Affreschi cosmici

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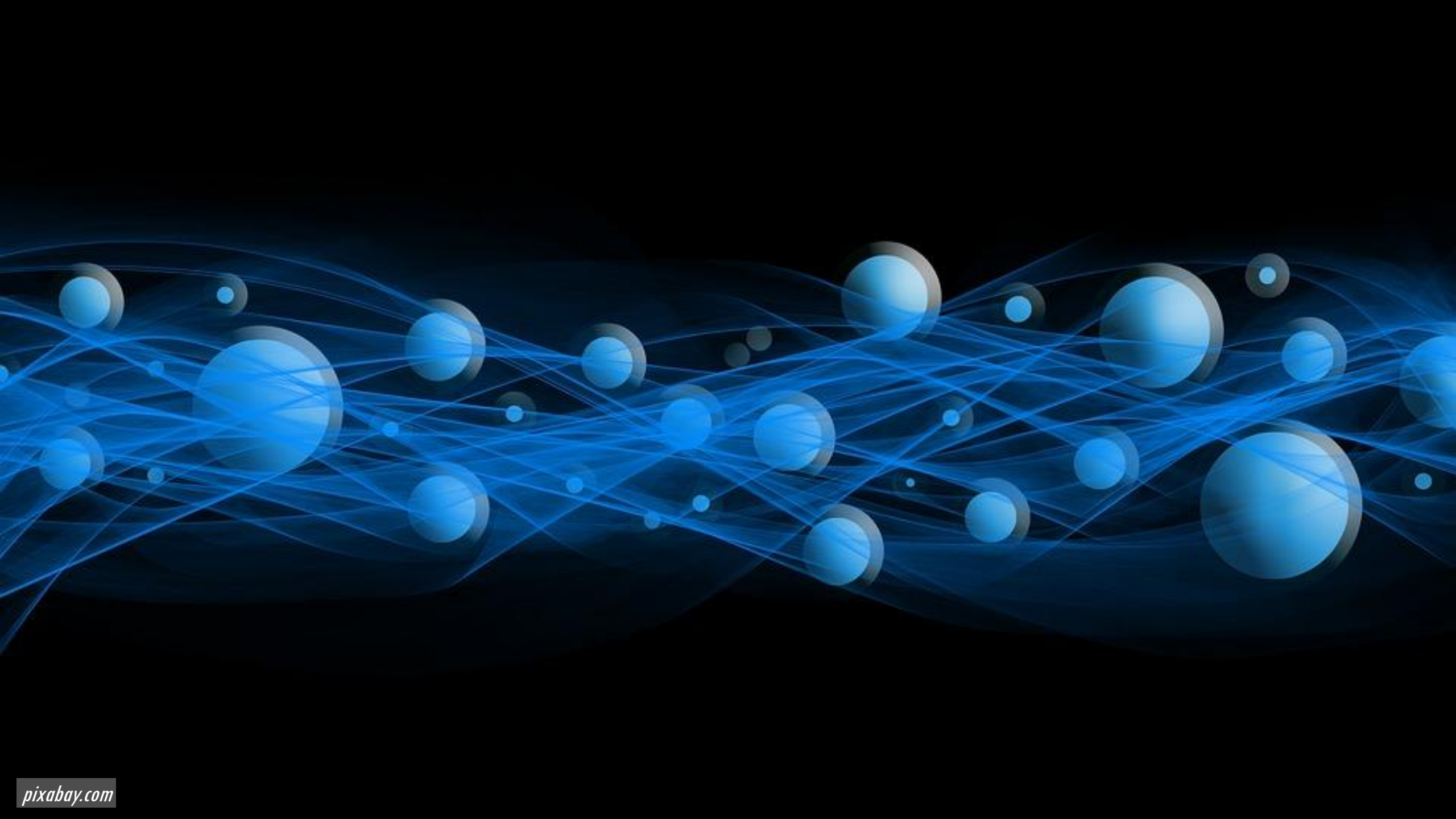
Dipartimento Interateneo di Fisica "M. Merlin"

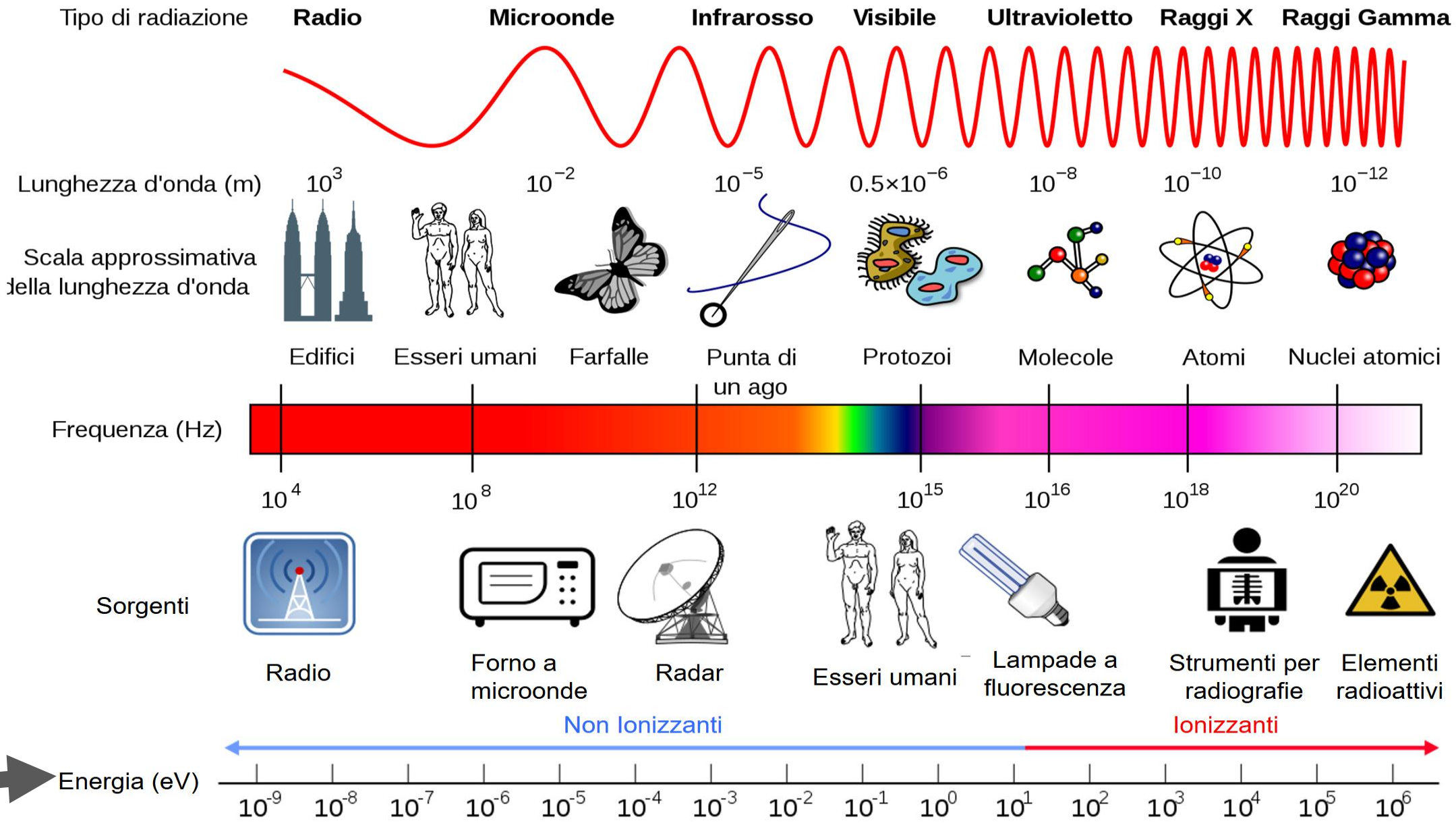
Politecnico di Bari e INFN – Sezione di Bari

La Radiazione Elettromagnetica

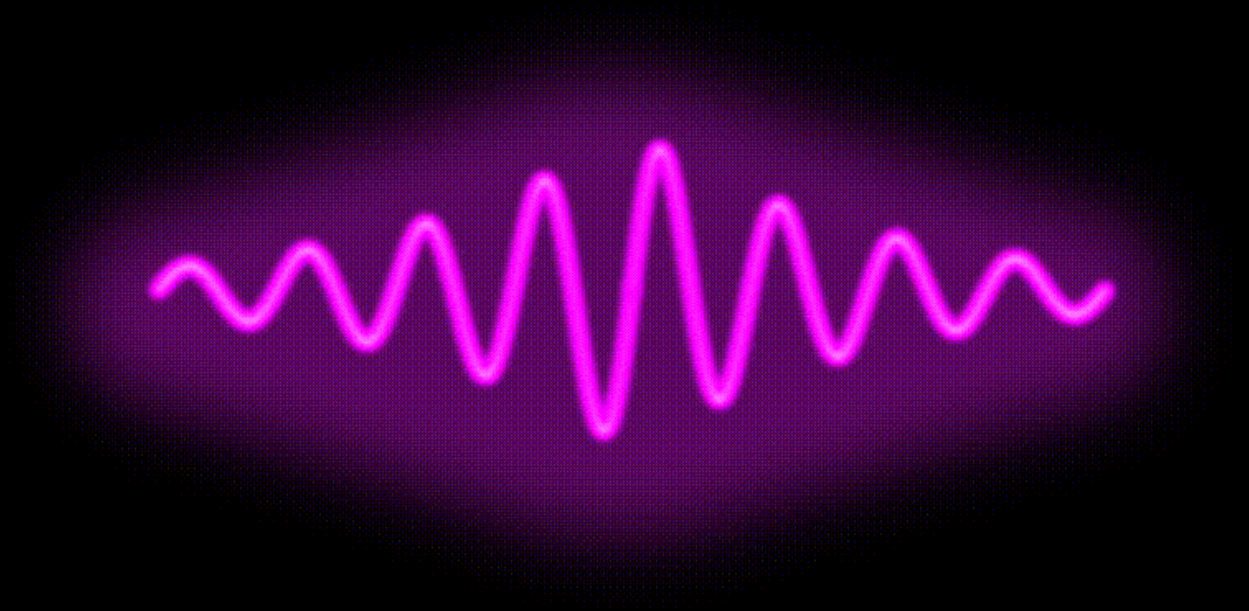
Credit: NASA/GSFC

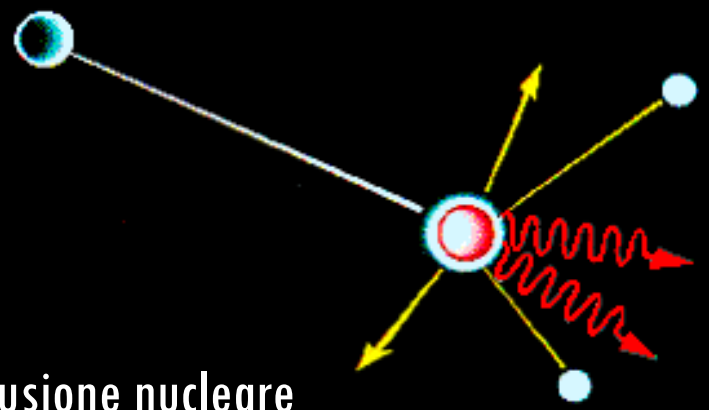
Credit: Seb Janiak


pixabay.com

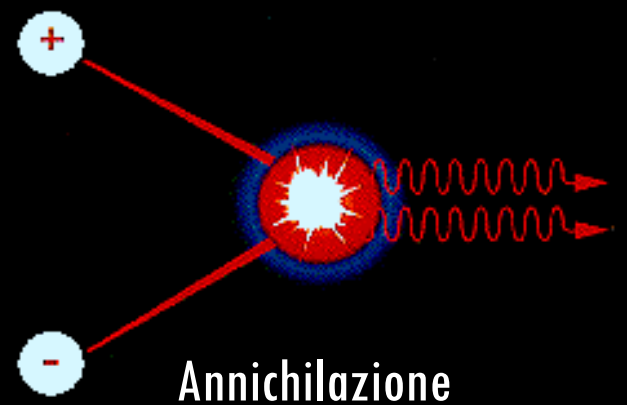


Un elettronvolt (eV) è un'unità di misura dell'energia molto usata in ambito atomico e subatomico

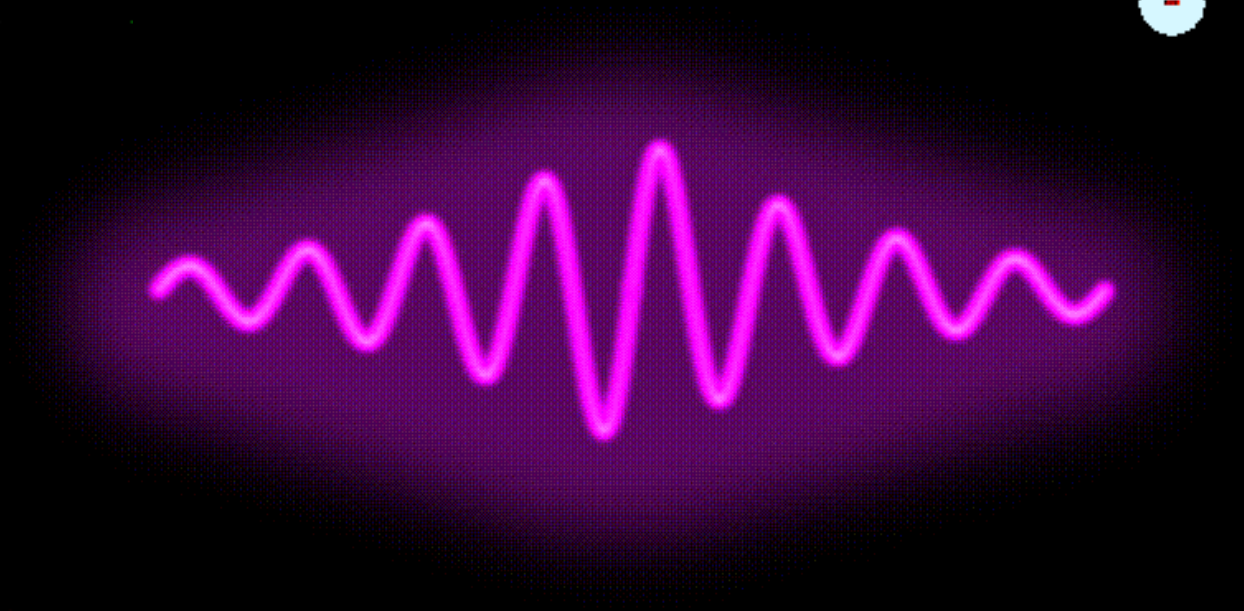




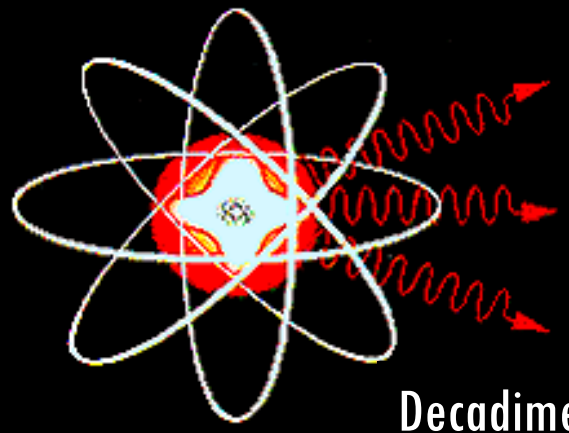
Fusione nucleare



Annichilazione
elettrone-positrone

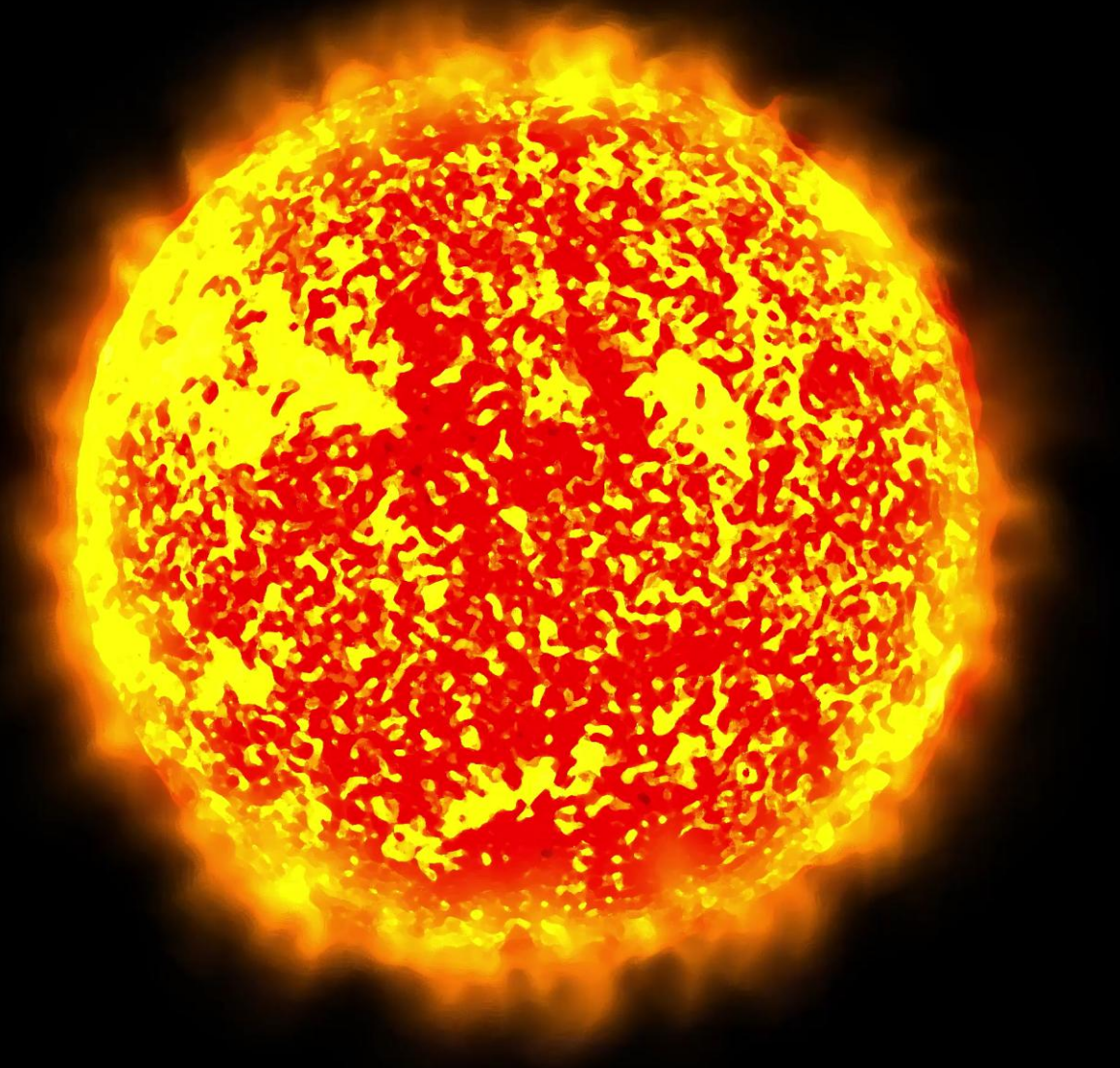


Accelerazione di particelle
cariche (Bremsstrahlung,
Sincrotrone, Compton)



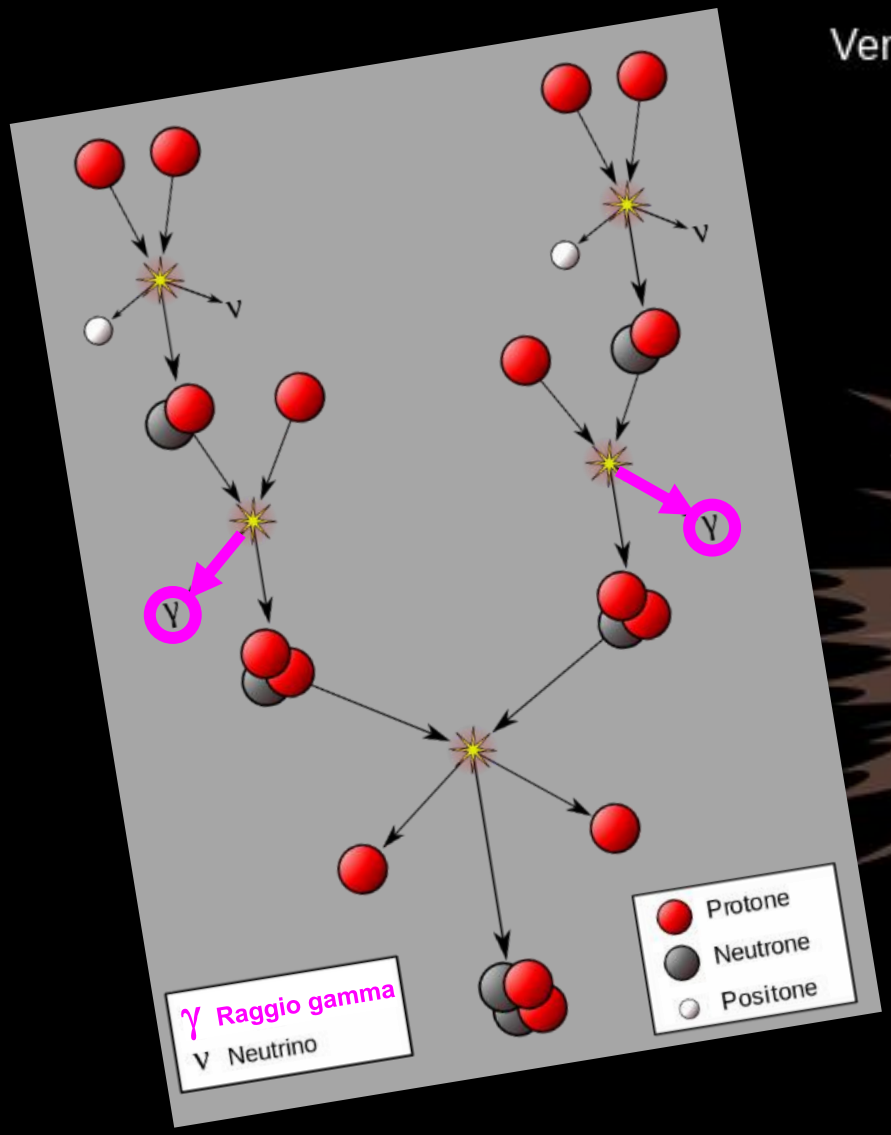
Decadimenti nucleari gamma

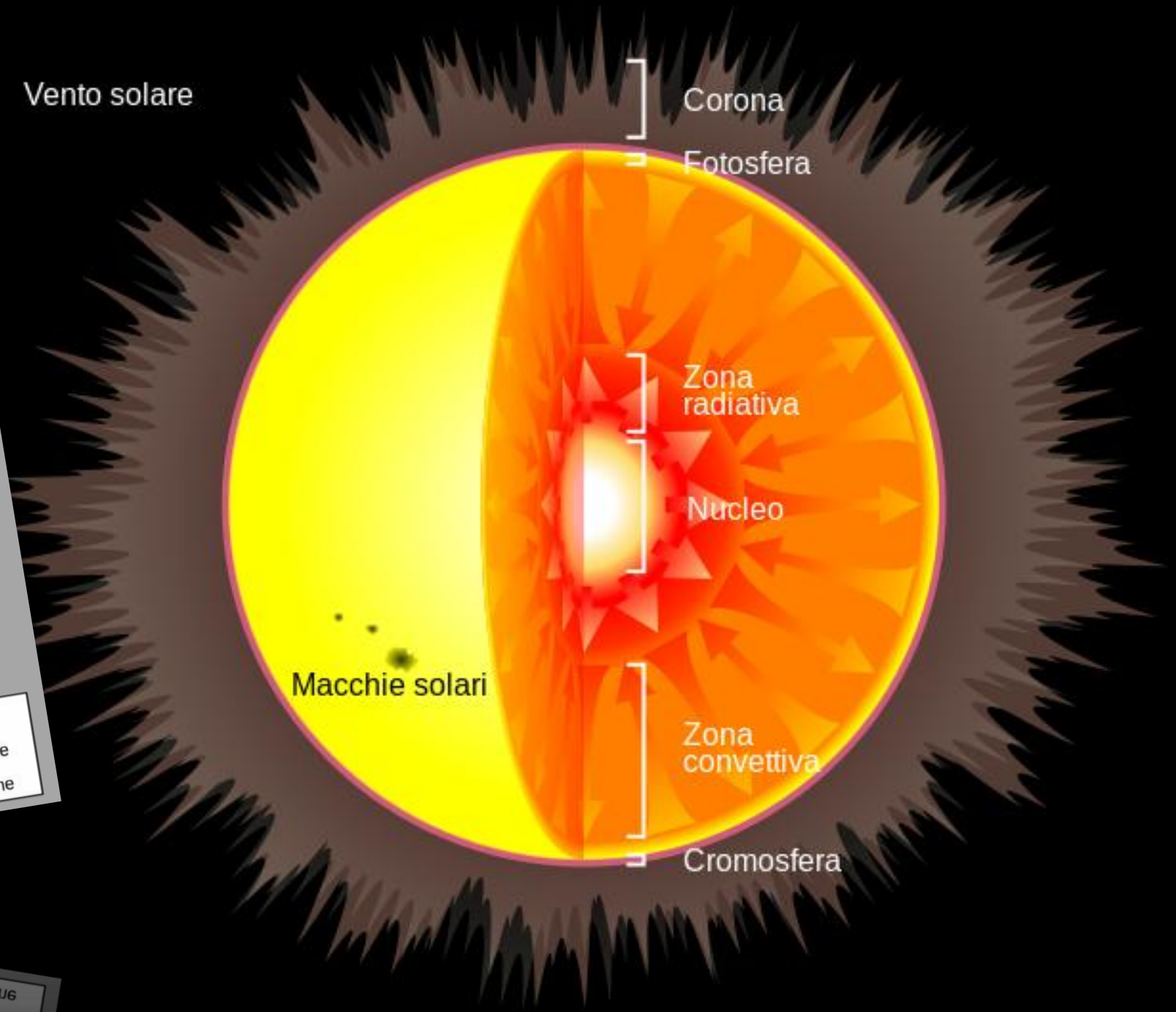
Rappresentazione artistica



NASA Goddard Media Studio
https://svs.gsfc.nasa.gov/13094

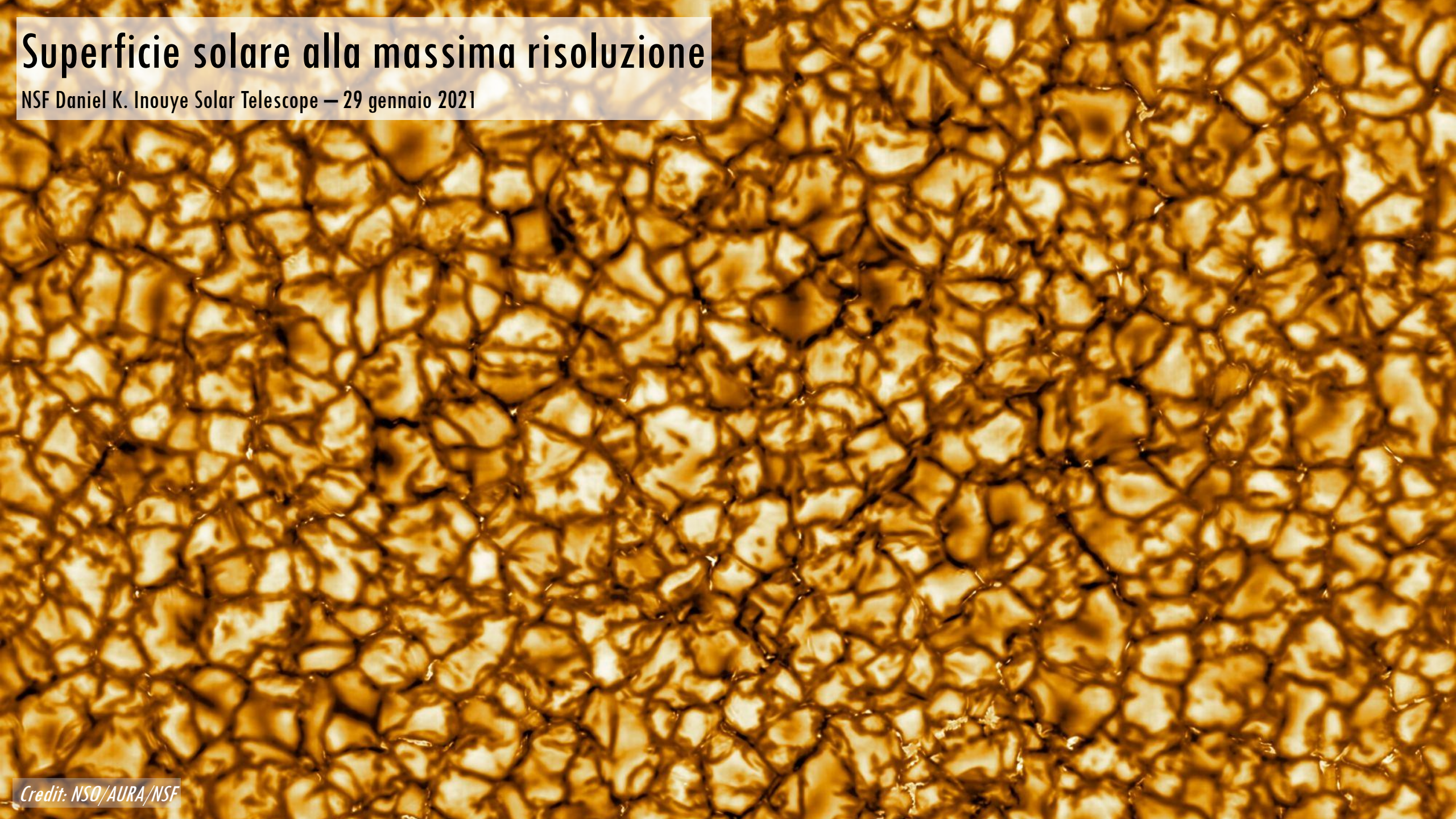
Credit: NASA's Goddard Space Flight Center


ν
ν
γ
γ
Protone
Neutrone
Positone
γ Raggio gamma
ν Neutrino


Vento solare
Corona
Fotosfera
Zona radiativa
Nucleo
Macchie solari
Zona convettiva
Cromosfera

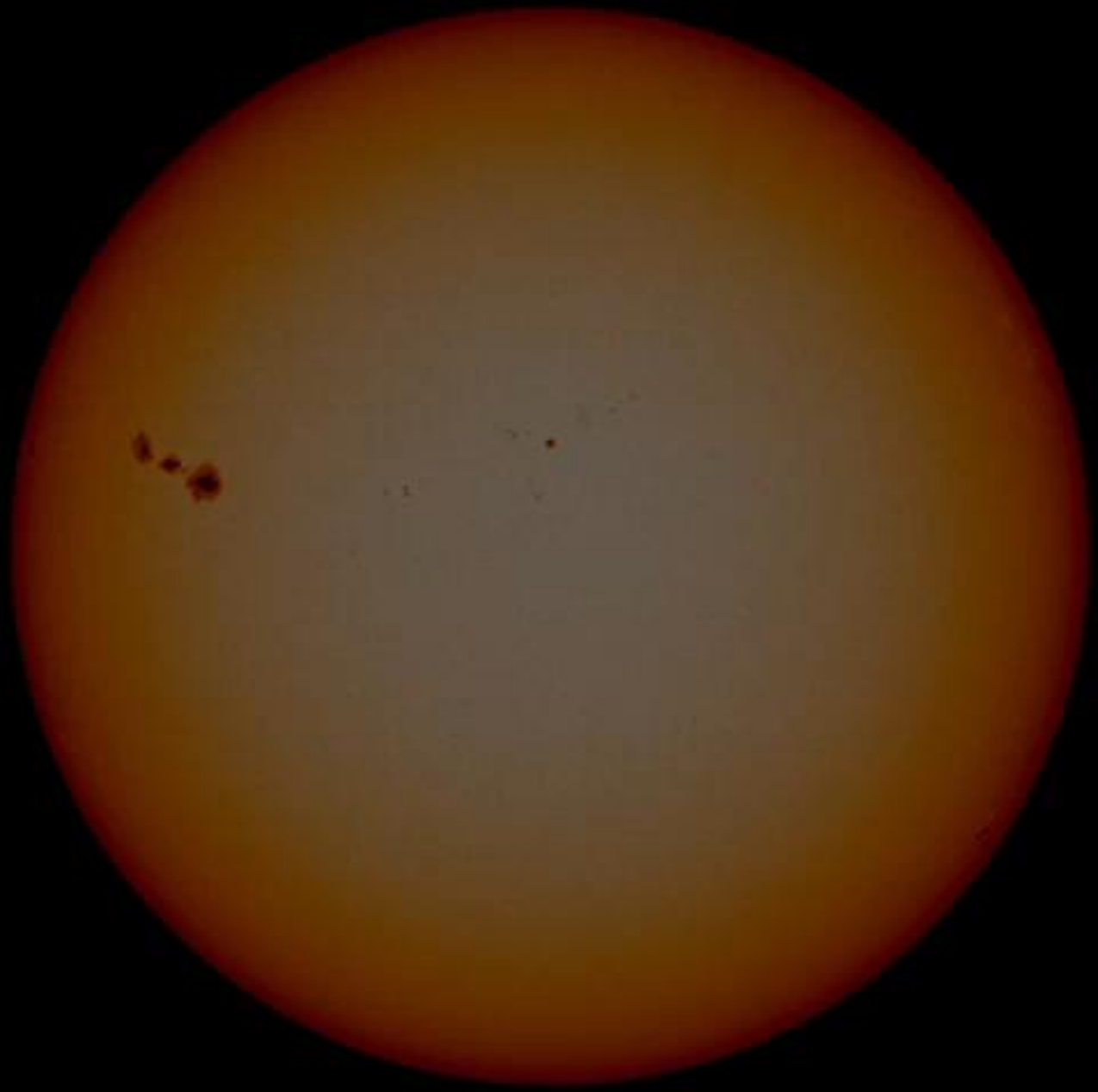
Superficie solare alla massima risoluzione

NSF Daniel K. Inouye Solar Telescope – 29 gennaio 2021



Credit: NSO/AURA/NSF

Jewel Box Sun

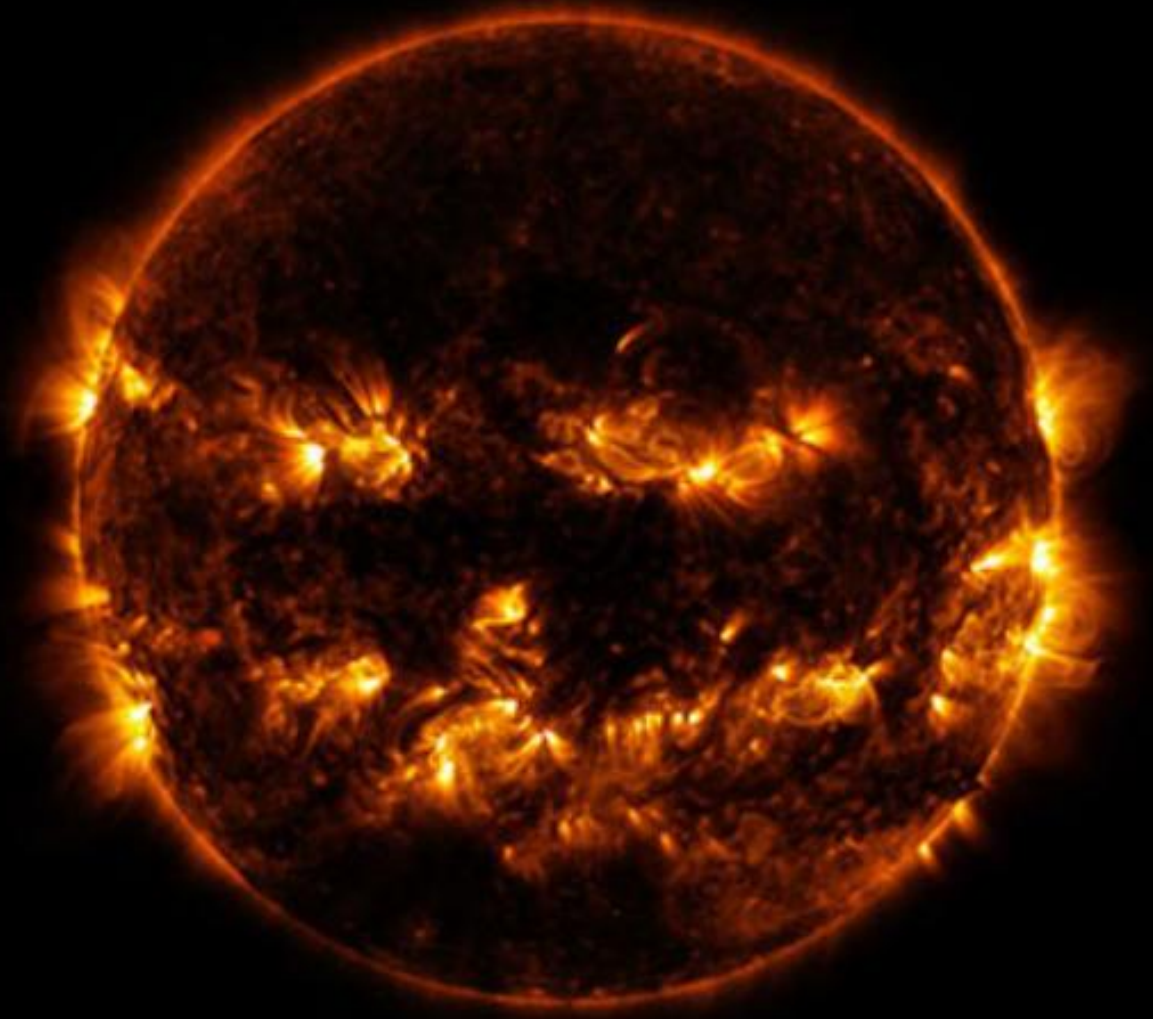


NASA Goddard Media Studios
https://www.youtube.com/watch?v=kS57VH3QN1g
http://svs.gsfc.nasa.gov/goto?11385

Credit: NASA/GSFC

Regioni solari attive

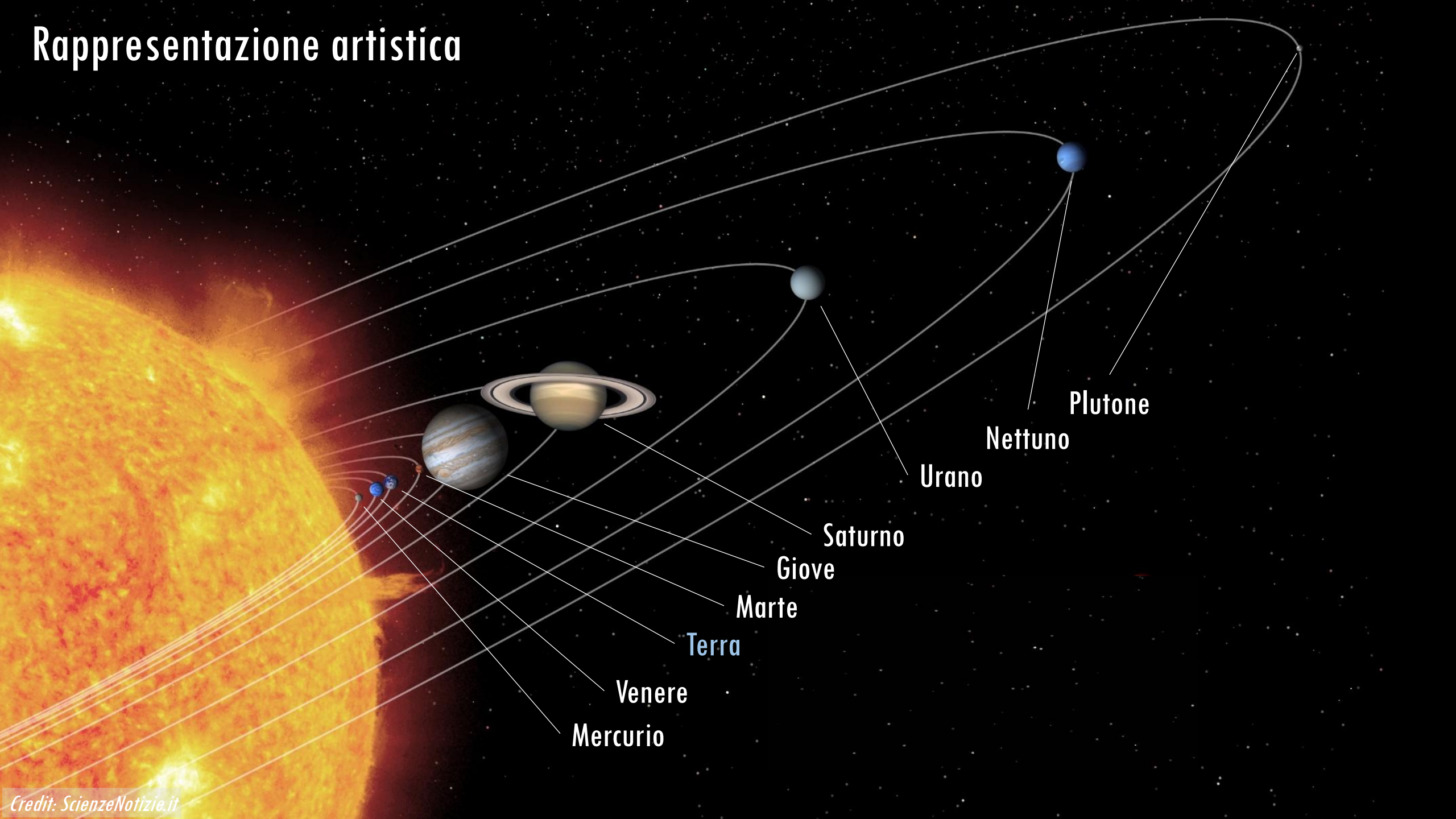
Solar Dynamics Observatory – 8 ottobre 2014



«Our Halloween Sun»

Credit: NASA/GSFC/SDO

Rappresentazione artistica



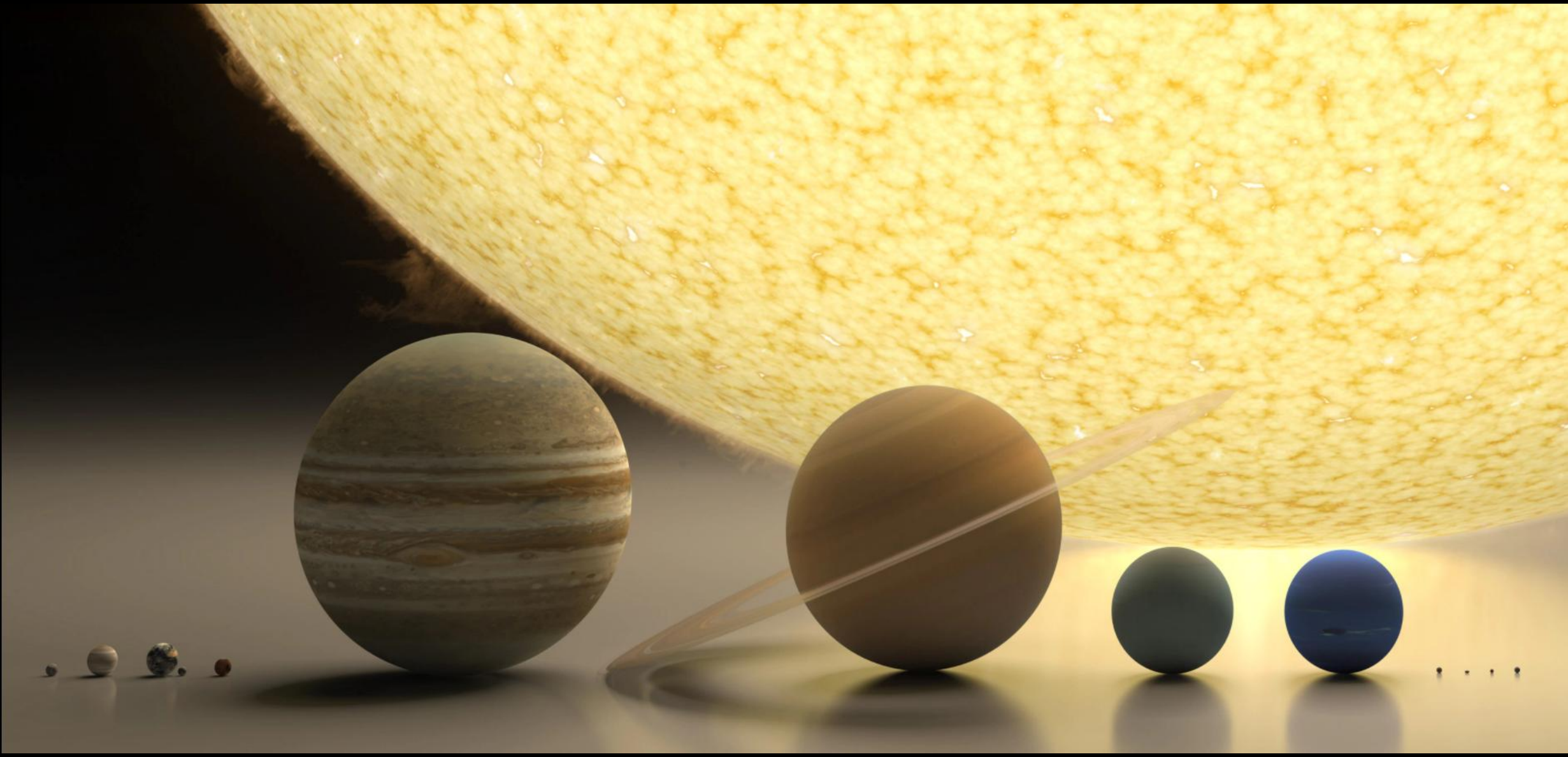
Credit: ScienzeNotizie.it

Eruzione solare

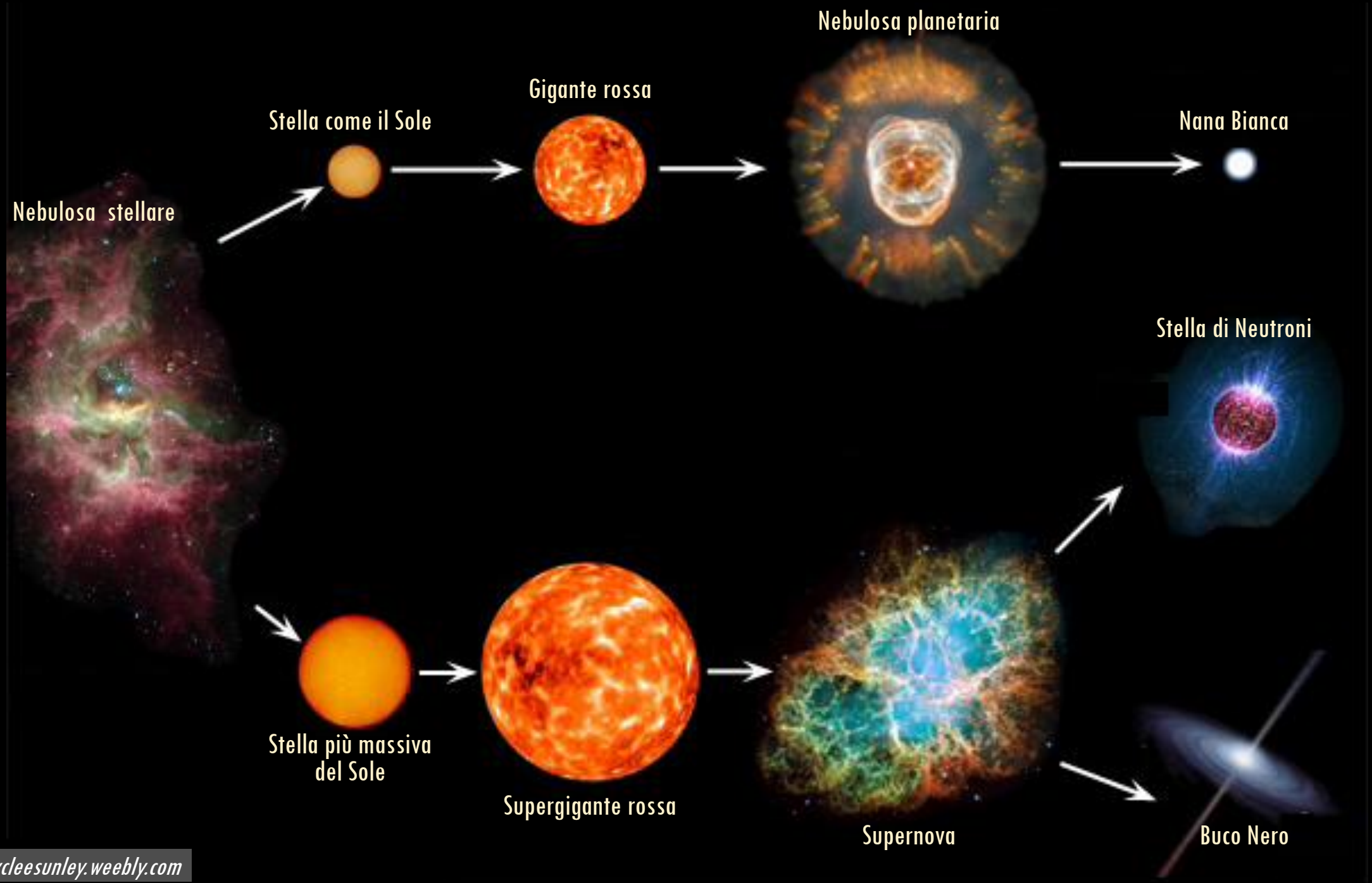
Solar and Heliospheric Observatory (SOHO) – 27 luglio 1999

Credit: SOHO (ESA/NASA)

Installazione artistica



Credit: R.Ziche



Credit: starcycleesunley.weebly.com

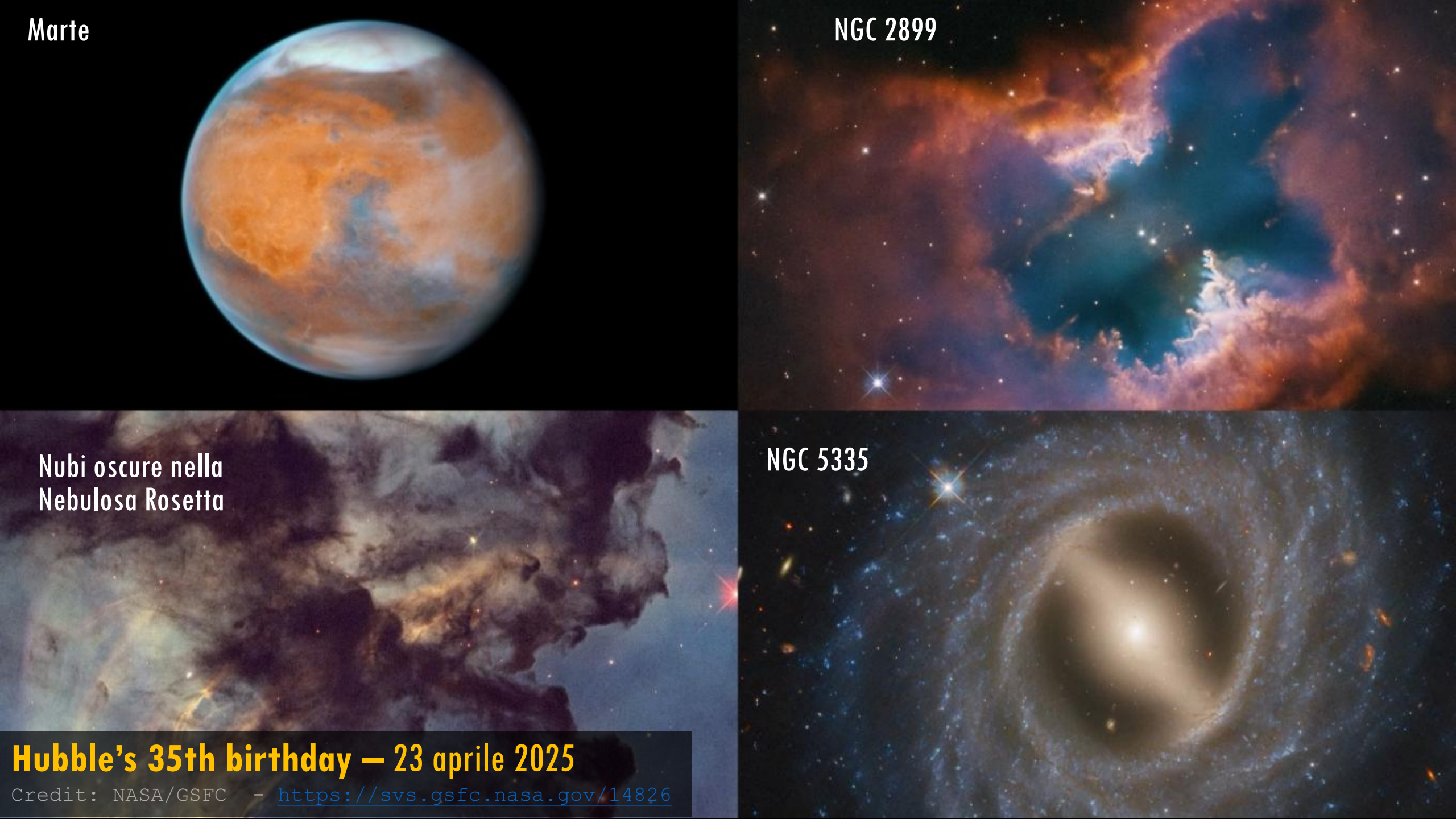
Hubble visto dallo Space Shuttle Discovery

Febbraio 1997 – In orbita dal 1990

Credit: NASA/Getty

Credit: NASA/GSFC

Credit: NASA



Hubble's 35th birthday – 23 aprile 2025

Credit: NASA/GSFC - https://svs.gsfc.nasa.gov/14826

I Pilastri della Creazione della Nebulosa Aquila

Visible · WFC3 · 2015

Infrared · WFC3 · 2015

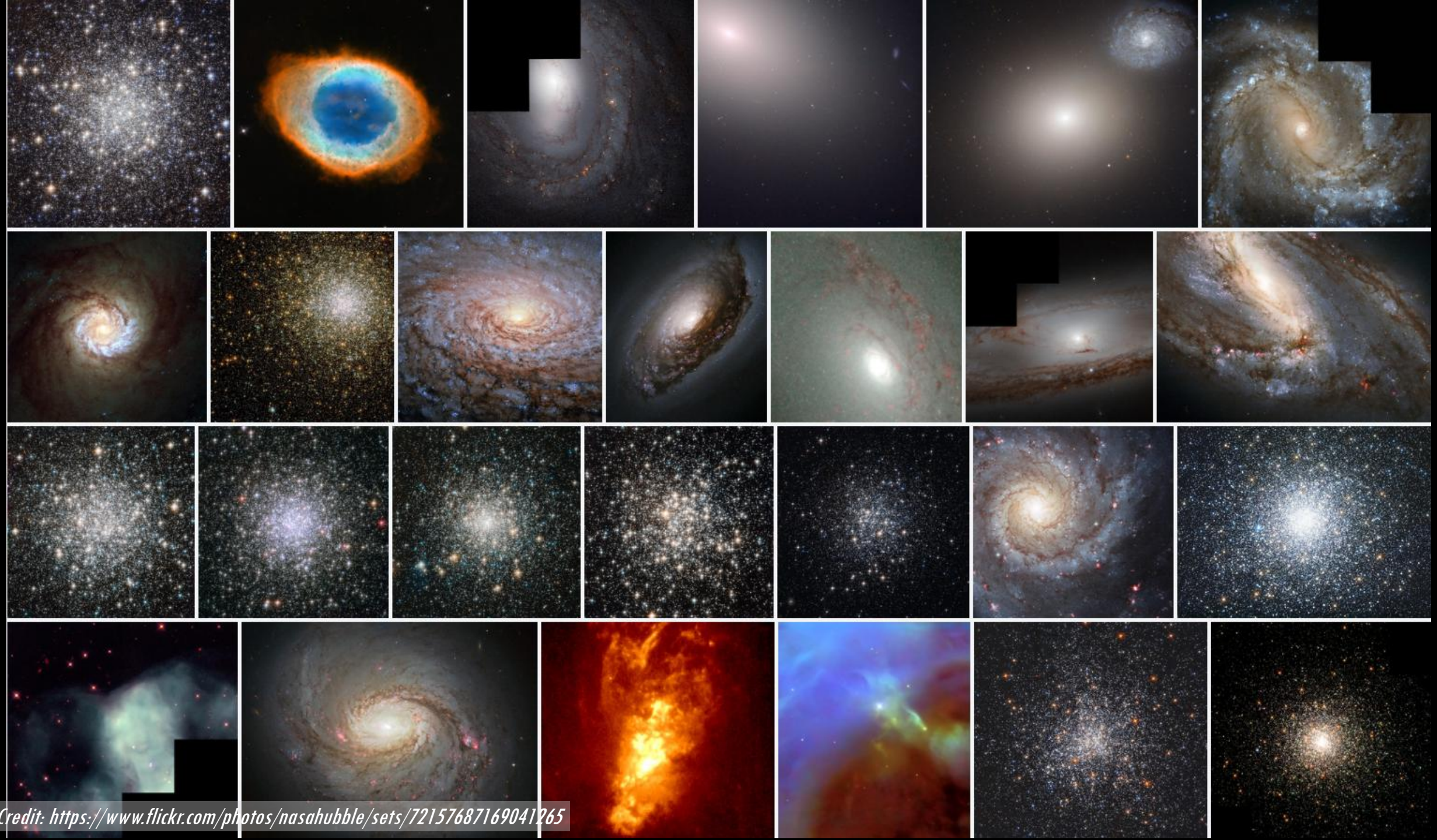
Credit: NASA, ESA/Hubble and the Hubble Heritage Team

NGC 6334 Nebulosa Zampa di Gatto

Credit: S. Lipinski/NASA & ESA

NGC 6543 Nebulosa Occhio di Gatto

Credit: NASA, ESA, HEIC, and The Hubble Heritage Team (STScI/AURA



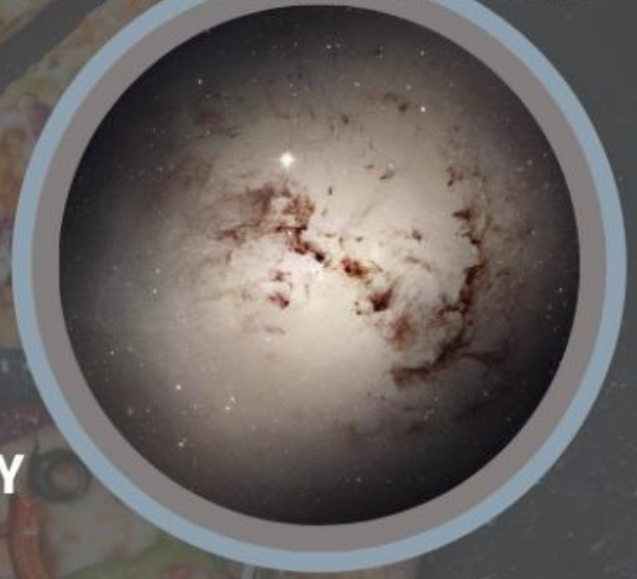
Credit: https://www.flickr.com/photos/nasahubble/sets/72157687169041265

NATIONAL PIZZA DAY

Which cosmic pizza is your favorite?

A. SPIRAL GALAXY

B. ELLIPTICAL GALAXY



C. IRREGULAR GALAXY

Credit: NASA/Universe

Galassia M101 “Girandola”

Diametro: 10^{18} metri $\approx$ 1 trilione di chilometri $\approx$ 100000 anni luce $\approx$ 32 600 parsec

Credits: ESA/NASA

Very Large Area Telescope (VLT)

European Southern Observatory, Paranal, Cile

Credit: ESO

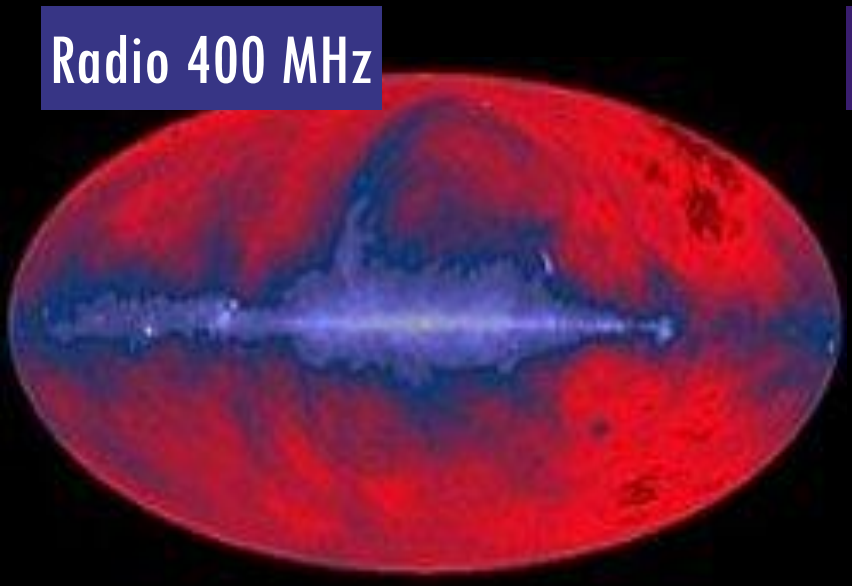
Gaia Early third Data Release (EDR3)

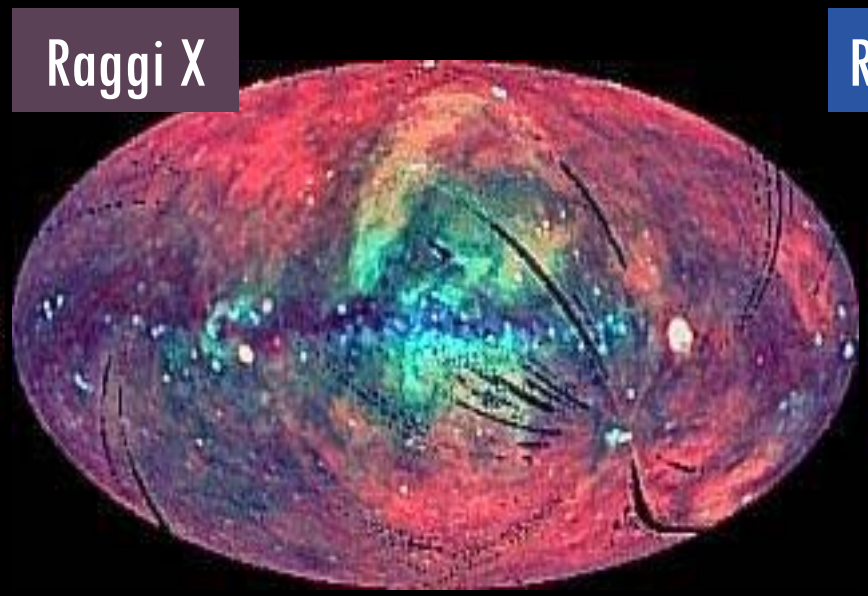
3 dicembre 2020

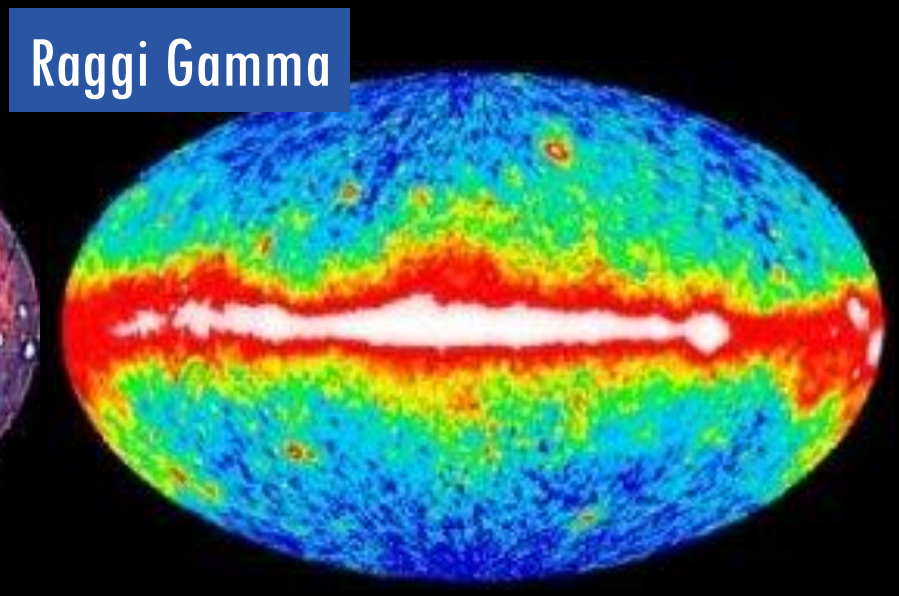
UN MILIARDO E 800 MILIONI di stelle mappate…!!!!

Credit: ESA/Gaia/DPAC

Il nostro Universo



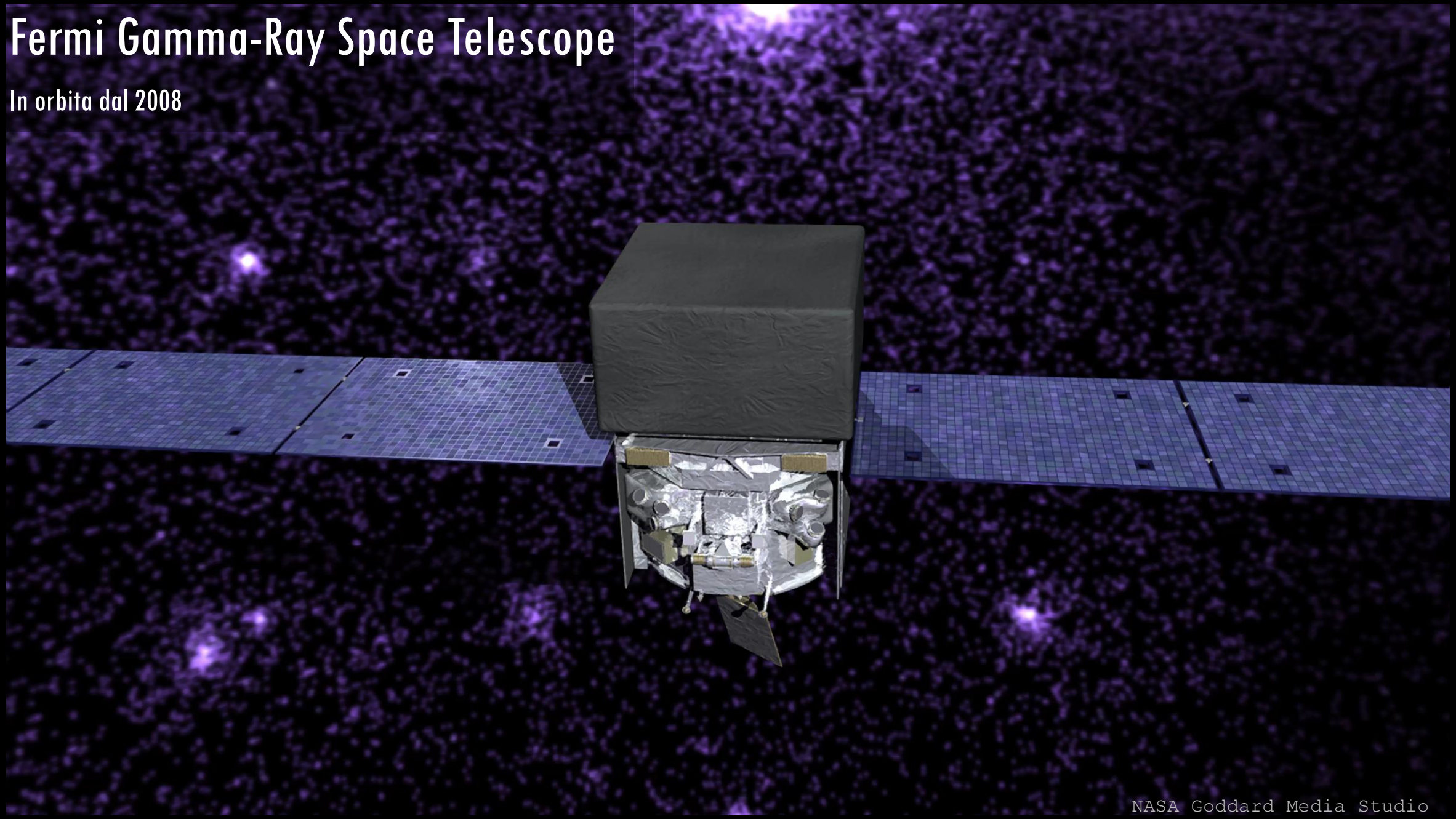




Credit: NASA/ESA

Fermi Gamma-Ray Space Telescope

In orbita dal 2008

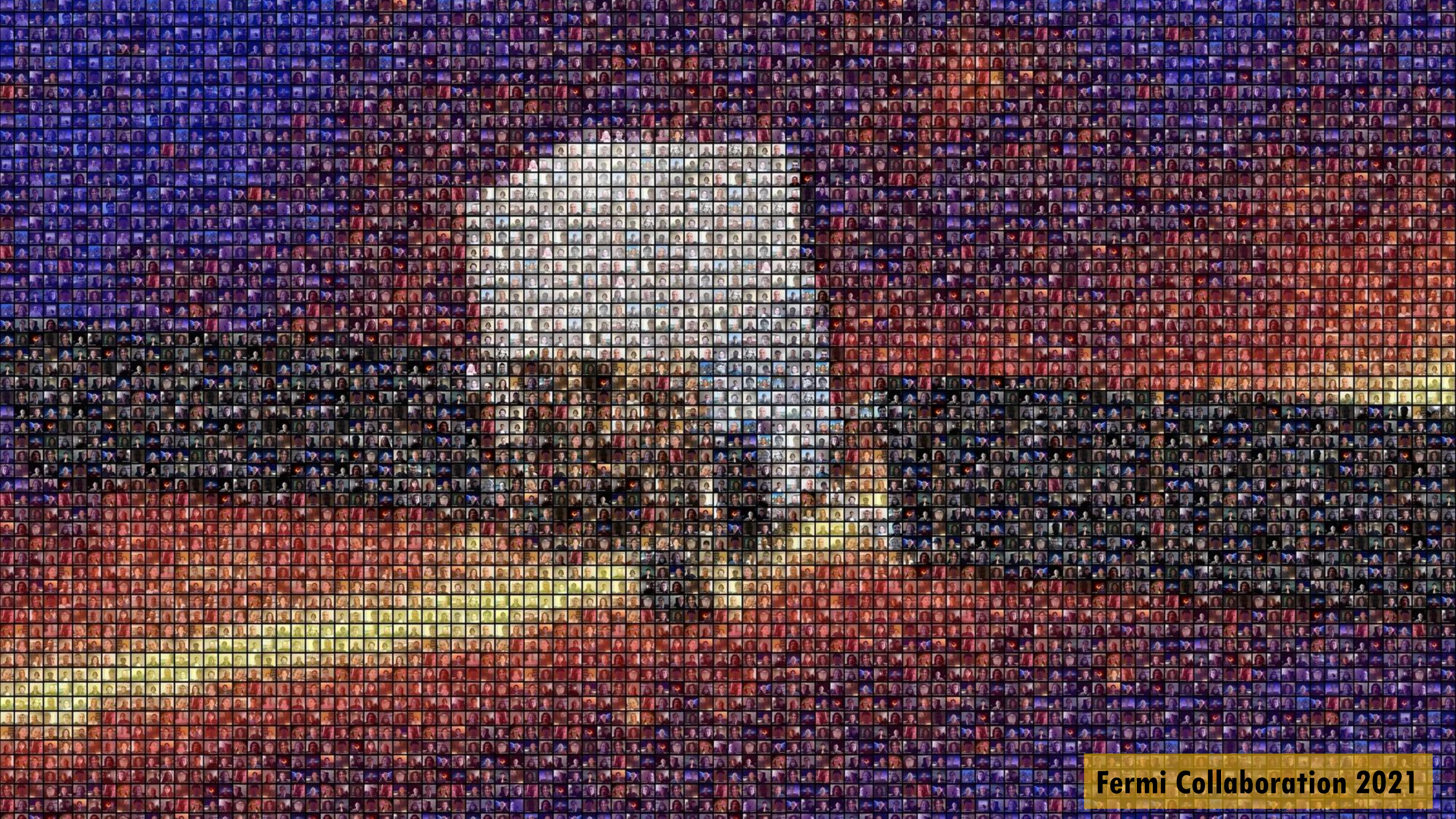


NASA Goddard Media Studio
https://svs.gsfc.nasa.gov/13094

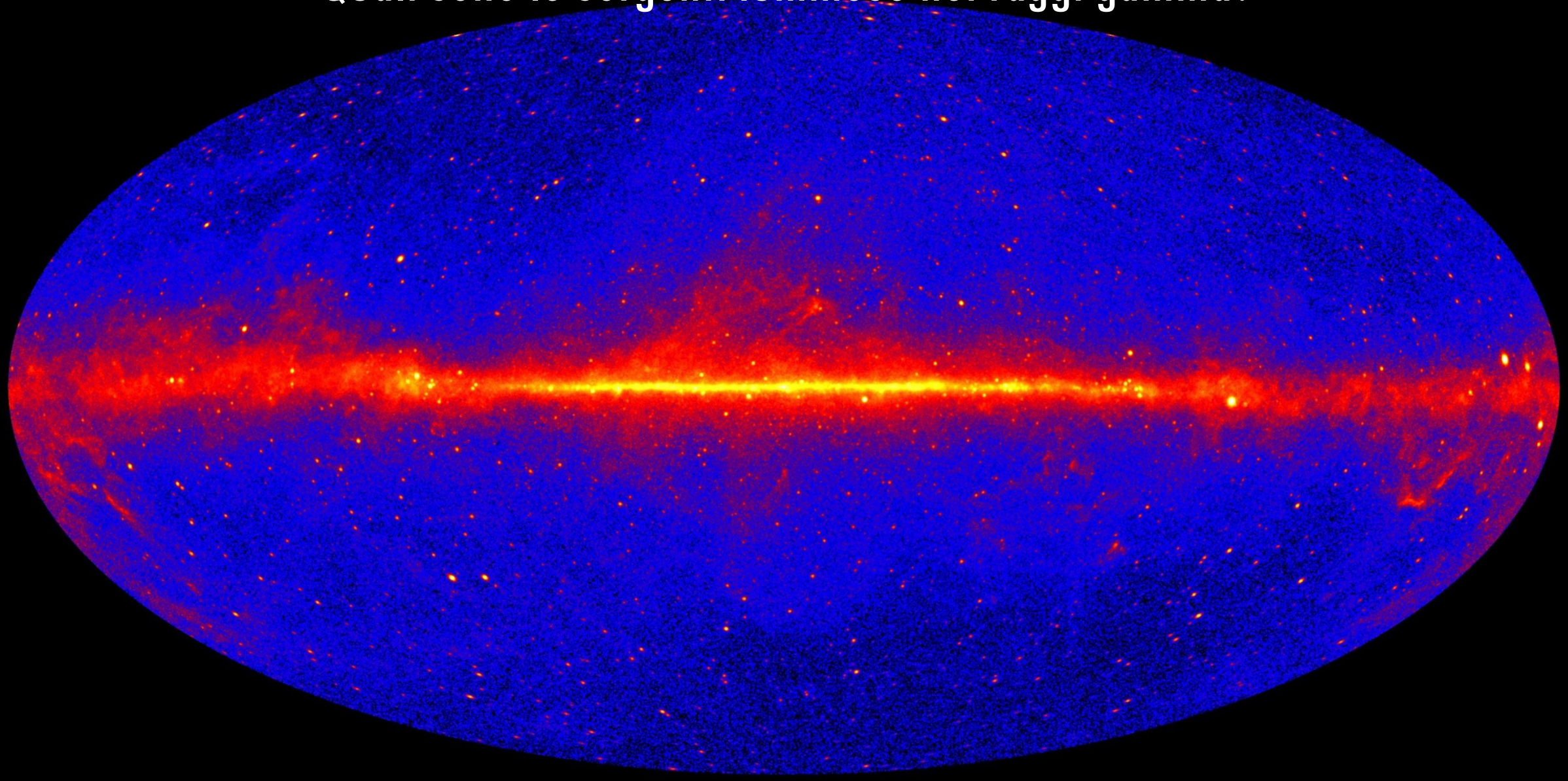
Credit: NASA's Goddard Space Flight Center/CI Lab

NASA Goddard Media Studio
https://svs.gsfc.nasa.gov/13272

Credit: NASA's Goddard Space Flight Center/Gabby Garcia


Fermi Collaboration 2021

Quali sono le sorgenti luminose nei raggi gamma?

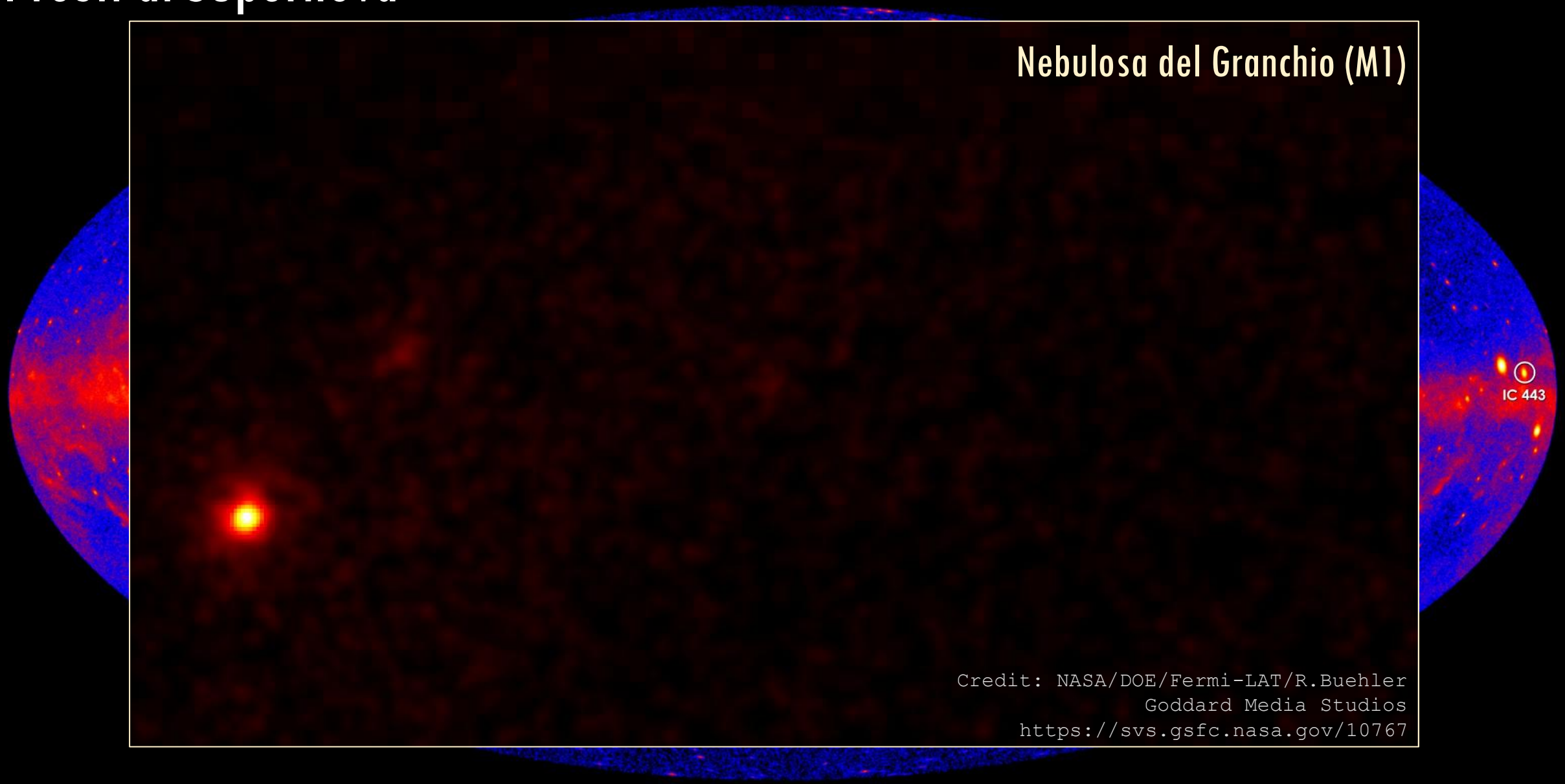


Credit: NASA/DOE/Fermi LAT Collaboration

Credit: NASA/Goddard Space Flight Center Scientific Visualization Studio

NASA GSFC Flickr Fotostream
https://www.flickr.com/photos/gsfc/5162413062

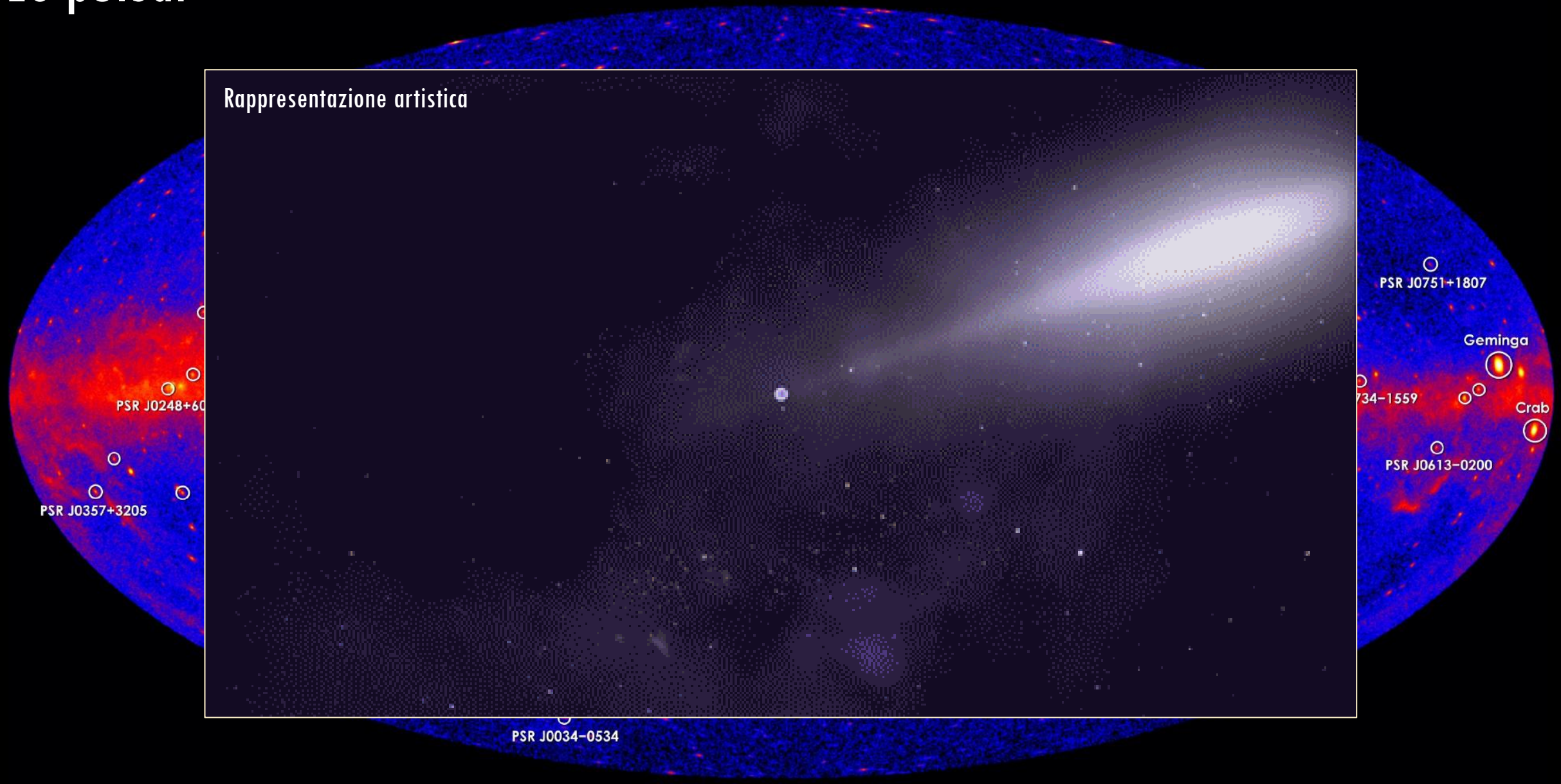
I resti di Supernova



Credit: NASA/DOE/Fermi LAT Collaboration

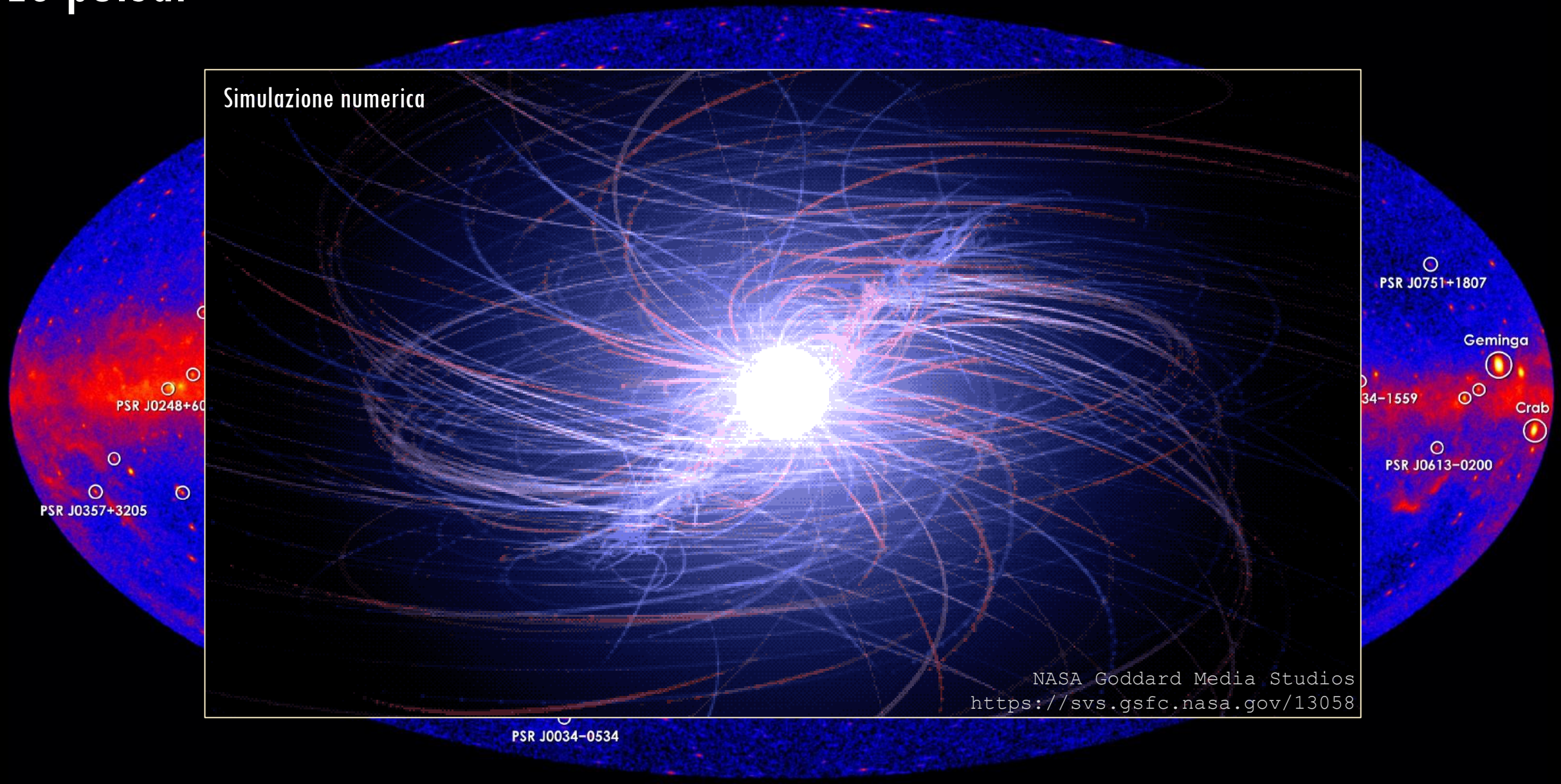
Credit: NASA, ESA, G. Dubner (IAFE, CONICET-University of Buenos Aires) et al.; A. Loll et al.;
T. Temim et al.; F. Seward et al.; VLA/NRAO/AUI/NSF; Chandra/CXC; Spitzer/JPL-Caltech; XMM-Newton/ESA; and Hubble/STScI

Le pulsar



Credit: NASA/DOE/Fermi LAT Collaboration/CI Lab

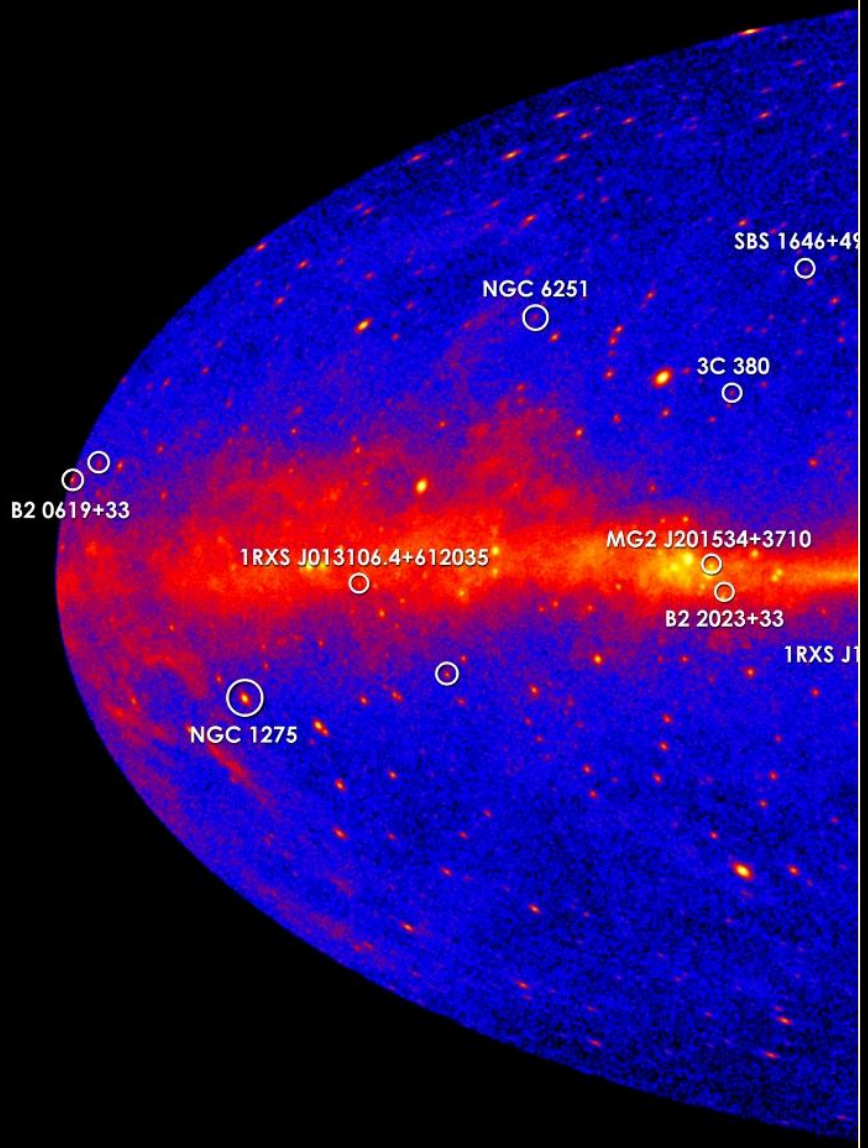
Le pulsar



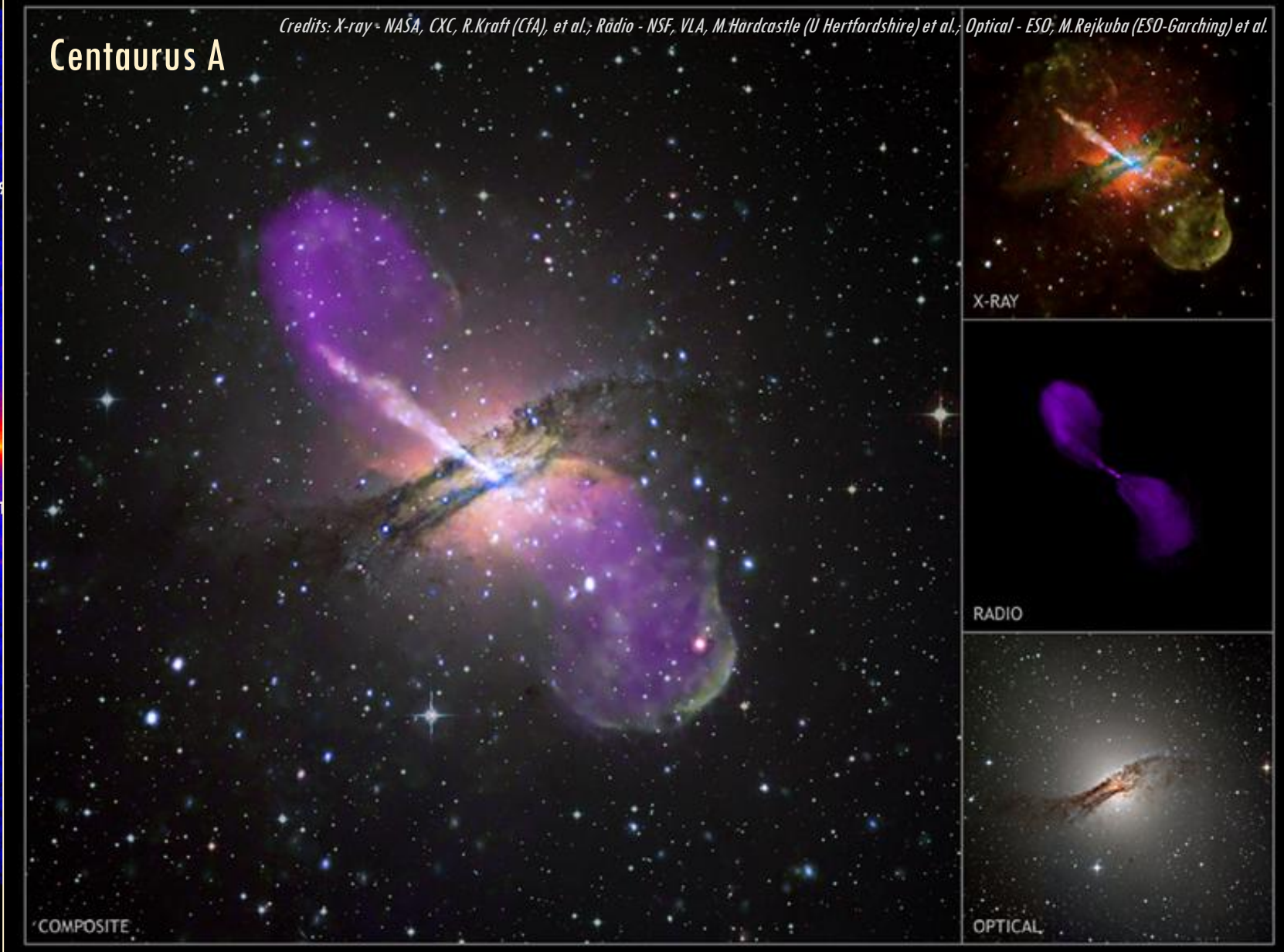
Credit: NASA/DOE/Fermi LAT Collaboration/GSFC


NASA Goddard Media Studios
https://svs.gsfc.nasa.gov/13156
NRAO Outreach
https://vimeo.com/325195213
Credit Sophia Dagnello, NRAO/AUI/NSF

I Nuclei Galattici Attivi (AGN)

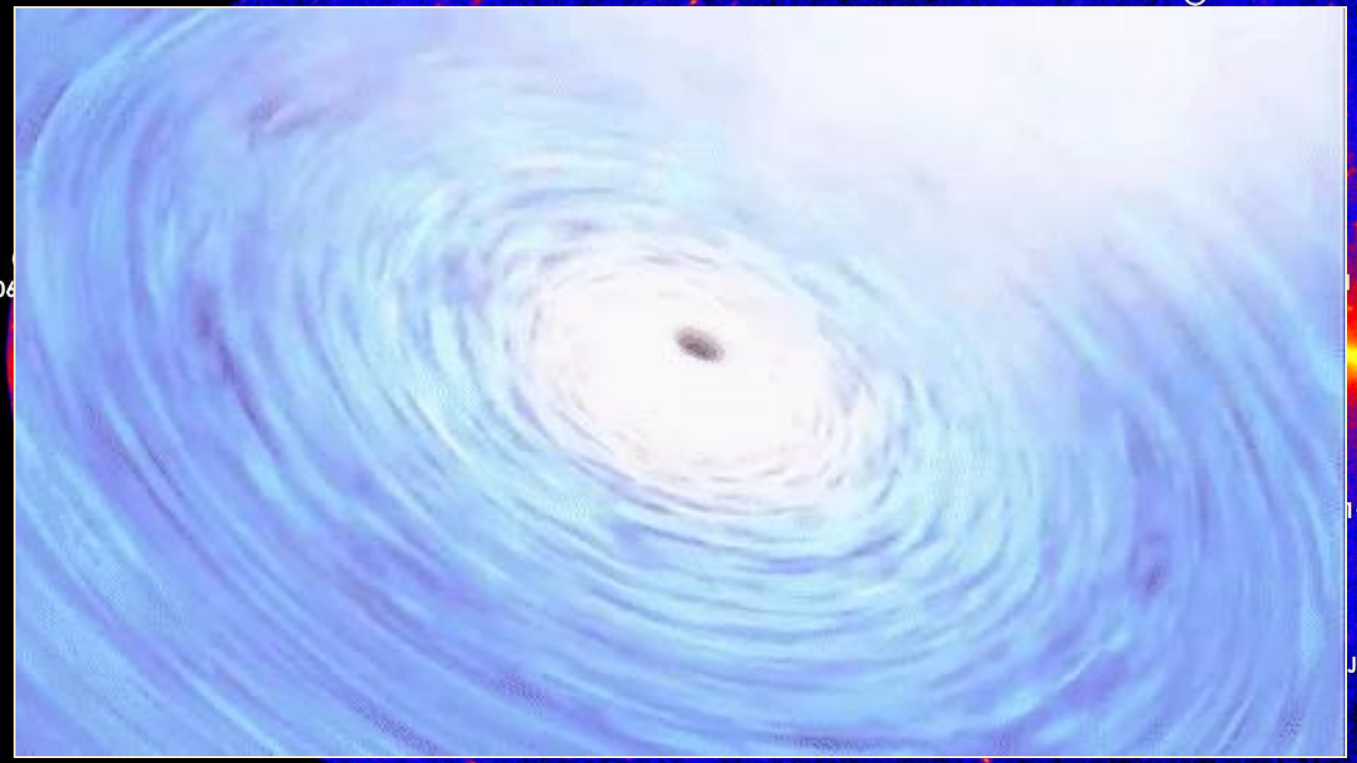


Credit: NASA/DOE/Fermi LAT Collaboration



I Nuclei Galattici Attivi (AGN)

Rappresentazioni artistiche



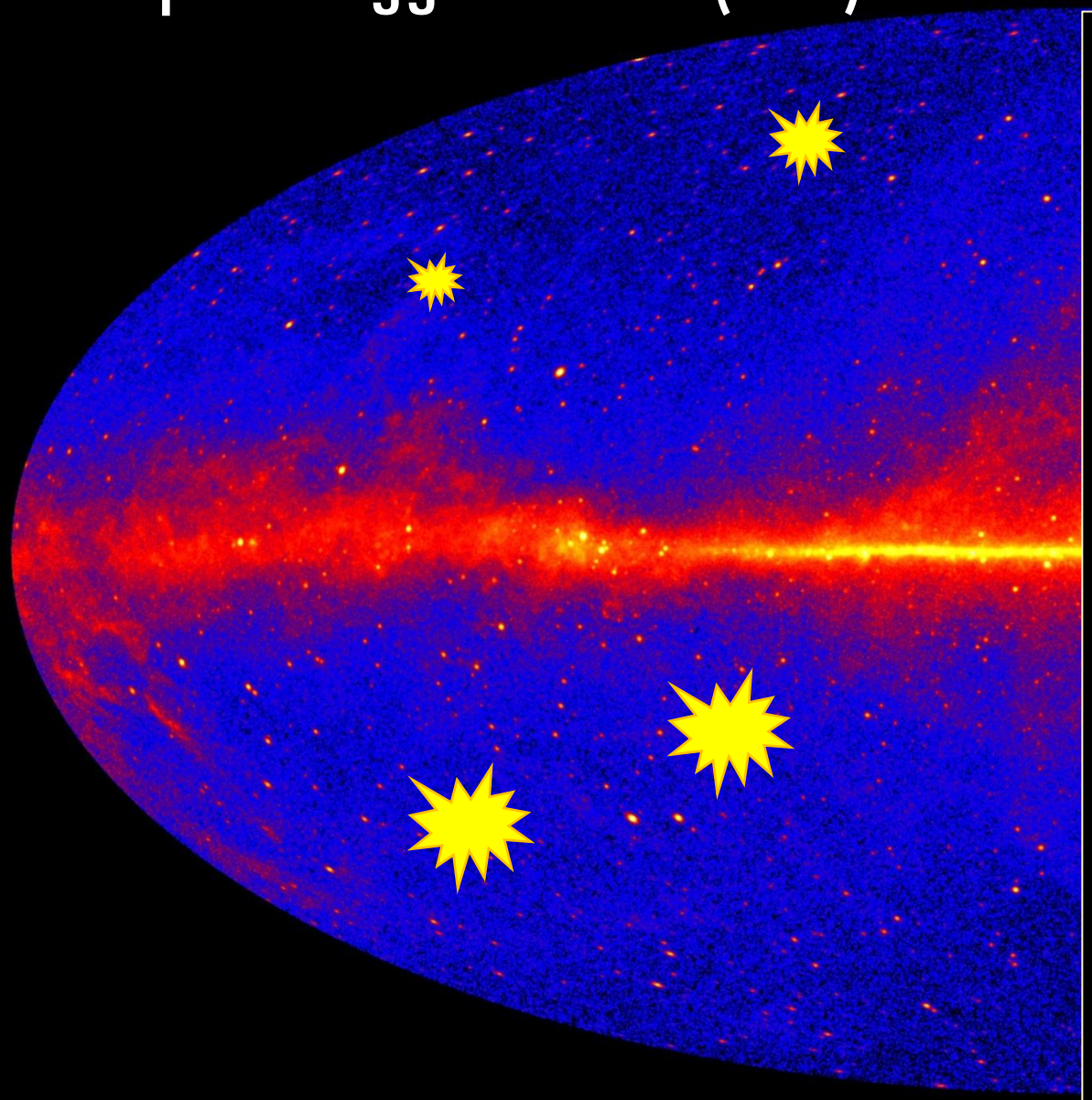
Credit: NASA/DOE/Fermi LAT Collaboration

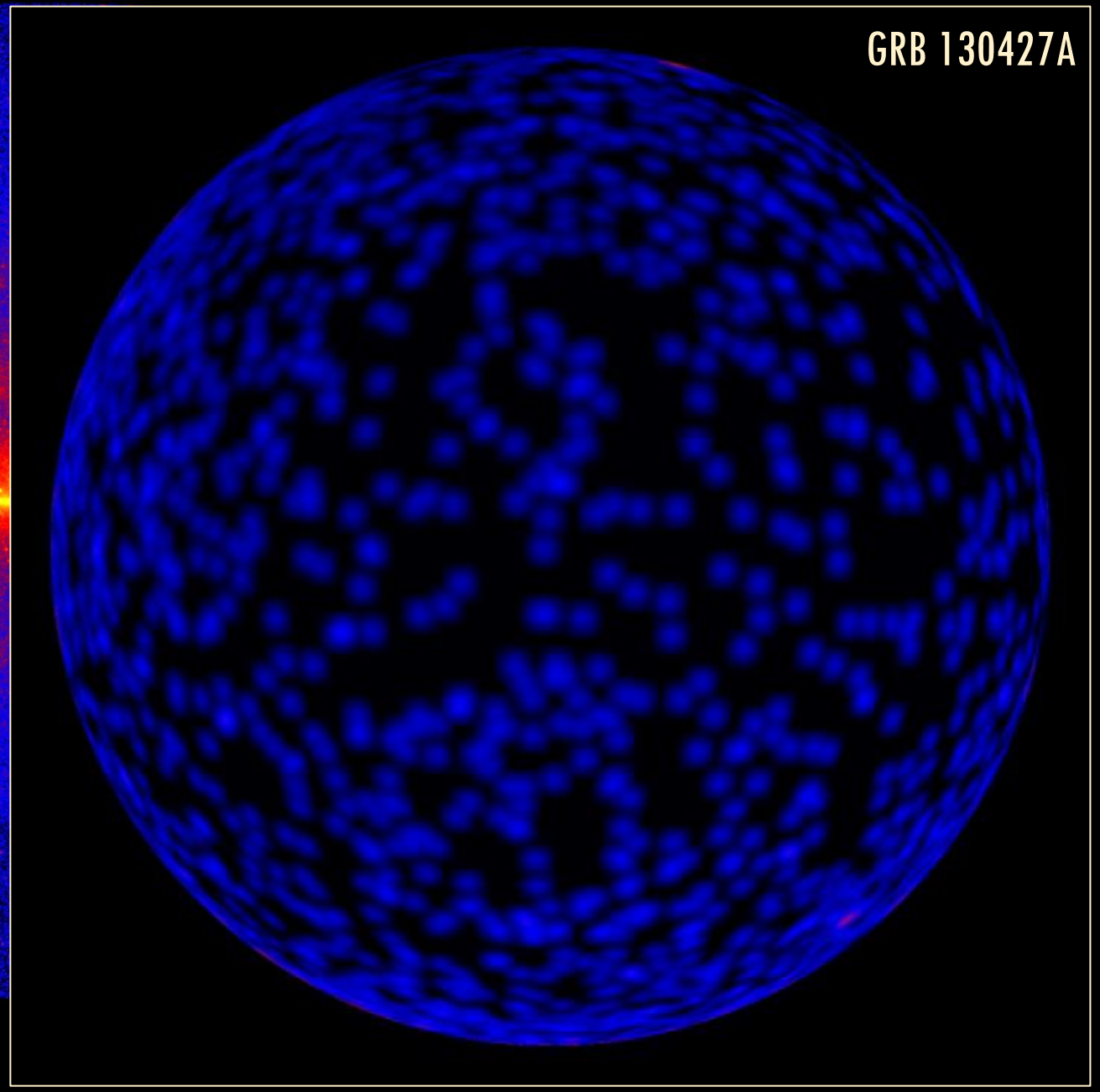
Galassia Attiva 3C 279

NASA Goddard Media Studios
https://www.youtube.com/watch?v=9Rl4l6tuHGg
https://svs.gsfc.nasa.gov/11947

Credit NASA/DOE/Fermi LAT Collaboration

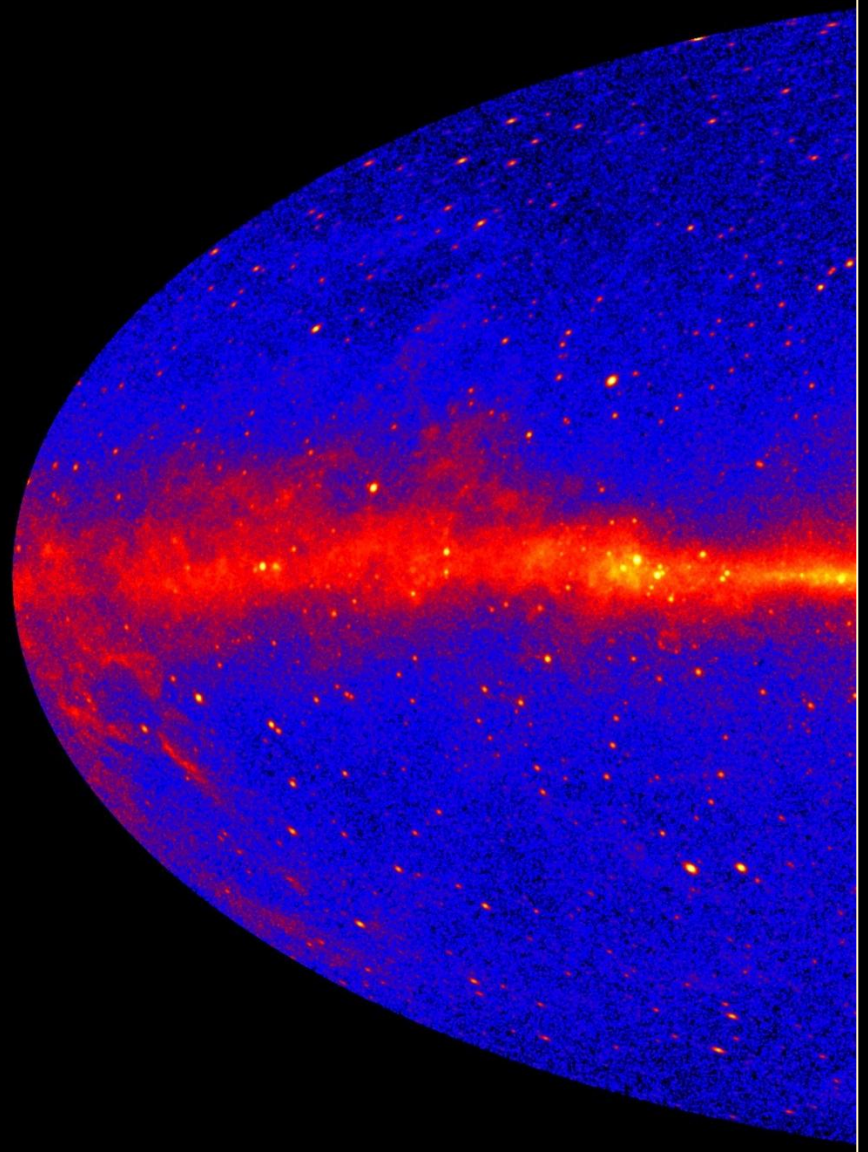
I Lampi di Raggi Gamma (GRB)

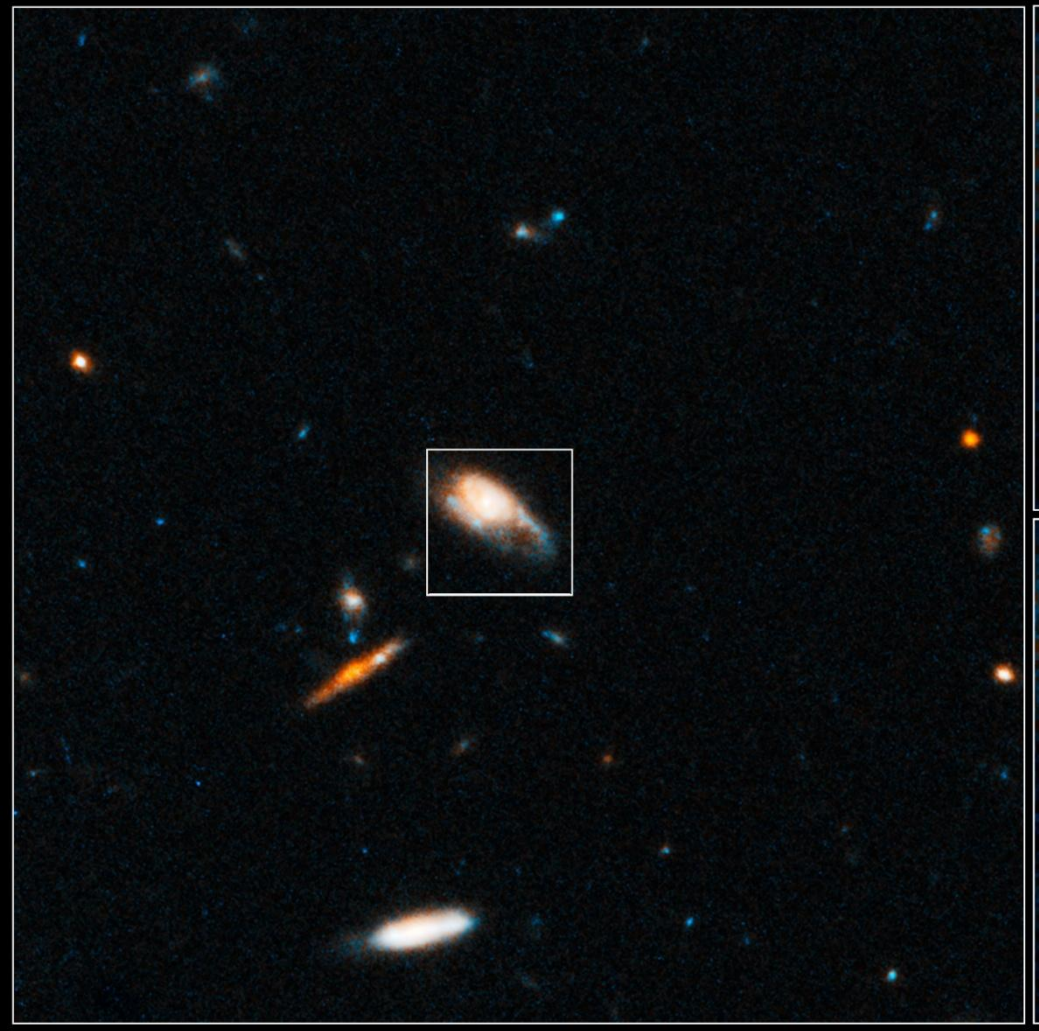


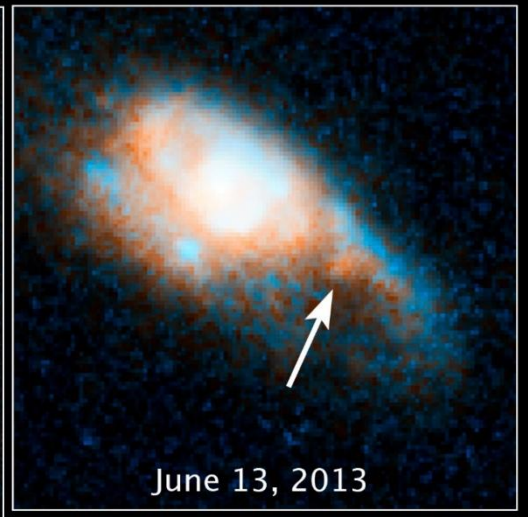


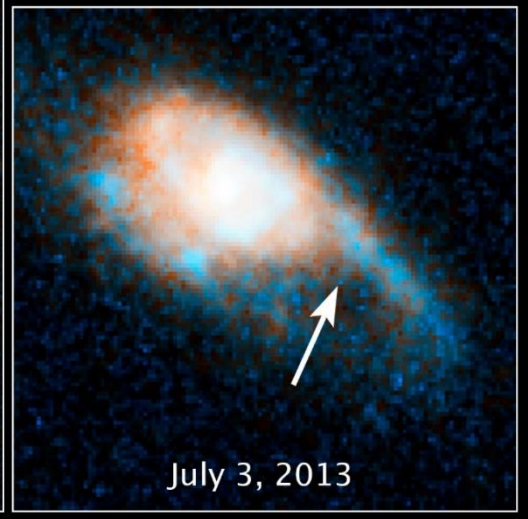
Credit: NASA/DOE/Fermi LAT Collaboration/GSFC

I Lampi di Raggi Gamma (GRB)









Gamma-ray Burst GRB 130603B
Hubble Space Telescope ▪ ACS/WFC3

NASA and ESA

STScI-PRC13-29a

Credit: NASA/DOE/Fermi LAT Collaboration/GSFC

I Lampi di Raggi Gamma (GRB)

Rappresentazioni artisticiche

Credit: NASA/DOE/Fermi LAT Collaboration/GSFC

Credit: LIGO/SXS/R.Hurt and T. Pyle
https://www.youtube.com/watch?v=FlDtXIBrAYE

Credit: NASA/AEI/ZIB/M. Koppitz and L. Rezzolla
Music: "Approaching Eclipse" from stock music site Killer Tracks

NASA Goddard Media Studios
https://svs.gsfc.nasa.gov/11530

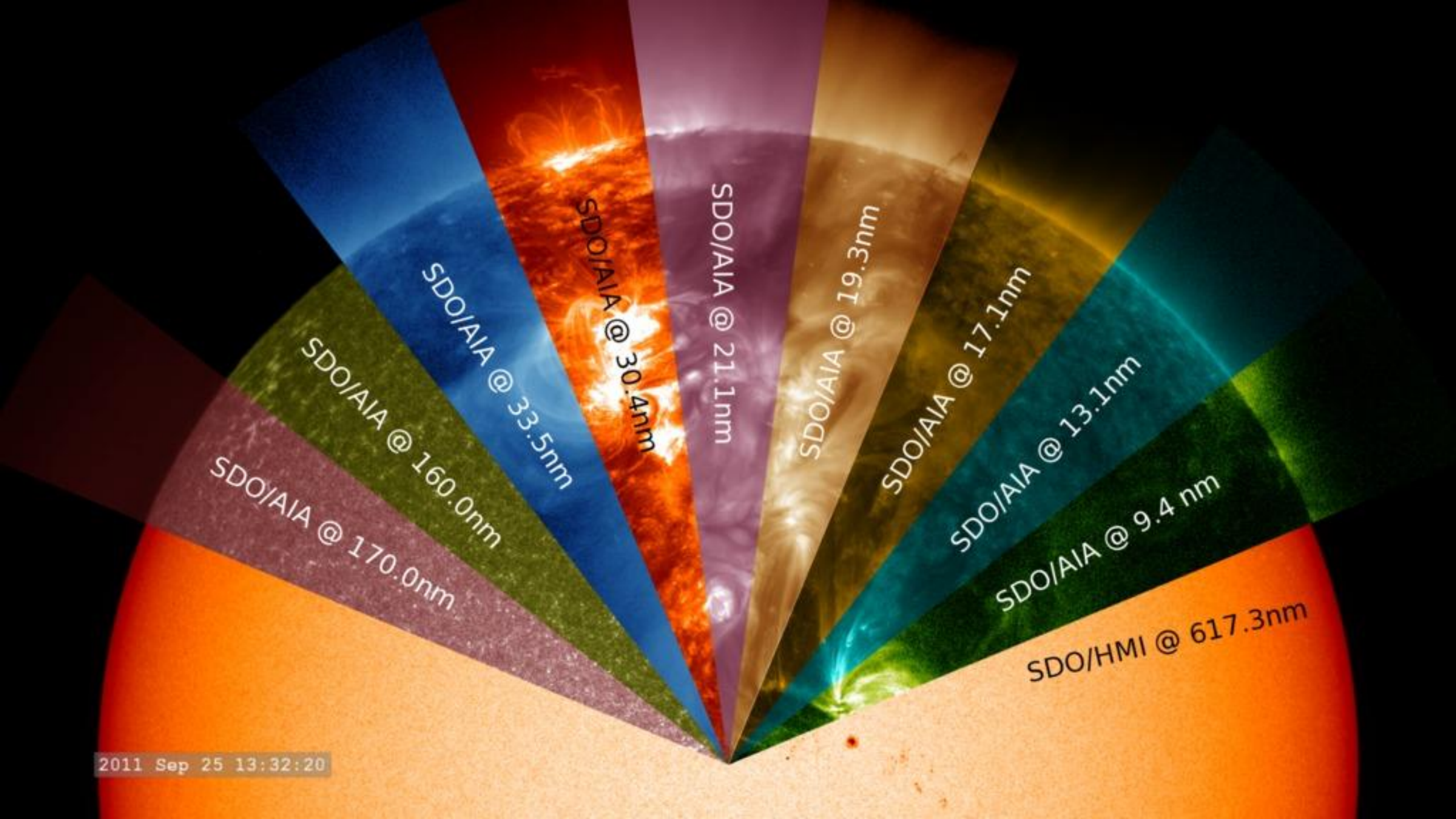
Credit: NASA/Universe

Grazie per l'attenzione

Elisabetta Bissaldi

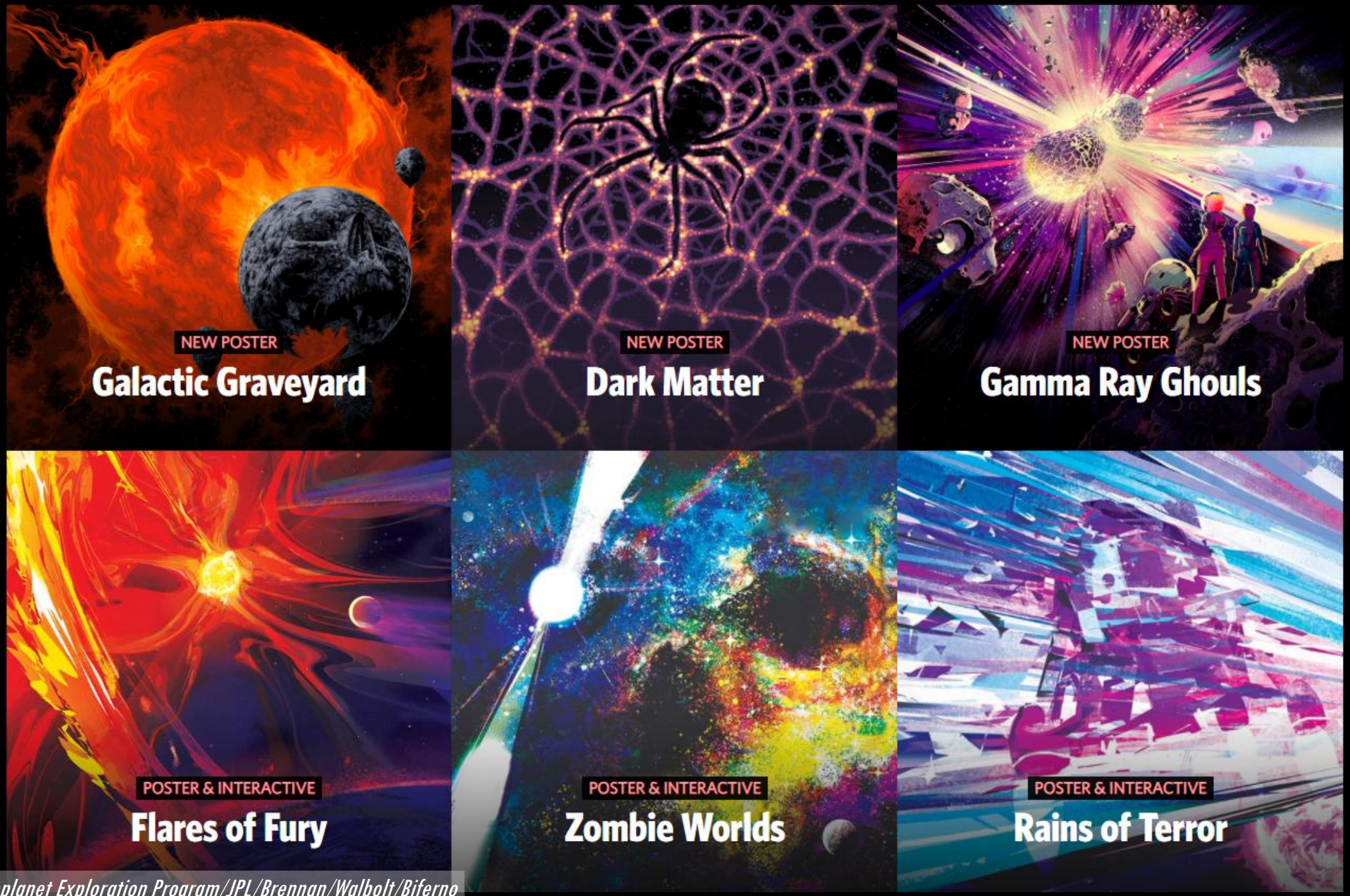
elisabetta.bissaldi@ba.infn.it

Credit: NASA, ESA, and T. Brown (STScI)


SDO/AIA @ 170.0nm
SDO/AIA @ 160.0nm
SDO/AIA @ 33.5nm
SDO/AIA @ 30.4nm
SDO/AIA @ 21.1nm
SDO/AIA @ 19.3nm
SDO/AIA @ 17.1nm
SDO/AIA @ 13.1nm
SDO/AIA @ 9.4 nm
SDO/HMI @ 617.3nm
2011 Sep 25 13:32:20

Ogni frequenza è tipica di particolari fenomeni:

- Radio: elettroni in campi magnetici
- Infrarosso: emissione dalle polveri
- Visibile: tipica delle Stelle
- Raggi X: dischi attorno ad oggetti compatti
- Raggi Gamma: getti di materia relativistica

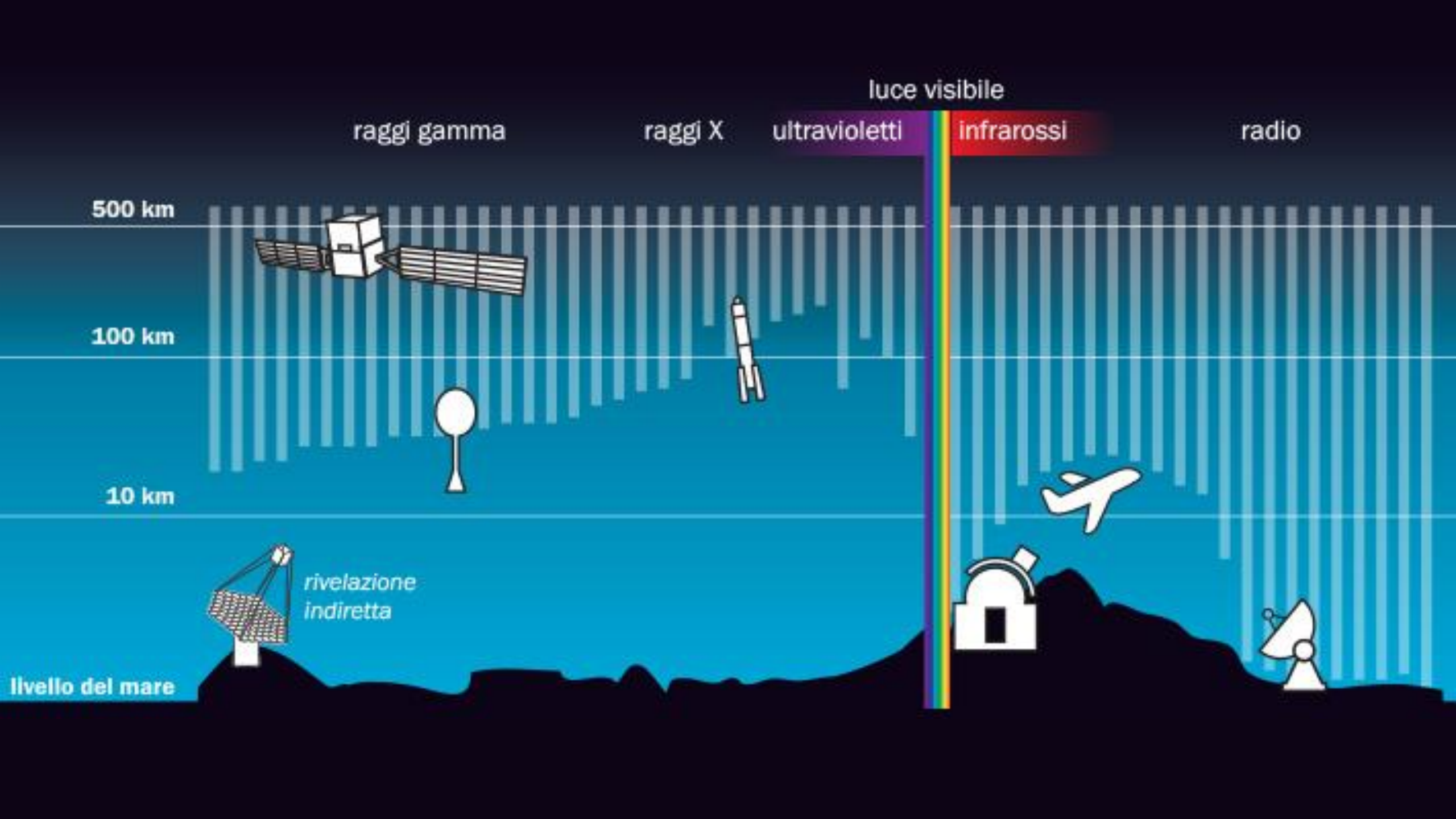


Credit: NASA Exoplanet Exploration Program/JPL/Brennan/Walbolt/Biferno

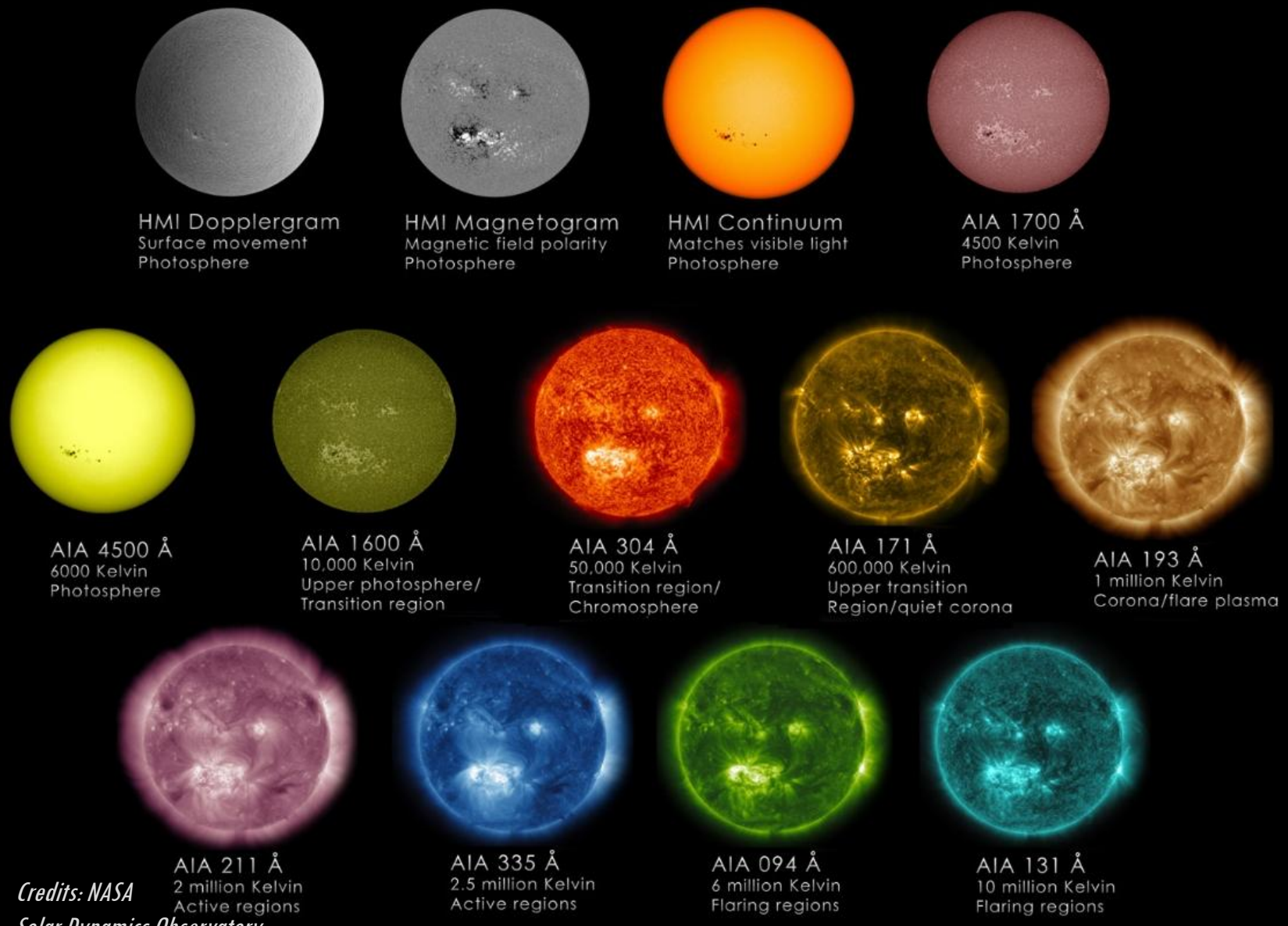
Transito di Mercurio

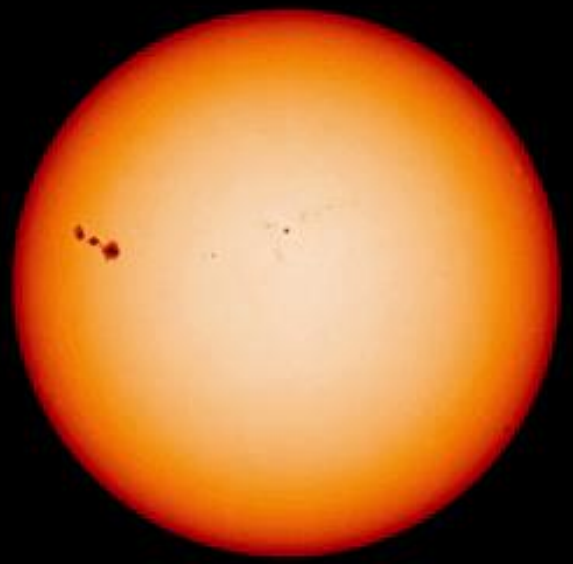
11 novembre 2019

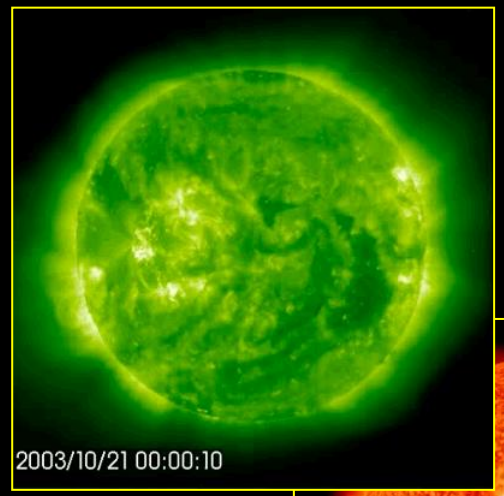
Credit: NASA/Bill Ingalls

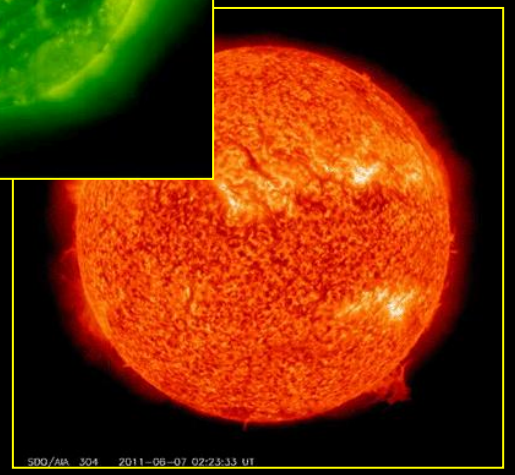

luce visibile
raggi gamma
raggi X
ultravioletti
infrarossi
radio
500 km
100 km
10 km
rivelazione
indiretta
livello del mare

La stella più vicina: Il nostro Sole

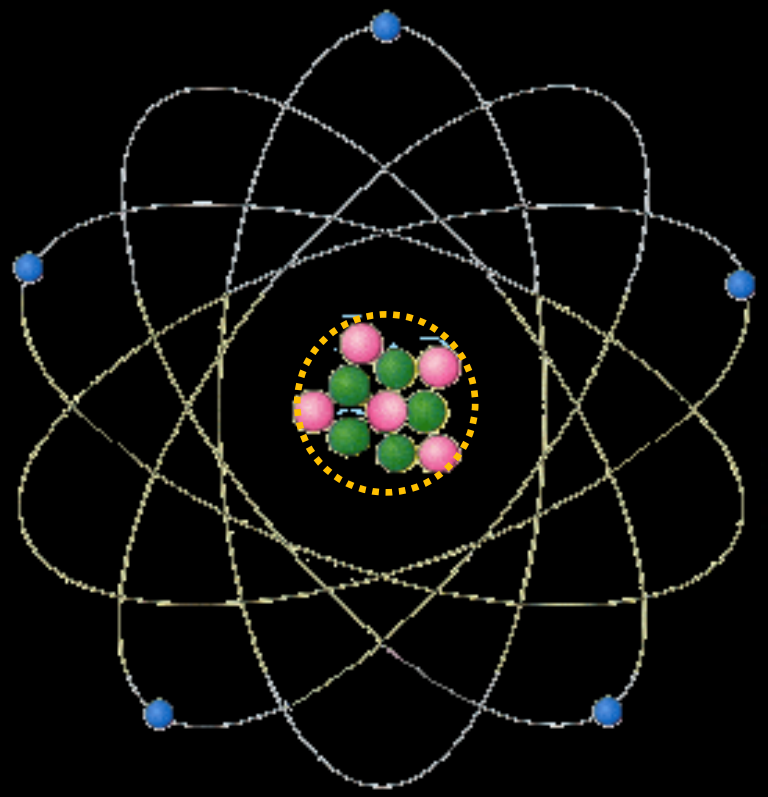




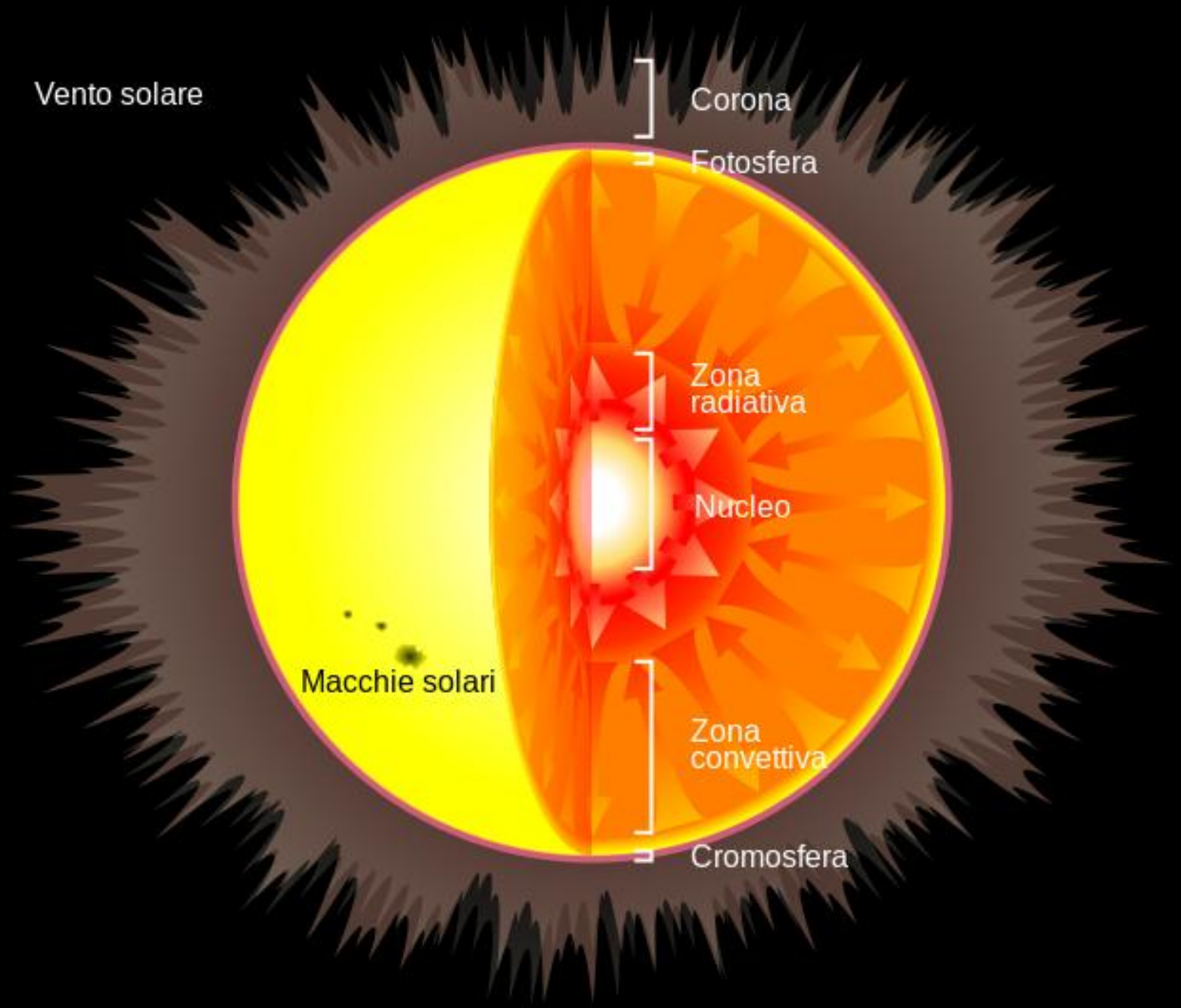




Credits: NASA
Solar Dynamics Observatory

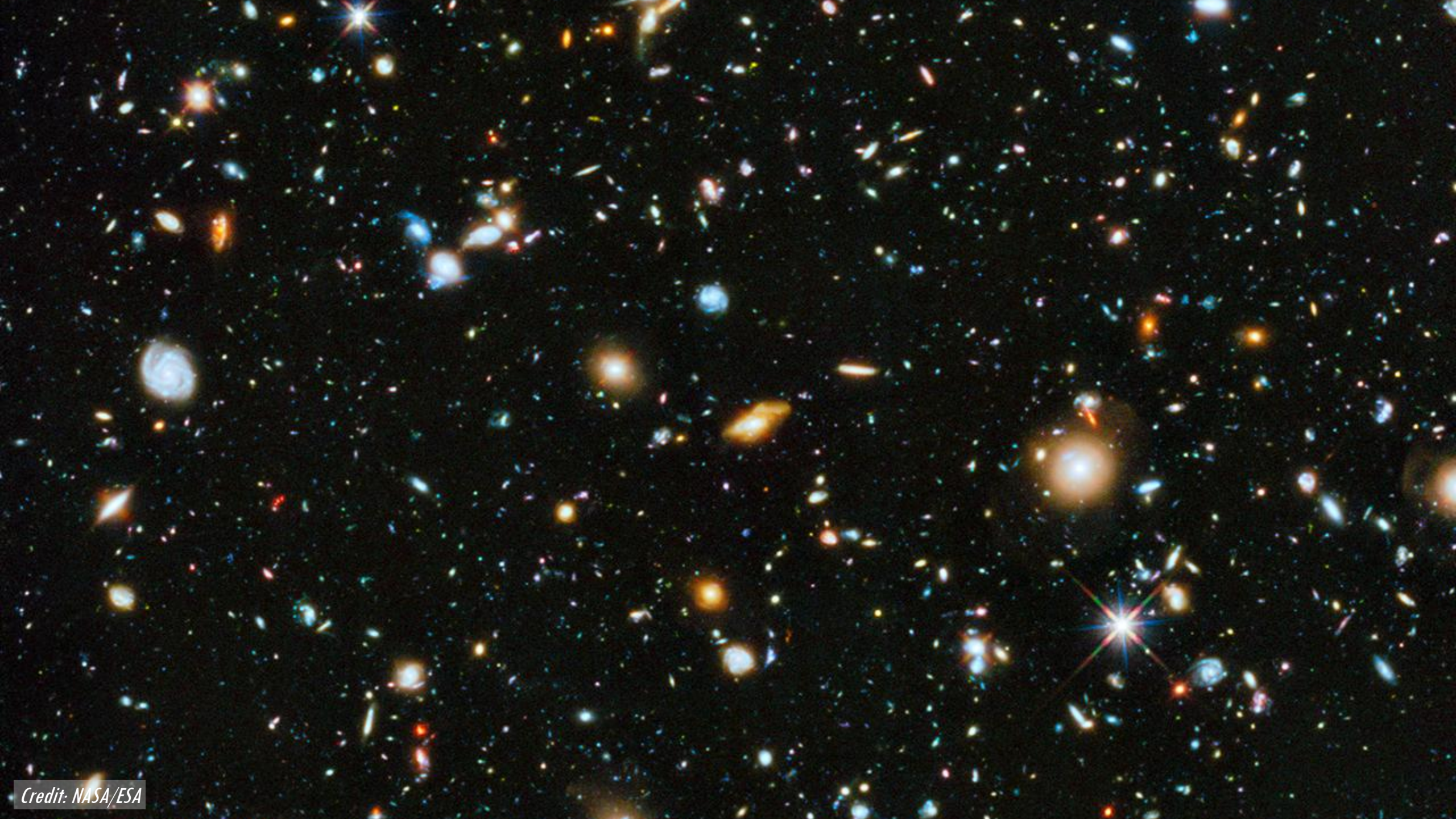


Protone
Neutrone
Nucleo
Elettrone



On April 25, 1990, the Hubble Space Telescope was deployed from the cargo bay of space shuttle Discovery. Here, Hubble has one of its two solar array panels deployed while still in the grasp of Discovery's remote manipulator system.

Credit: NASA


Credit: NASA/ESA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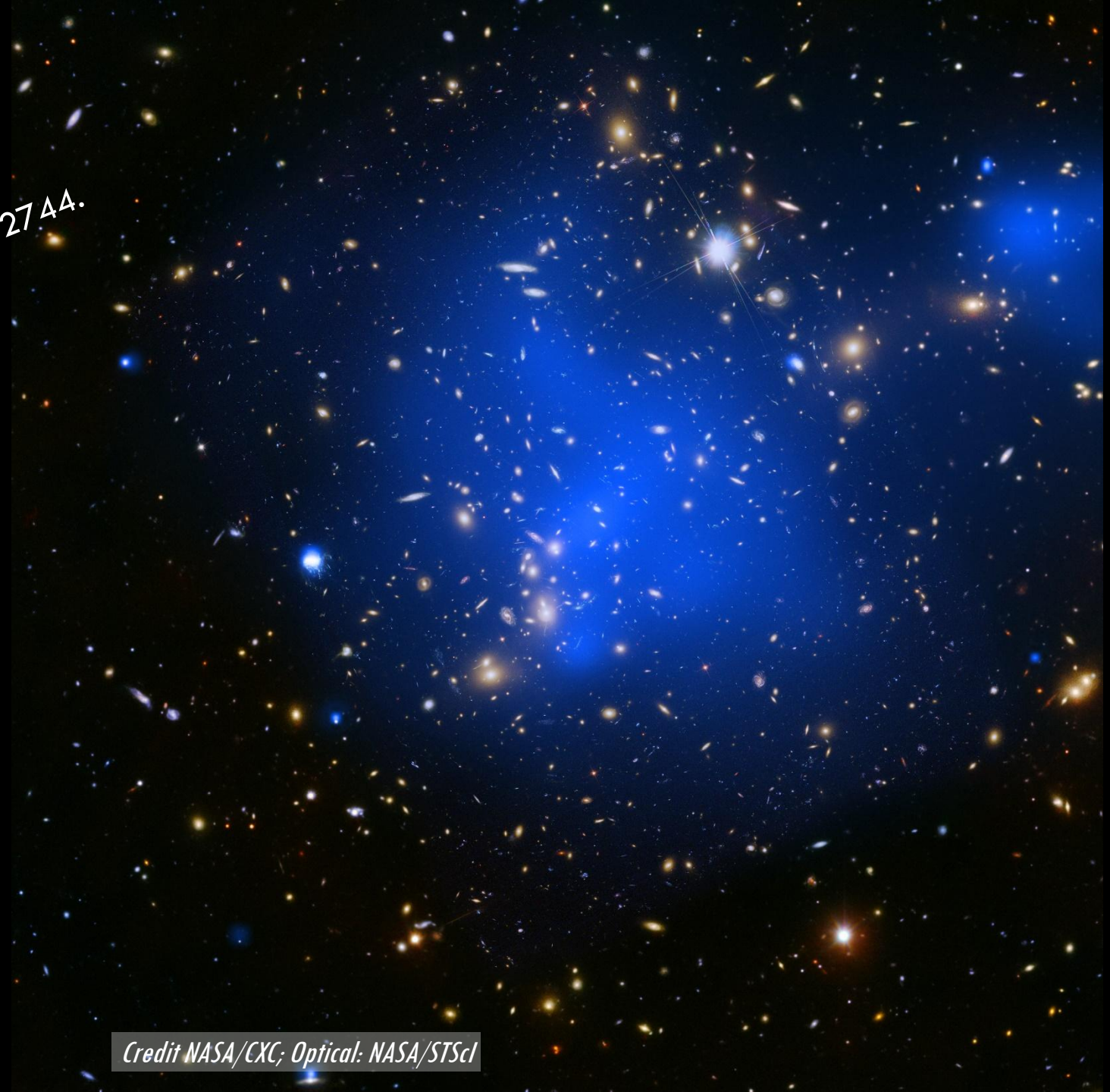
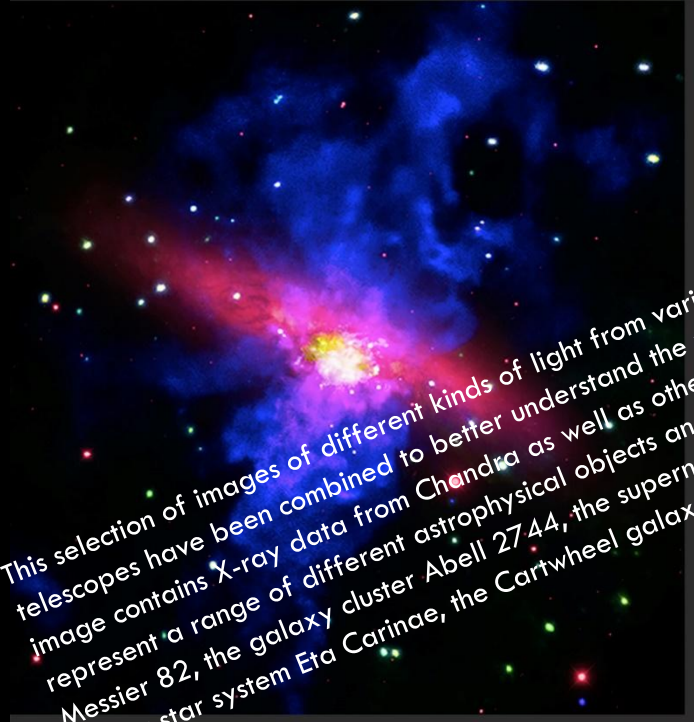
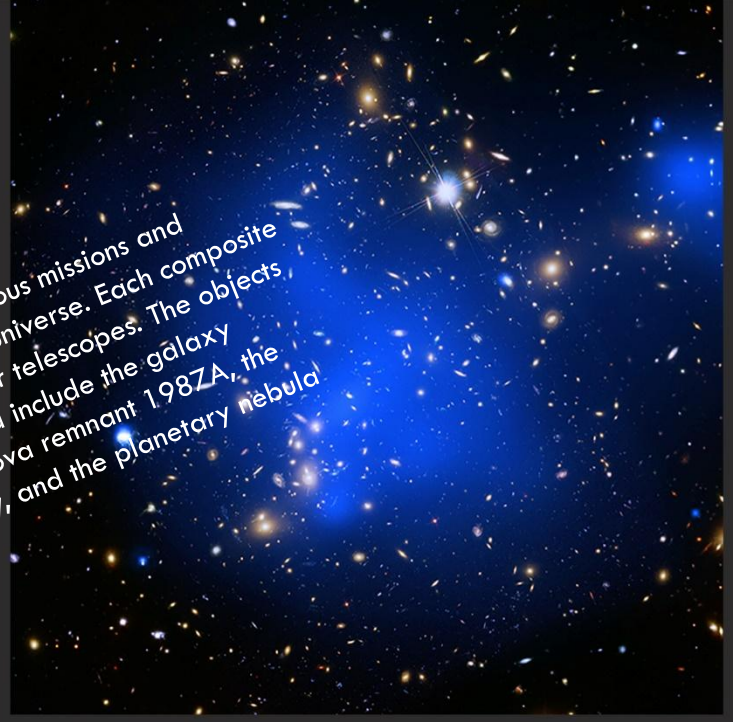
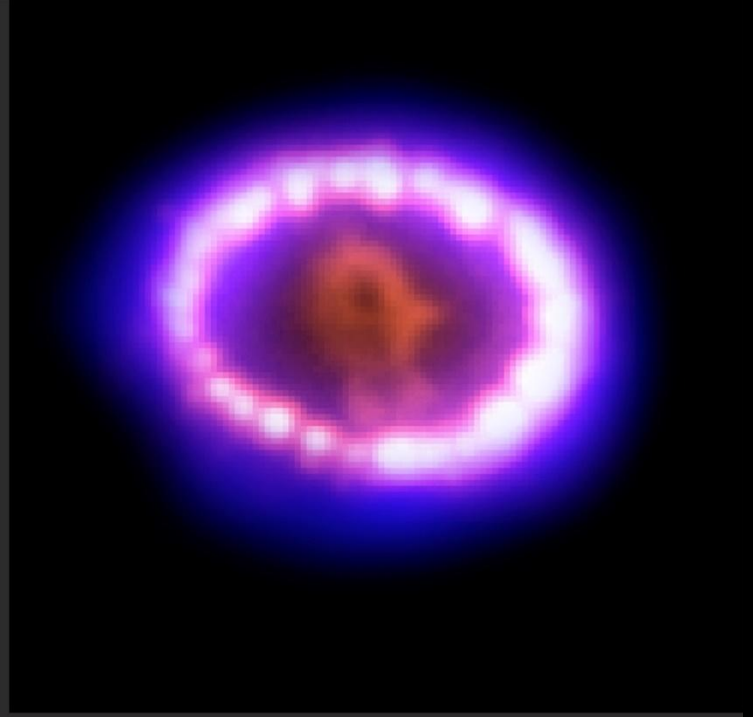
cluster Abell 2744.



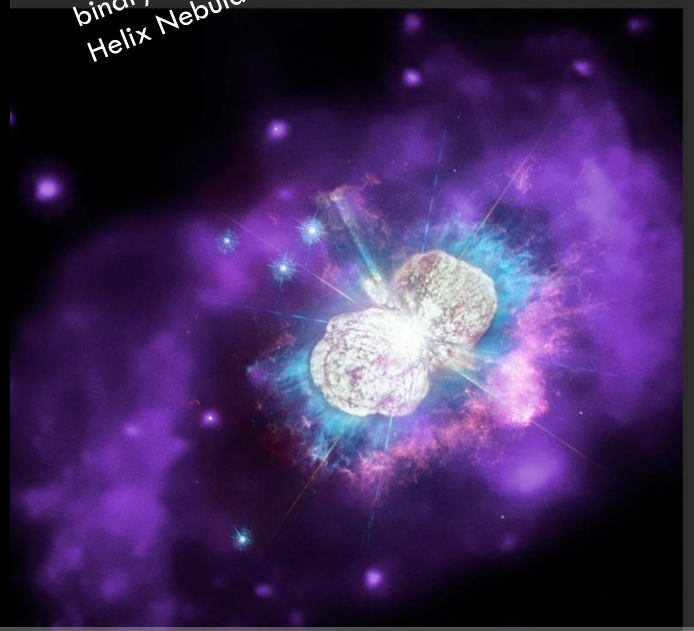
Credit NASA/CXC; Optical: NASA/STScI





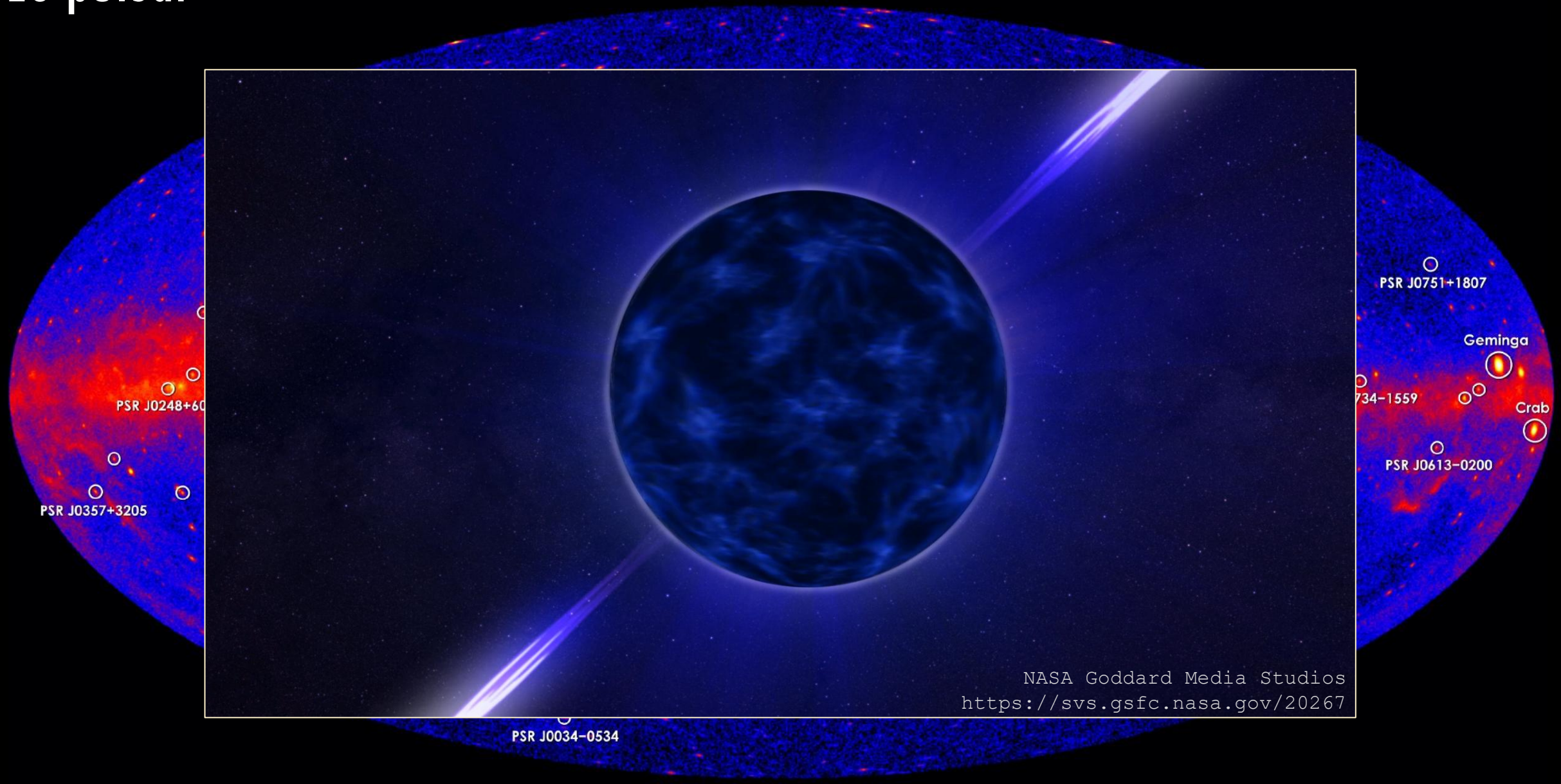


This selection of images of different kinds of light from various missions and telescopes have been combined to better understand the universe. Each composite image contains X-ray data from Chandra as well as other telescopes. The objects represent a range of different astrophysical objects and include the galaxy Messier 82, the galaxy cluster Abell 2744, the supernova remnant 1987A, the binary star system Eta Carinae, the Cartwheel galaxy, and the planetary nebula Helix Nebula.

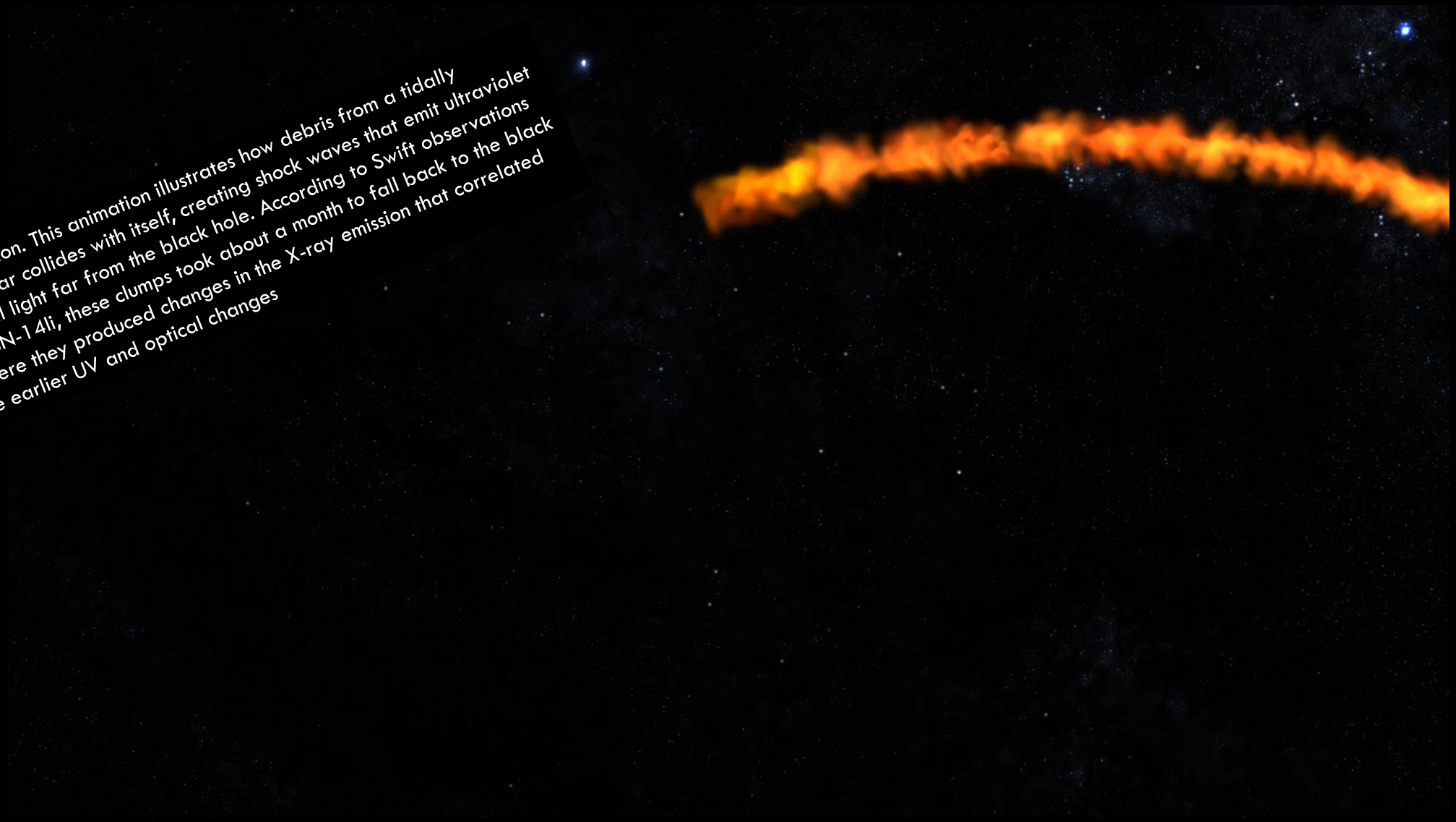


CreditNASA/CXC/SAO, NASA/STScI, NASA/JPL-Caltech/SSC, ESO/NAOJ/NRAO, NRAO/AUI/NSF, NASA/CXC/SAO/PSU, and NASA/ESA

Le pulsar



Credit: NASA/DOE/Fermi LAT Collaboration/CI Lab



4K UHD version. This animation illustrates how debris from a tidally disrupted star collides with itself, creating shock waves that emit ultraviolet and optical light far from the black hole. According to Swift observations of ASASSN-14li, these clumps took about a month to fall back to the black hole, where they produced changes in the X-ray emission that correlated with the earlier UV and optical changes

Credit: NASA GSFC

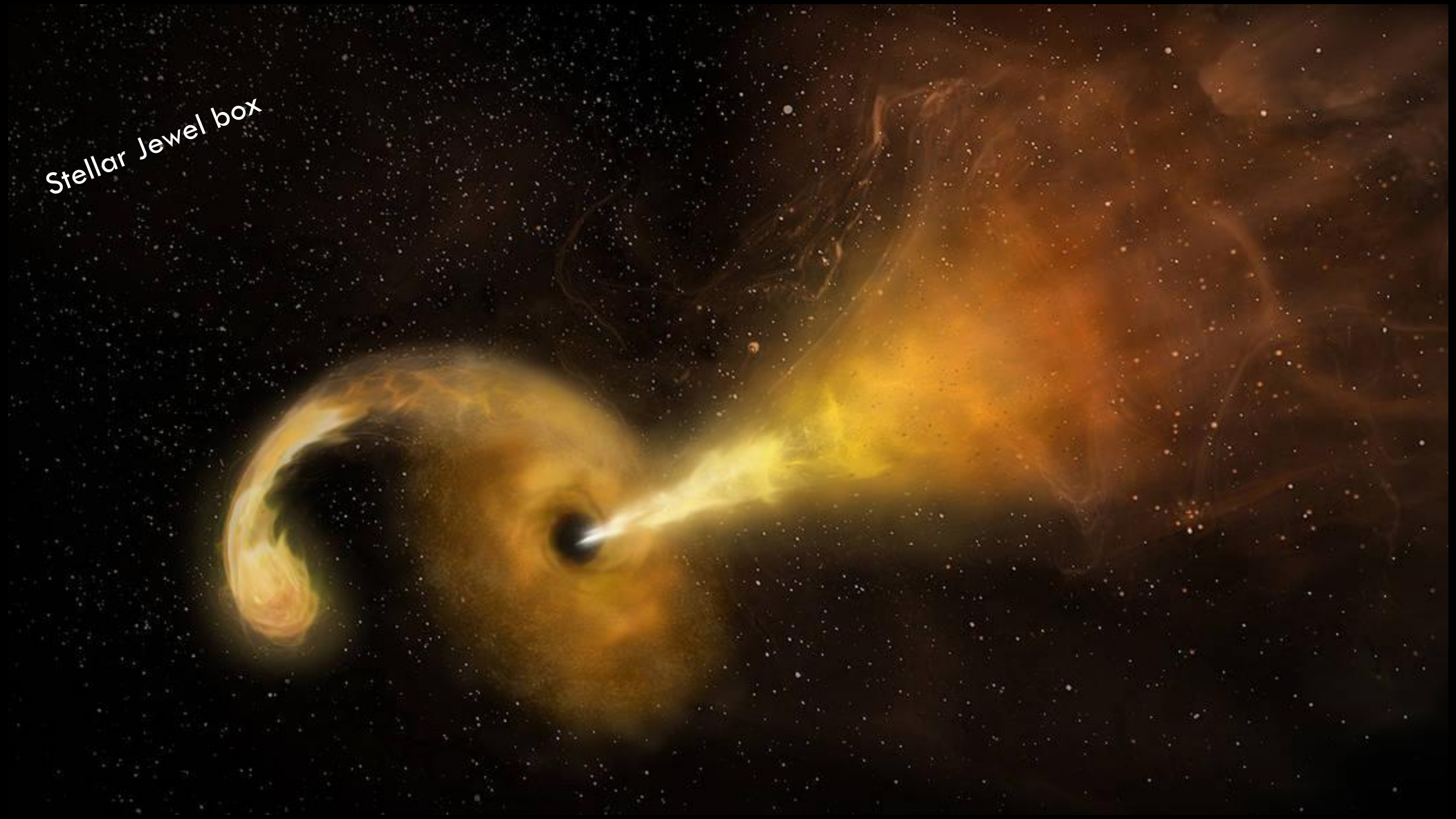
NASA Missions Unveil Magnetar Eruptions in Nearby Galaxies

CreditNASA's Goddard Space Flight Center

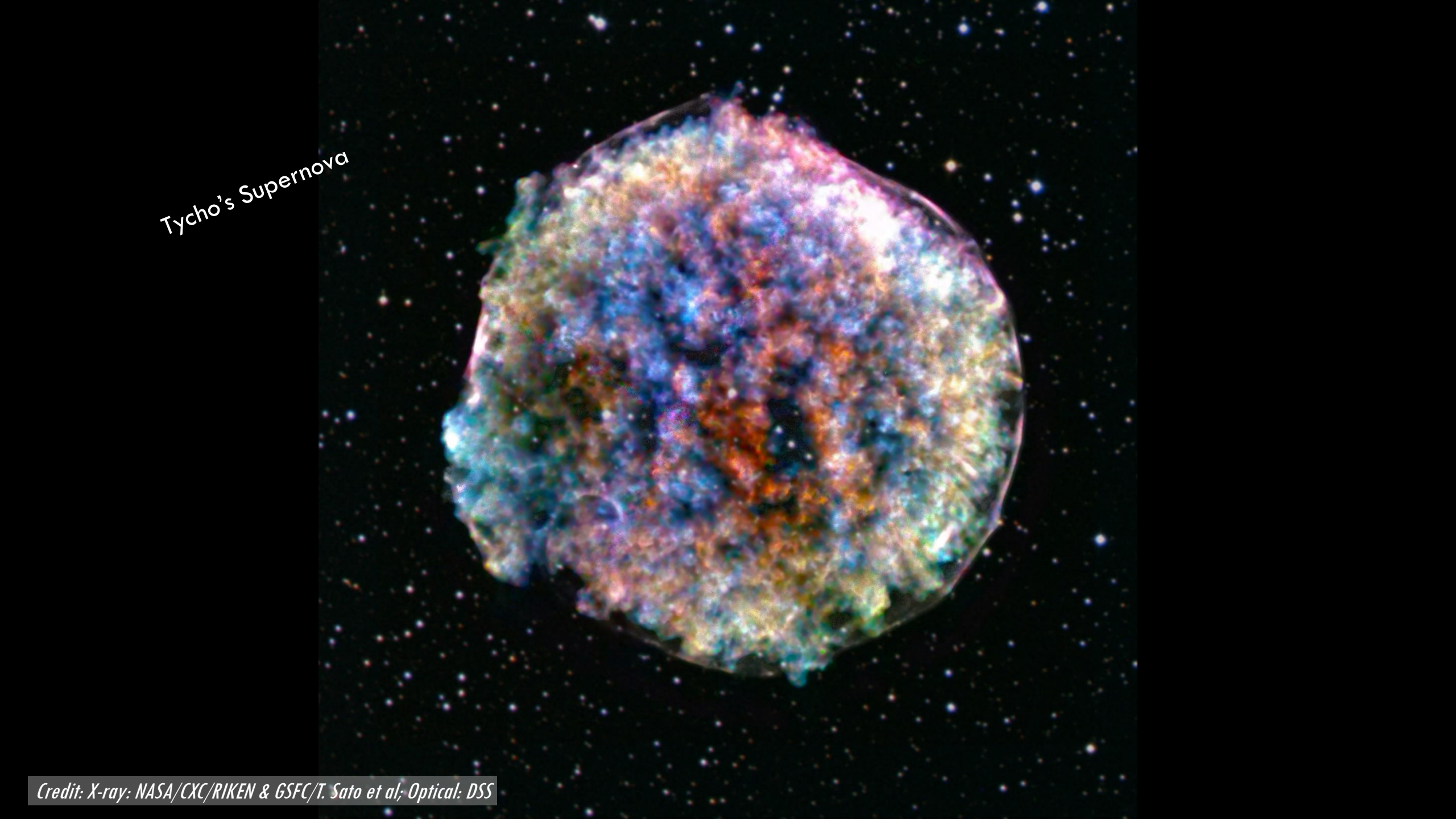
Music: "Collision Course-Alternative Version" from Universal Production Music

The Moon shines brightly in gamma rays as seen in this time sequence from NASA's Fermi Gamma-ray Space Telescope. Each 5-by-5-degree image is centered on the Moon and shows gamma rays with energies above 31 million electron volts, or tens of millions of times that of visible light. At these energies, the Moon is actually brighter than the Sun. Brighter colors indicate greater numbers of gamma rays. This animation shows how longer exposure, ranging from two to 128 months (10.7 years), improved the view.

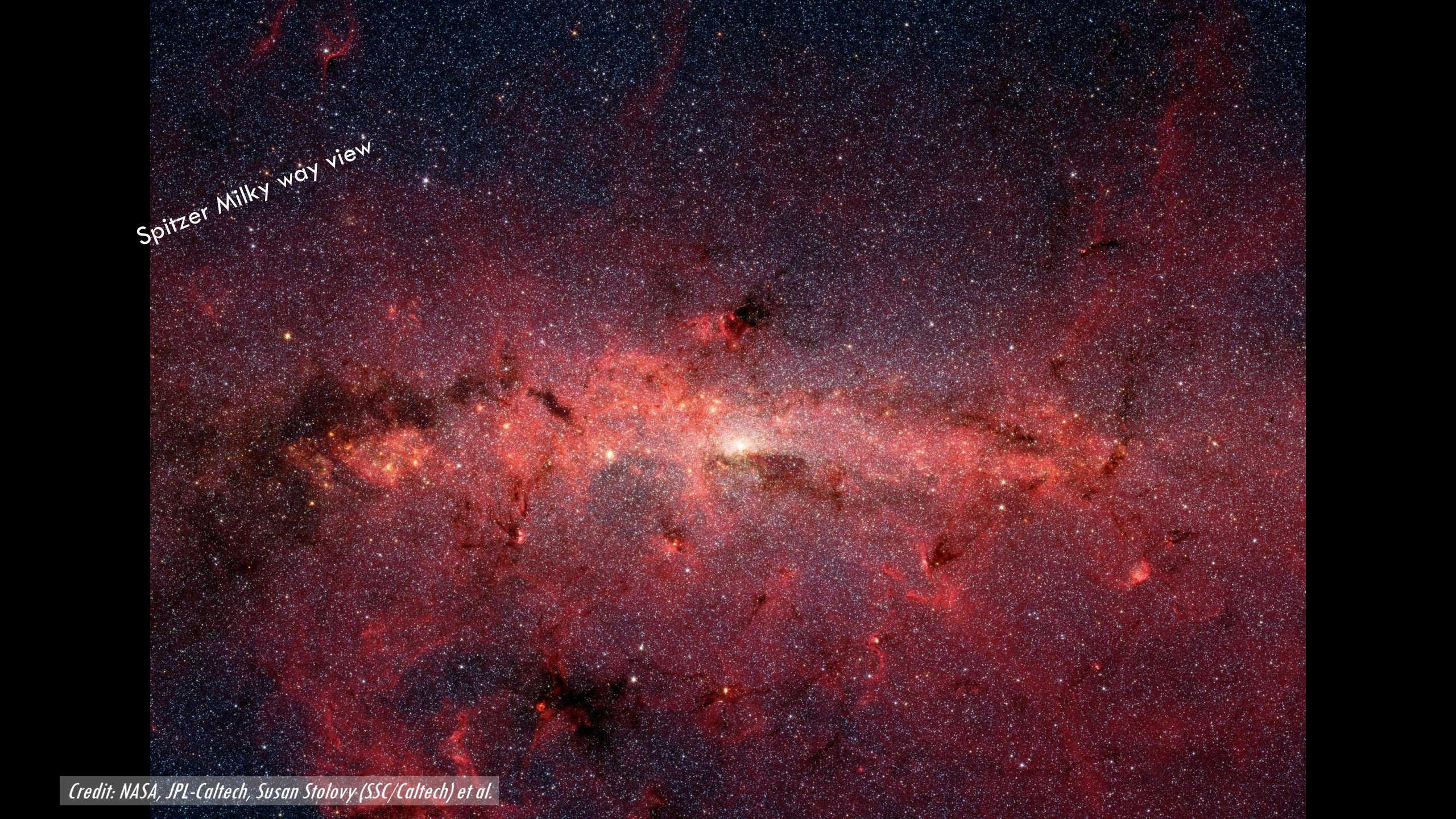
Credit NASA/DOE/Fermi LAT Collaboration



Credit: Sophia Dagnello, NRAO/AUI/NSF



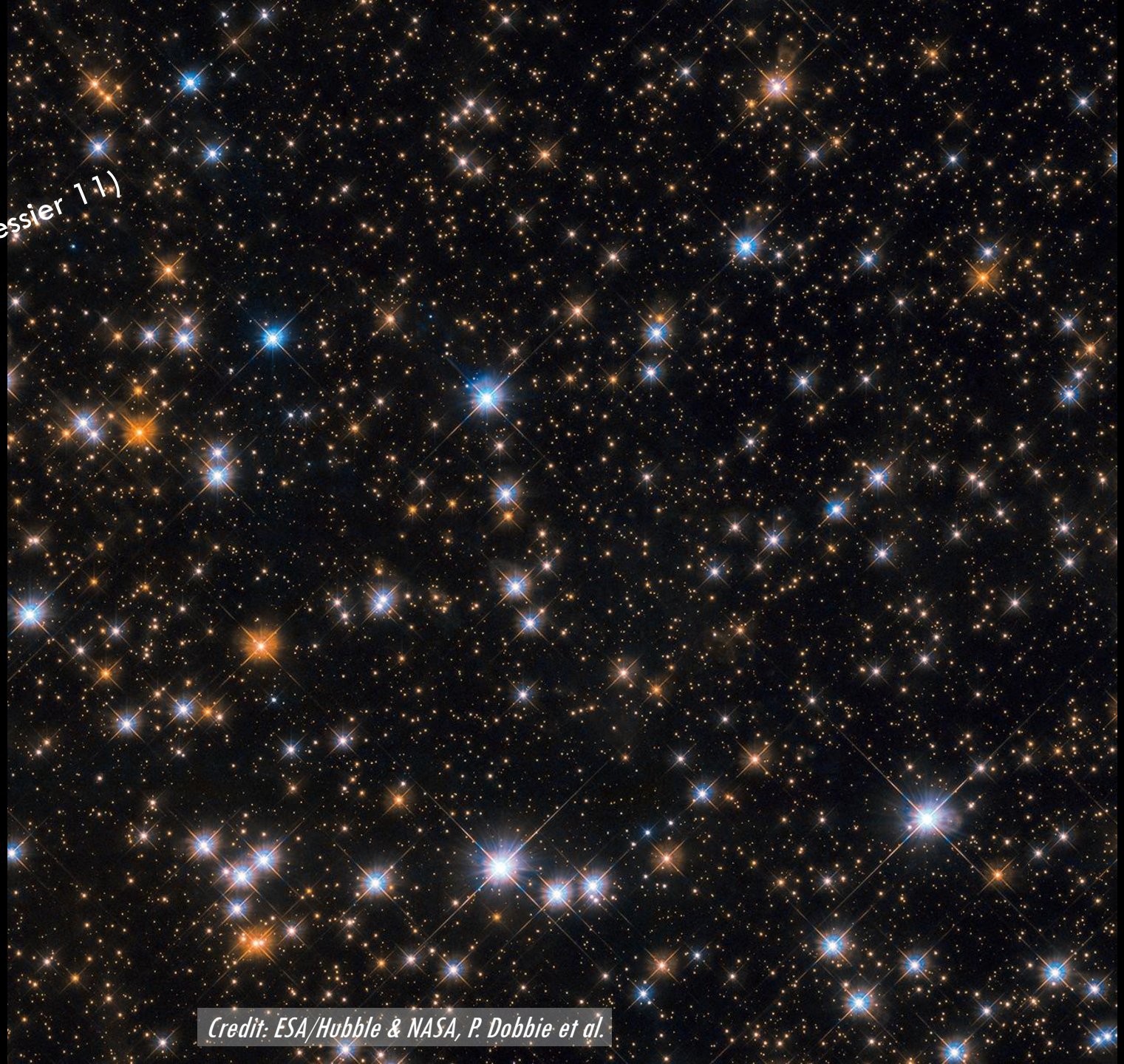
Credit: X-ray: NASA/CXC/RIKEN & GSFC/T. Sato et al; Optical: DSS



Credit: NASA, JPL-Caltech, Susan Stolovy (SSC/Caltech) et al.

Credit: X-ray: NASA/CXC/Univ. of Cambridge/G. Lansbury et al; Optical: NASA/STScI/W. Keel et al.

Cosmic Ducks (Messier 11)



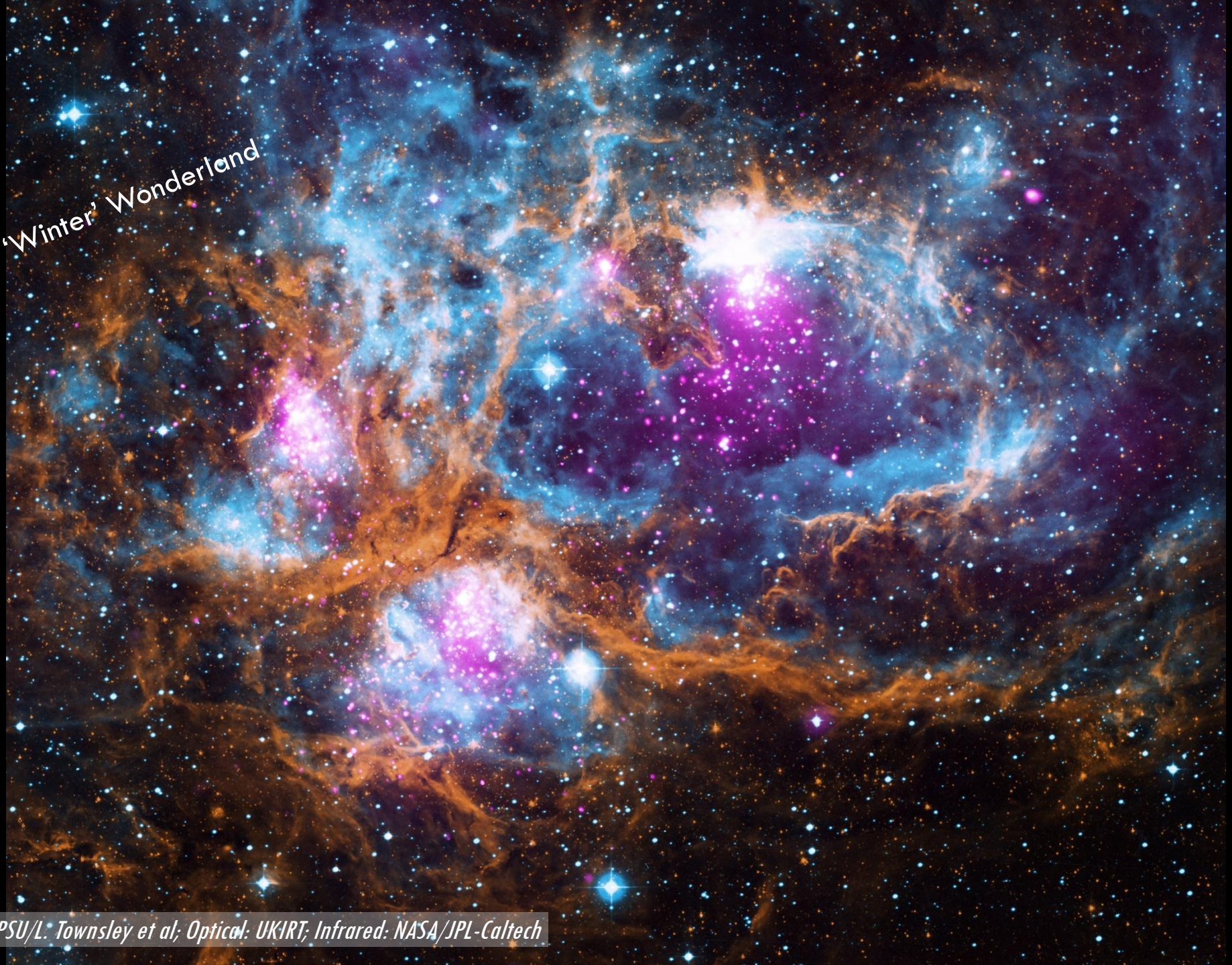
Credit: ESA/Hubble & NASA, P. Dobbie et al.

Credit: NASA, ESA and STScI/Arab

Stellar Jewel box

Credit: NASA, ESA, and the Hubble Heritage (STScI/AURA)-ESA/Hubble Collaboration

Credit: ESA/Hubble & NASA



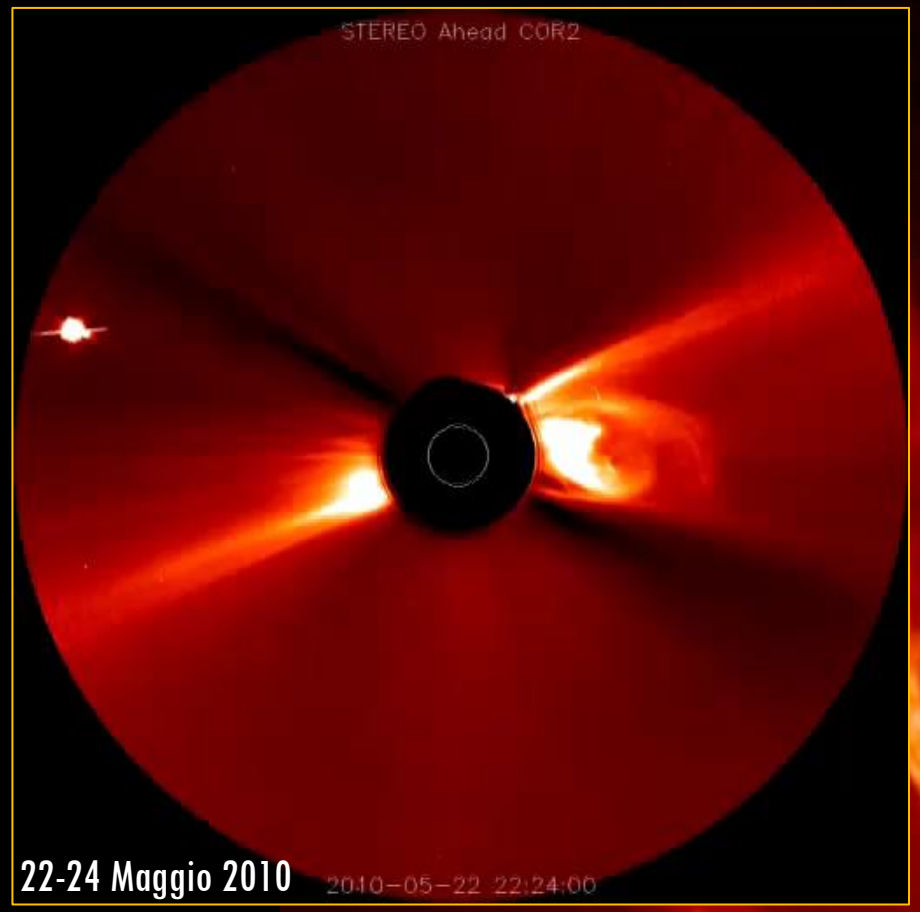
Credit: X-ray: NASA/CXC/PSU/L. Townsley et al; Optical: UKIRT; Infrared: NASA/JPL-Caltech

Solar and Heliospheric Observatory (SOHO)

27 Luglio 1999

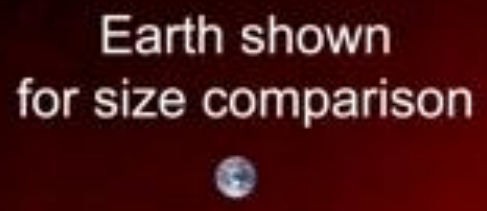
Solar Dynamics Observatory (SDO)

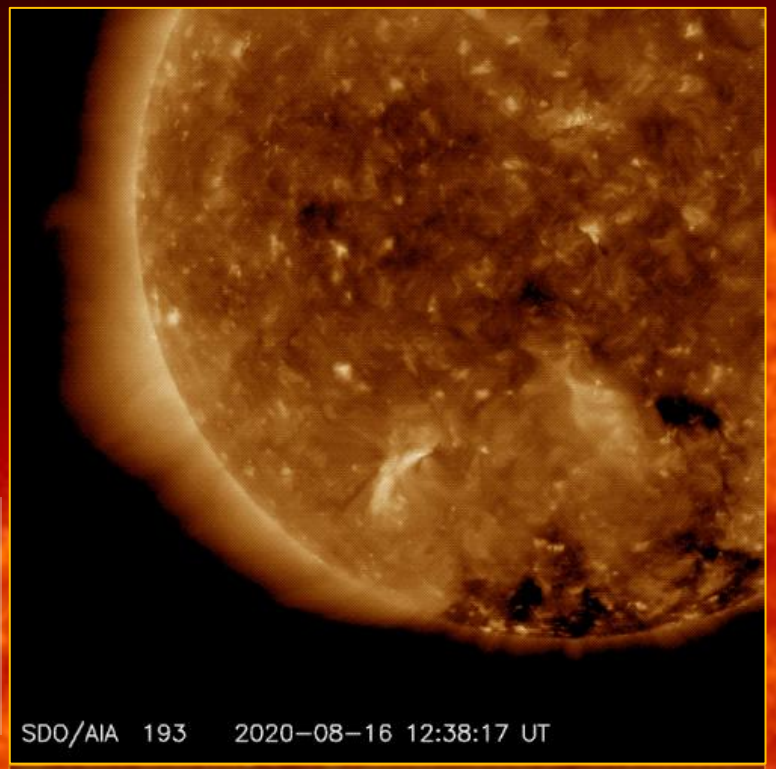
16 Agosto 2020



22-24 Maggio 2010

Credit: SOHO (ESA/NASA)

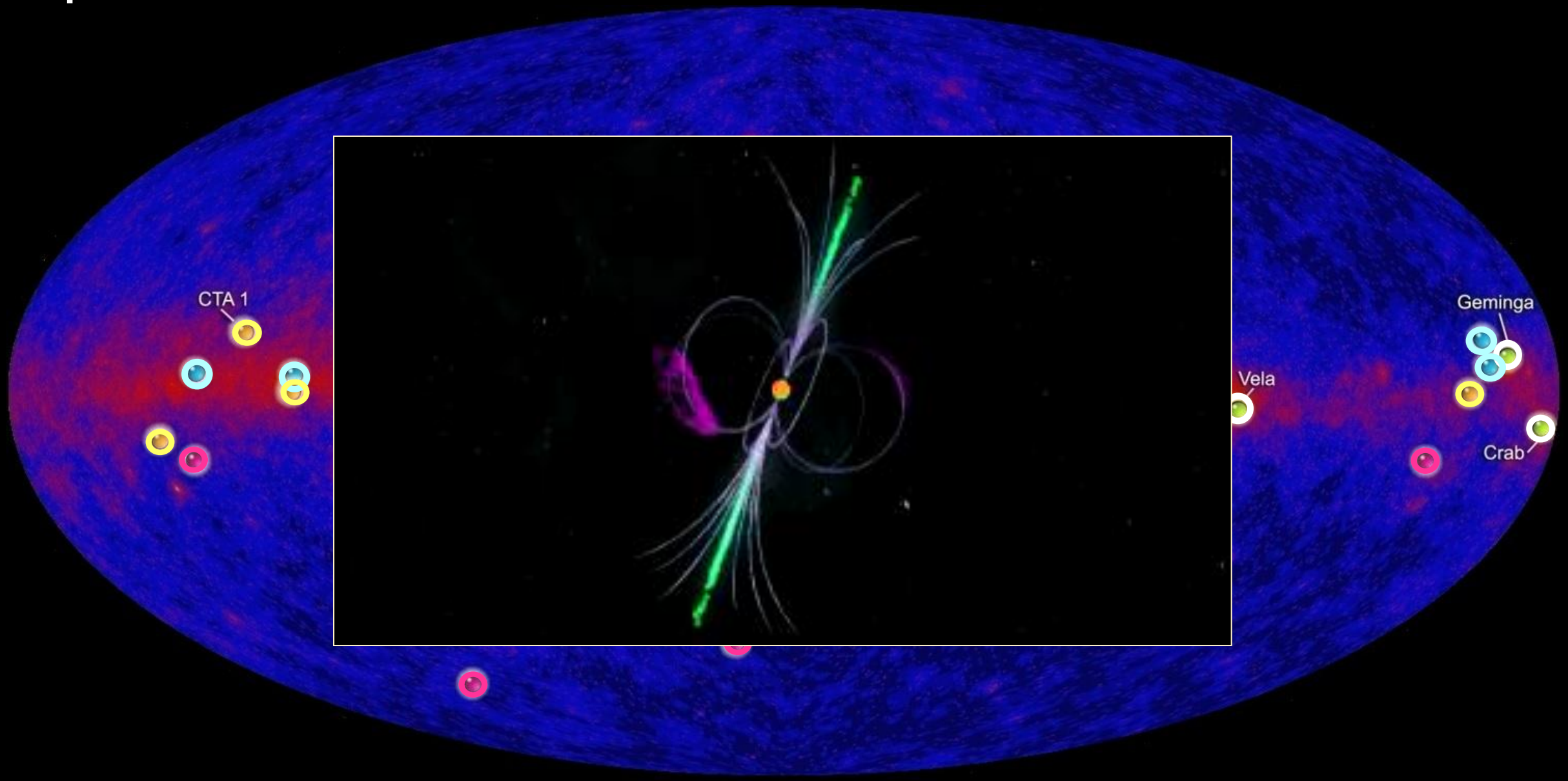




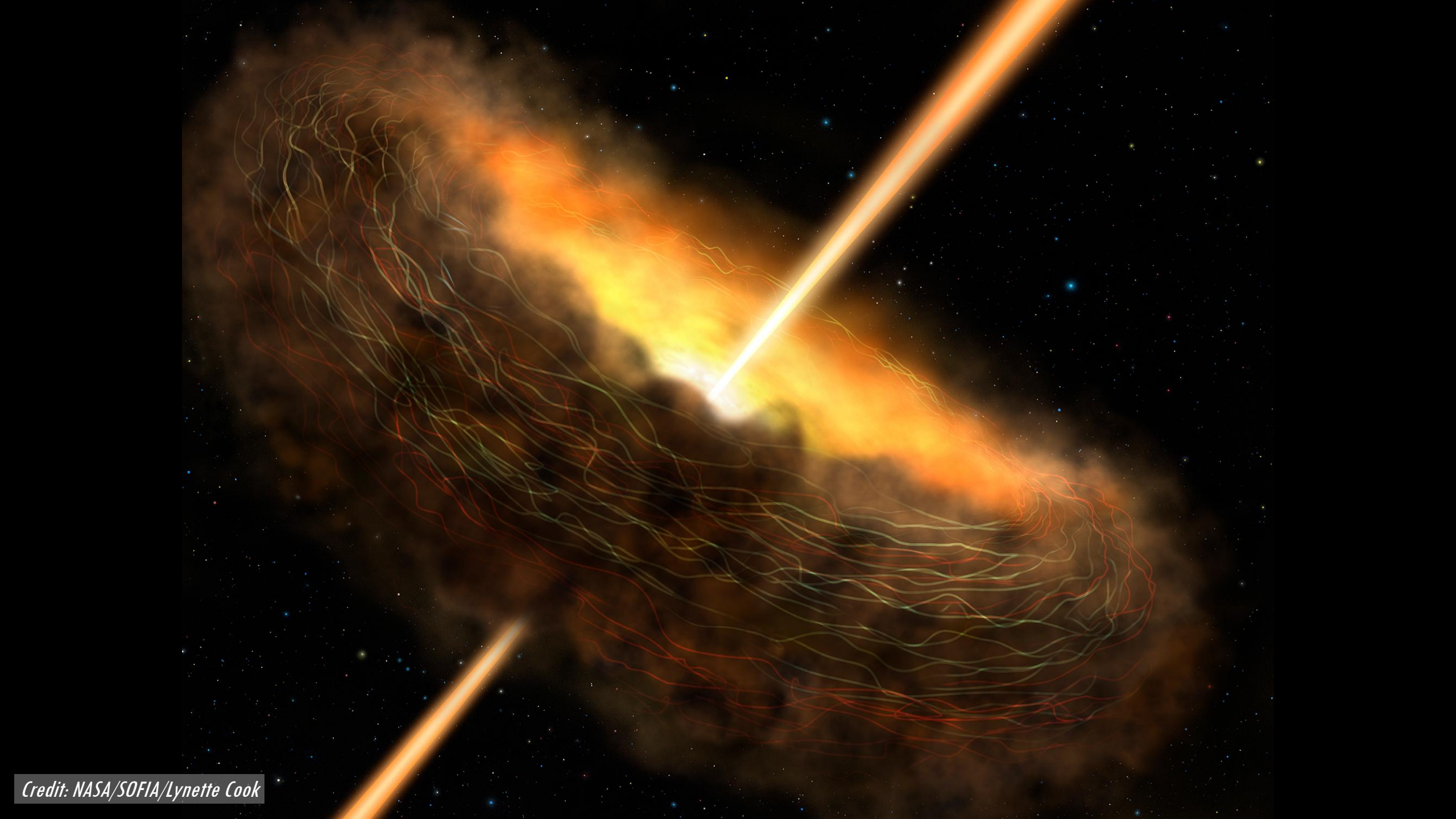
Credit: NASA/SDO

Le pulsar

Le pulsazioni sono 1/10 di quelle reali

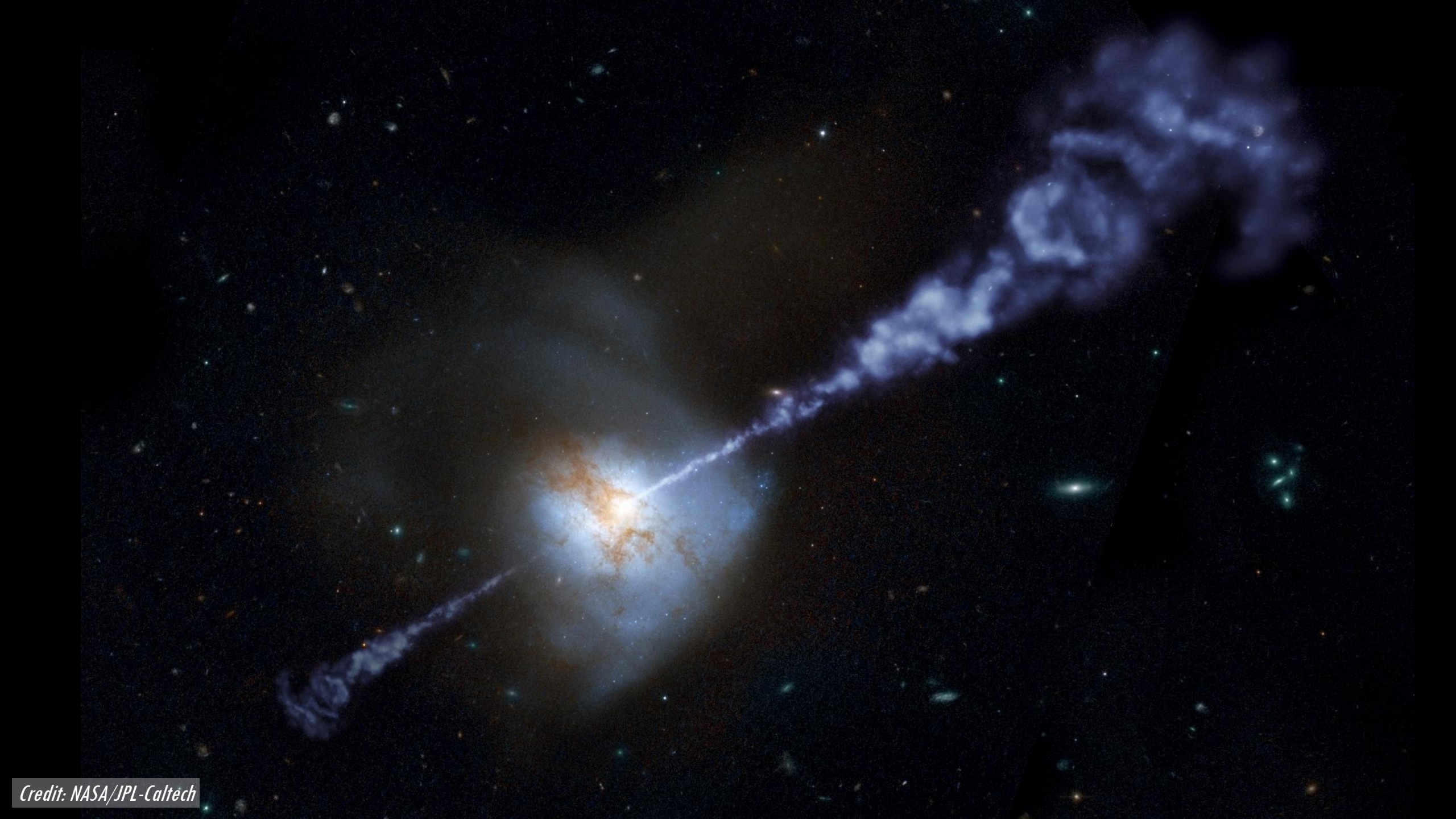


Credit: NASA/DOE/Fermi LAT Collaboration



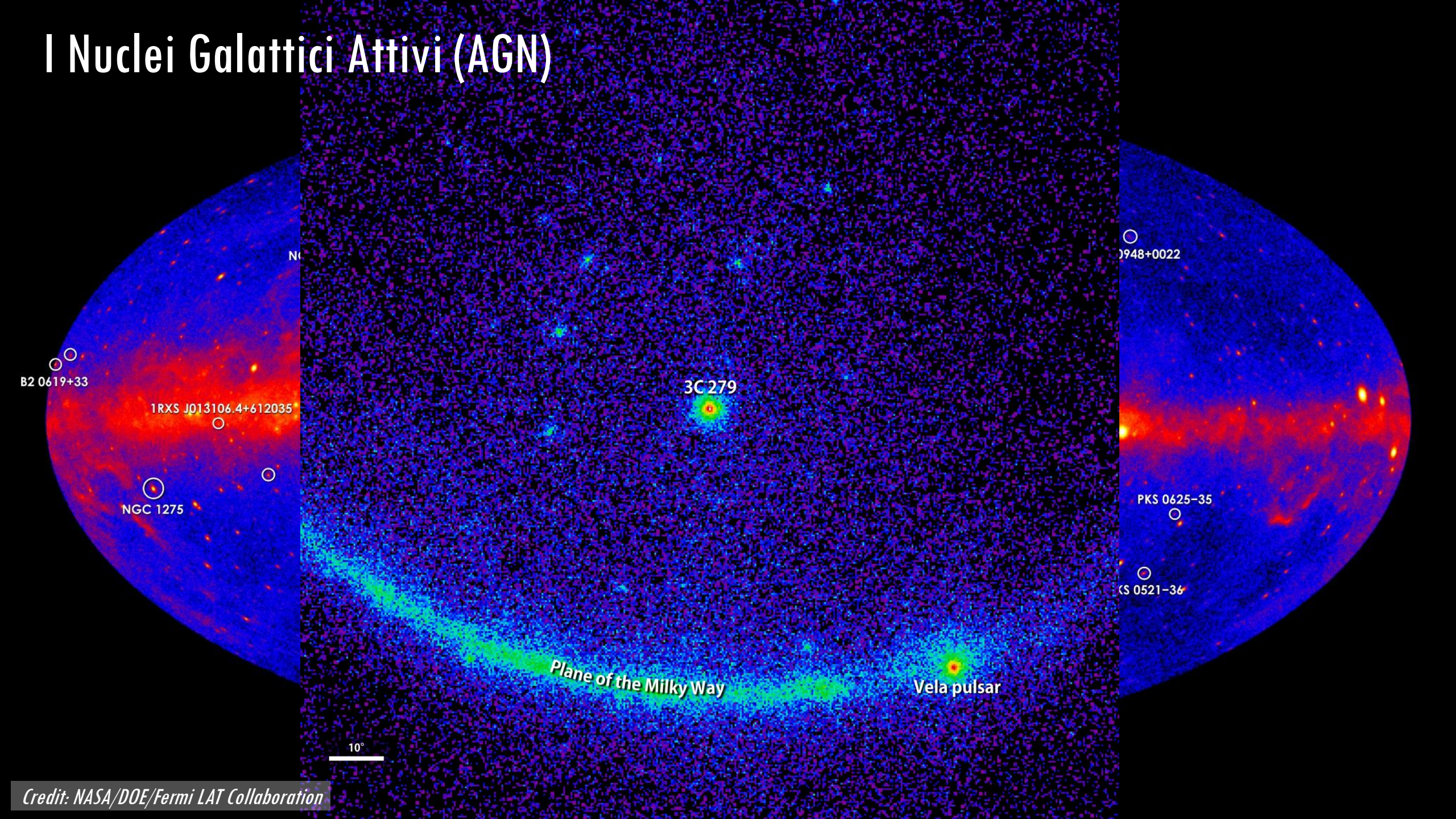
Credit: NASA/SOFIA/Lynette Cook

Credit: NASA/SOFIA/Lynette Cook



Credit: NASA/JPL-Caltech

I Nuclei Galattici Attivi (AGN)



Credit: NASA/DOE/Fermi LAT Collaboration

Credit: NASA/Swift/Cruz deWilde

50°anniversario Apollo 8

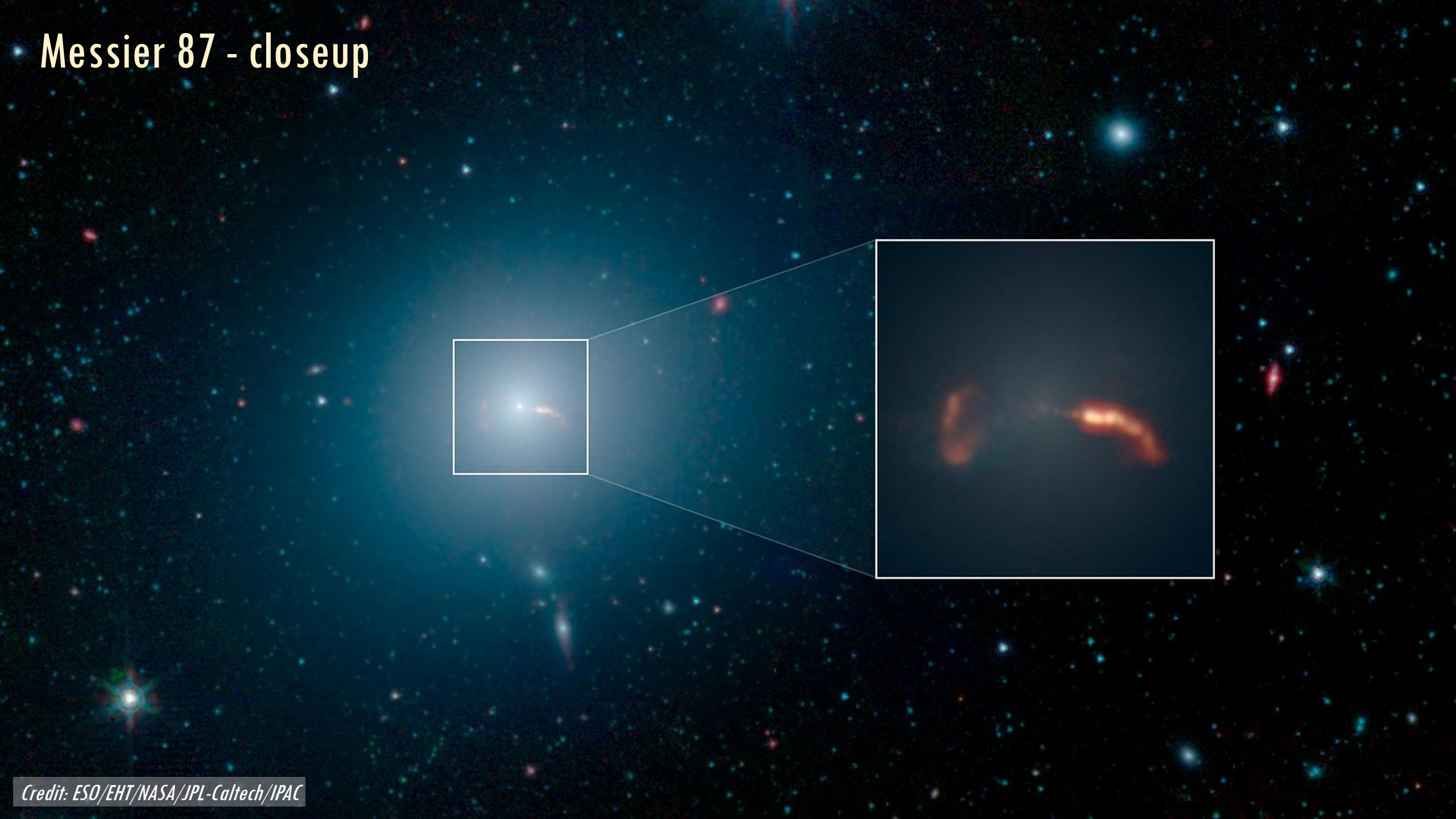
Washington National Cathedral – 11 dicembre 2018

Credit: NASA/Joel Kowsky

Messier 87

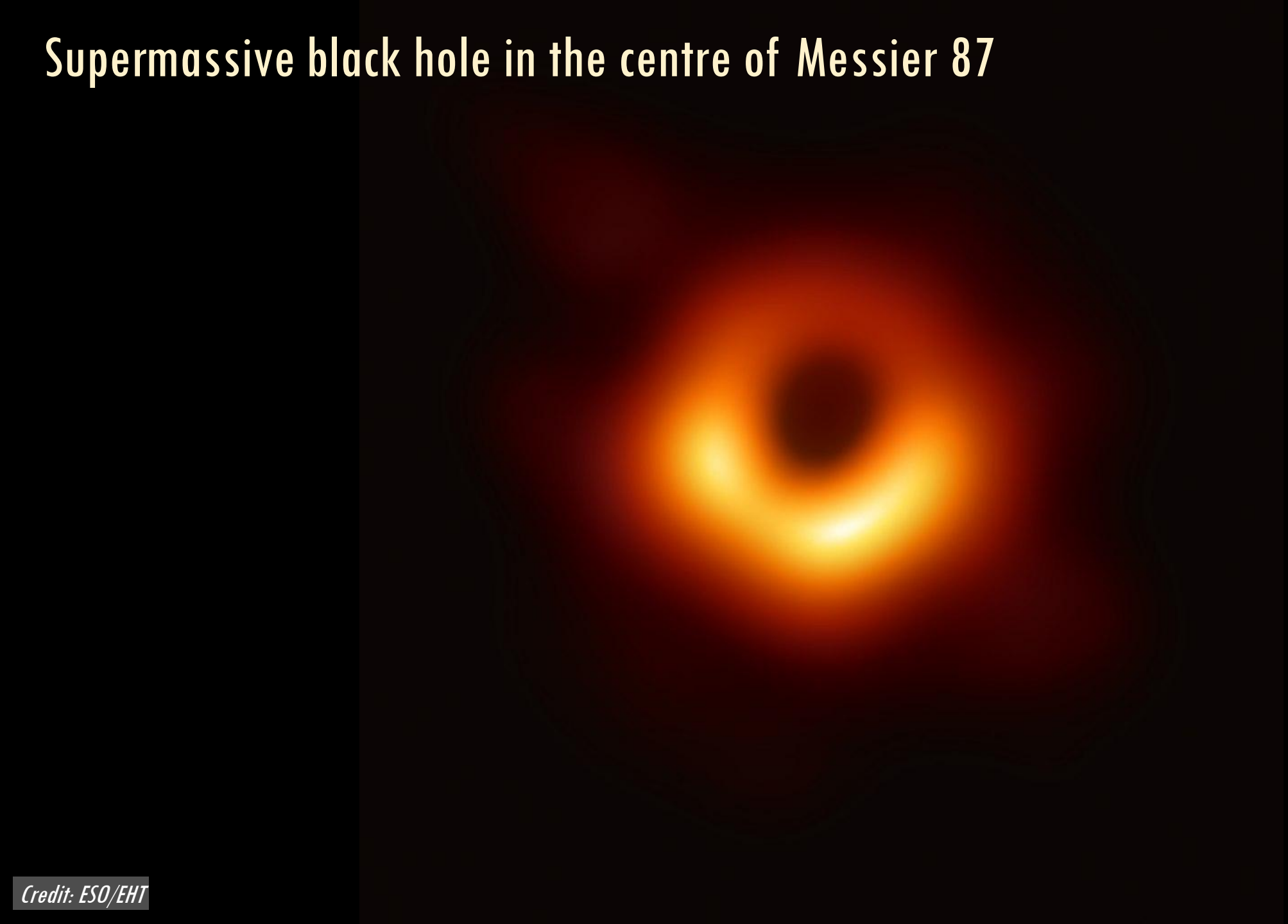
Credit: ESO/EHT/NASA/JPL-Caltech/IPAC

Messier 87 - closeup



Credit: ESO/EHT/NASA/JPL-Caltech/IPAC

Supermassive black hole in the centre of Messier 87



Credit: ESO/EHT

Transito della Stazione Spaziale Internazionale

7 ottobre 2018

Credit: NASA/Joel Kowsky