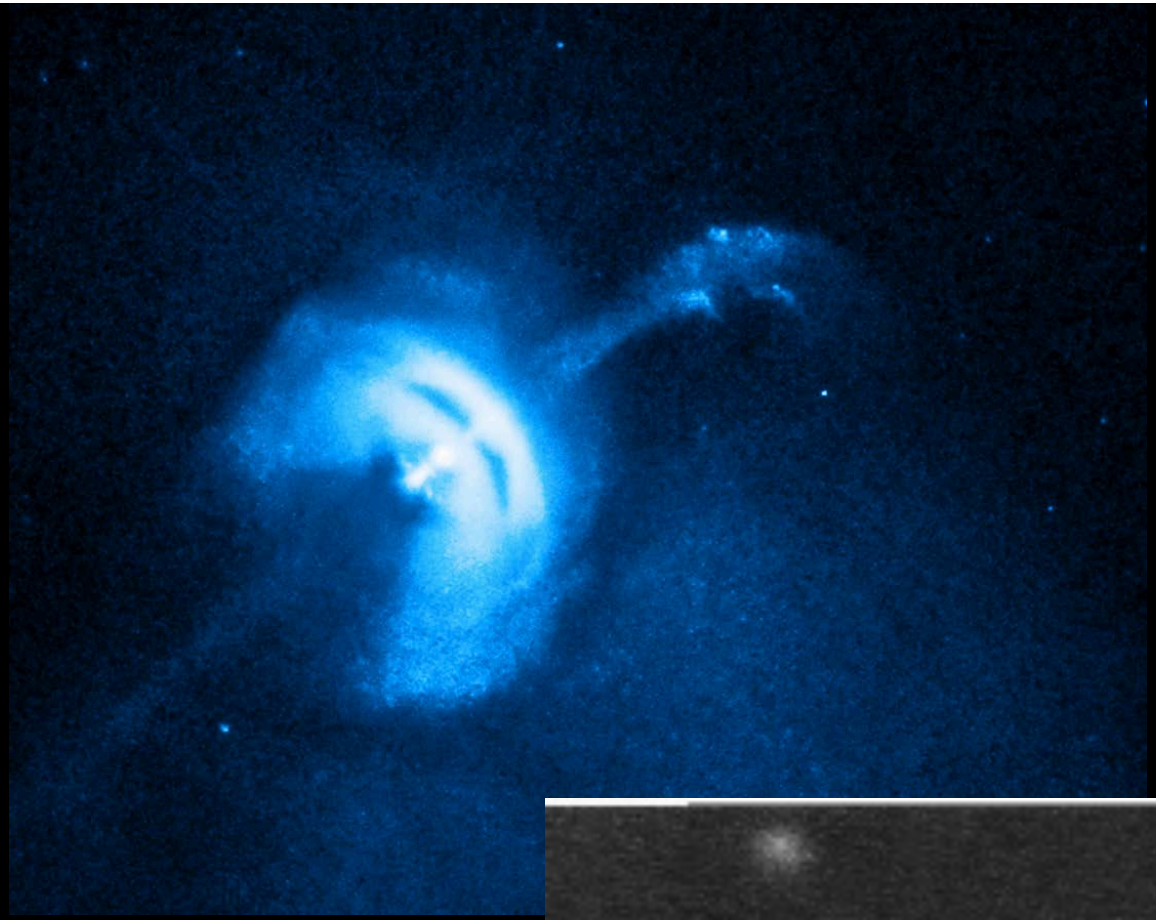


Pulsar
stelle di neutroni



Credits: By User:Mysid, User:Jm smits - Made by Mysid in Inkscape, based on en:Image:Pulsar schematic.jpg by Roy Smits.

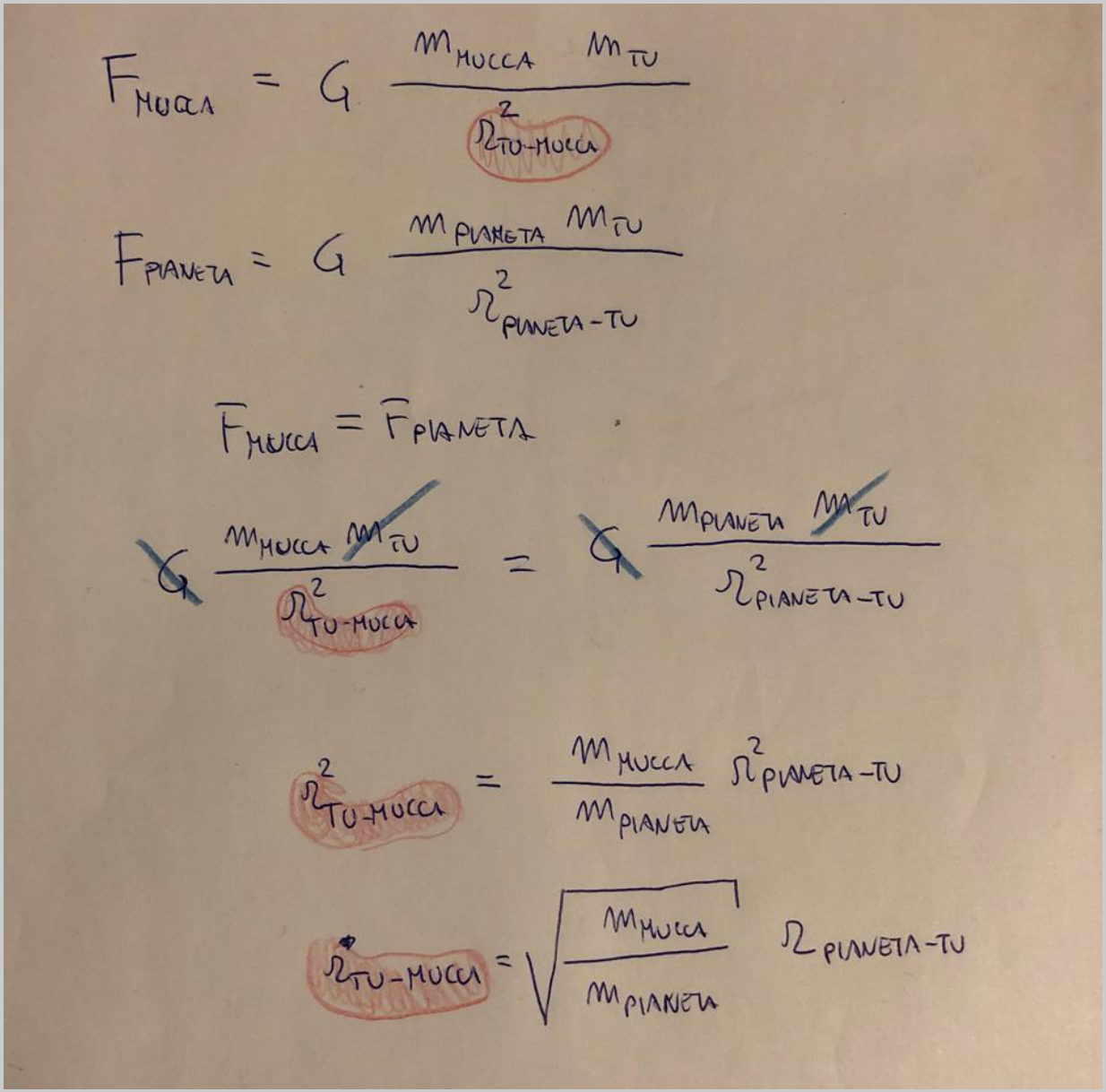
Credits: NASA



Pulsar
stelle di neutroni

Video dei segnali pulsar:
https://en.wikipedia.org/wiki/Pulsar#/media/File:Crab_Lucky_video2.gif
https://upload.wikimedia.org/wikipedia/commons/7/7d/Vela_Pulsar_jet_seen_by_Chandra_Observatory.ogv
(e suoni!) https://www.youtube.com/watch?v=zsDOqLWuWQ4

Di oroscopi e di mucche: svolgimento

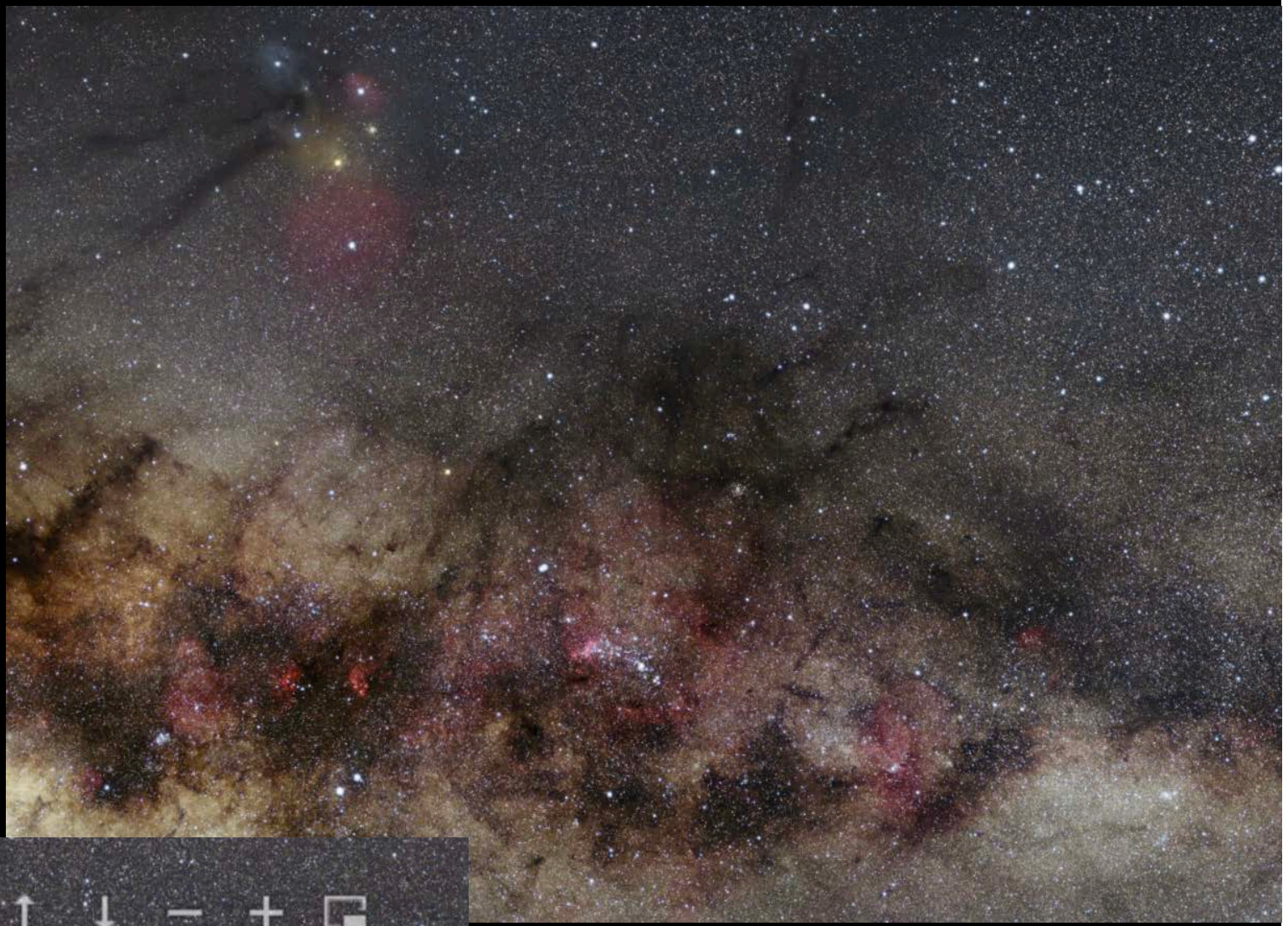


Giocare con la Galassia

http://media.skysurvey.org/interactive360/index.html

[*potrebbe essere necessario far partire Flash i.e. Run Adobe Flash*]

i: nomi di stelle e costellazioni
Cursori
Zoom in/out
Full screen



Viaggio stellare

http://stars.chromeexperiments.com/

Visualizzazione in movimento di ~100000 stelle vicine, dal Sole all'intera Galassia
[*consuma un sacco di CPU!*]