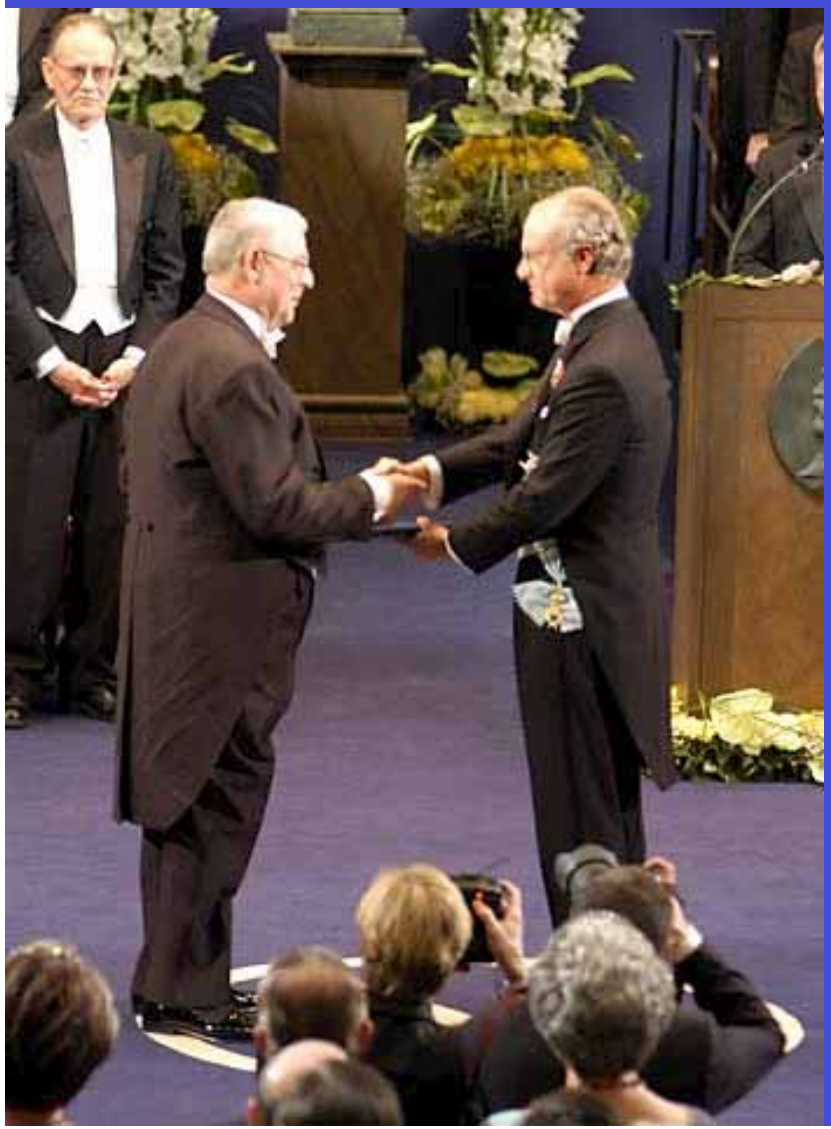
A.C.A. – Associazione Cernuschese Astrofili

CON ALTRI OCCHI:
ALTE ENERGIE

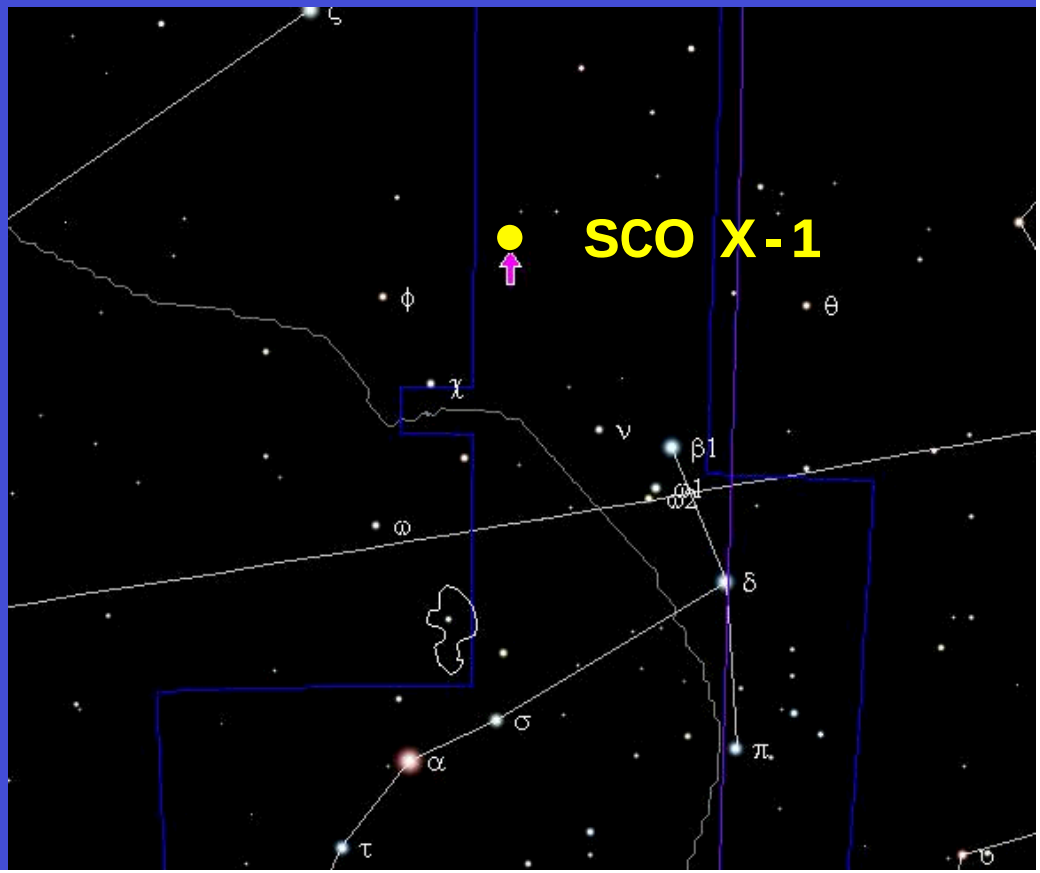
by Andrea Grieco

UN NUOVO COLOMBO

2002 R. GIACCONI RICEVE IL NOBEL PER LA FISICA

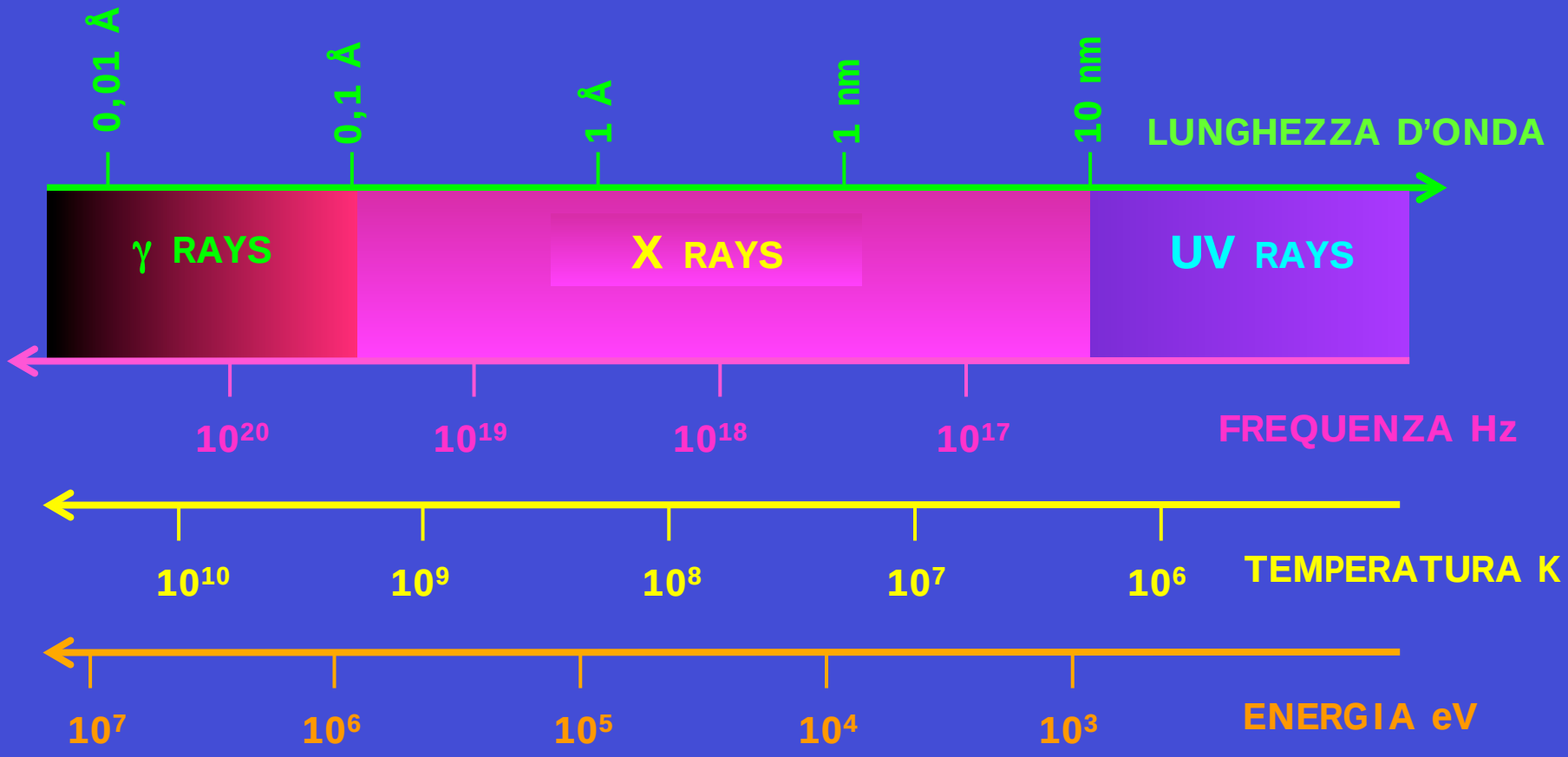


"for pioneering contributions to astrophysics, which have led to the discovery of cosmic X-ray sources"

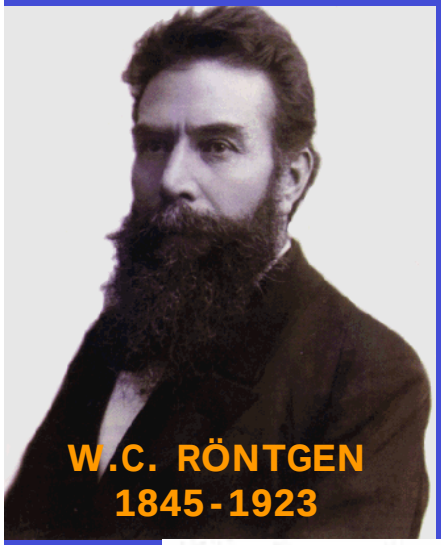


VERSO LE ALTE ENERGIE

REGIONE X E GAMMA DELLO SPETTRO ELETTROMAGNETICO



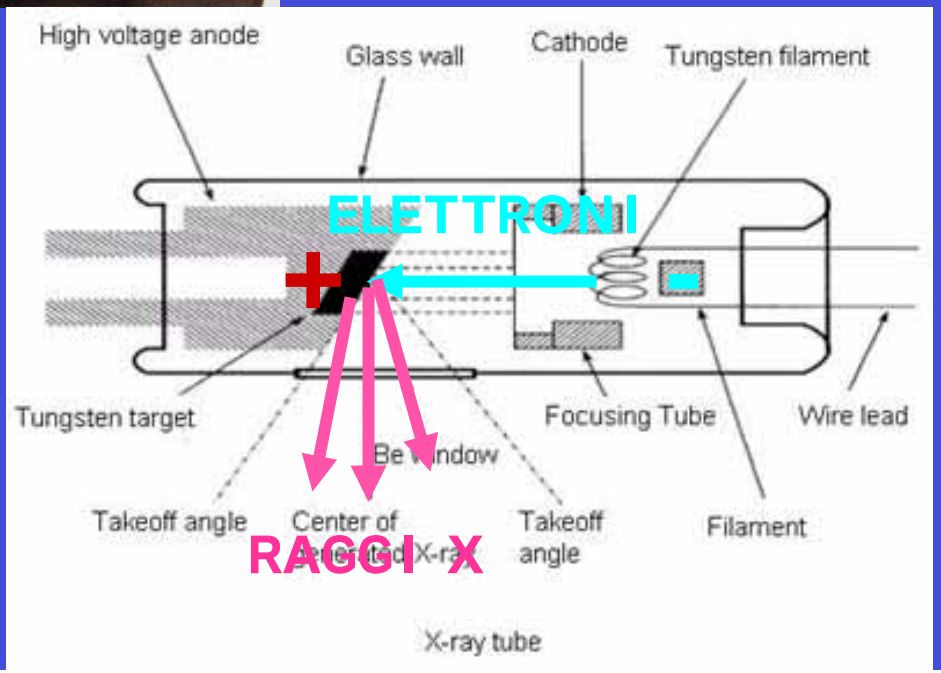
SCOPERTA RAGGI X



W.C. RÖNTGEN
1845-1923

1895 RÖNTGEN SCOPRE CASUALMENTE I RAGGI X

I RAGGI X SONO EMESSI DAGLI ELETTRONI DECELERATI DALL'ANODO
BREMSSTRAHLUNG
RADIATION

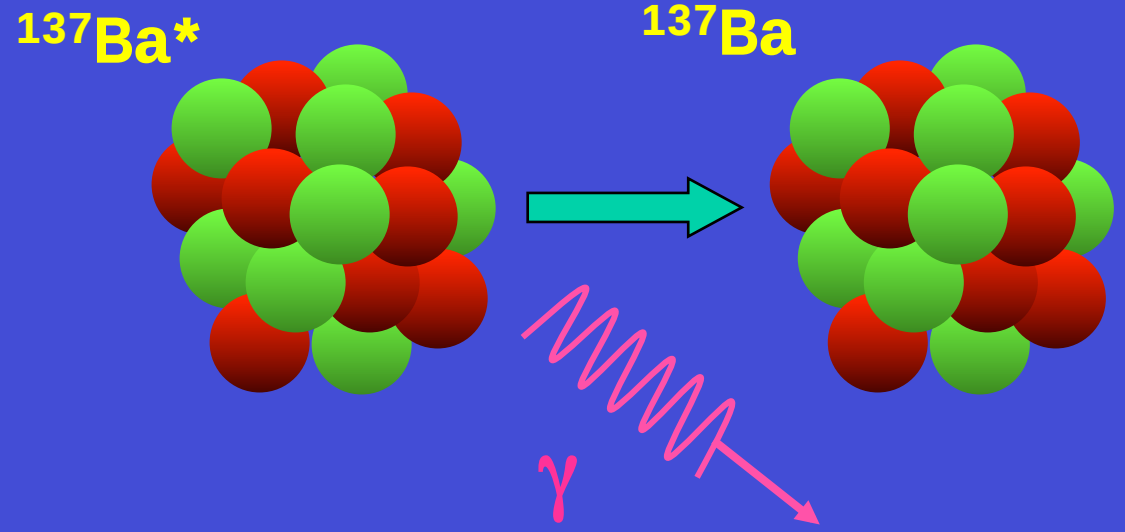


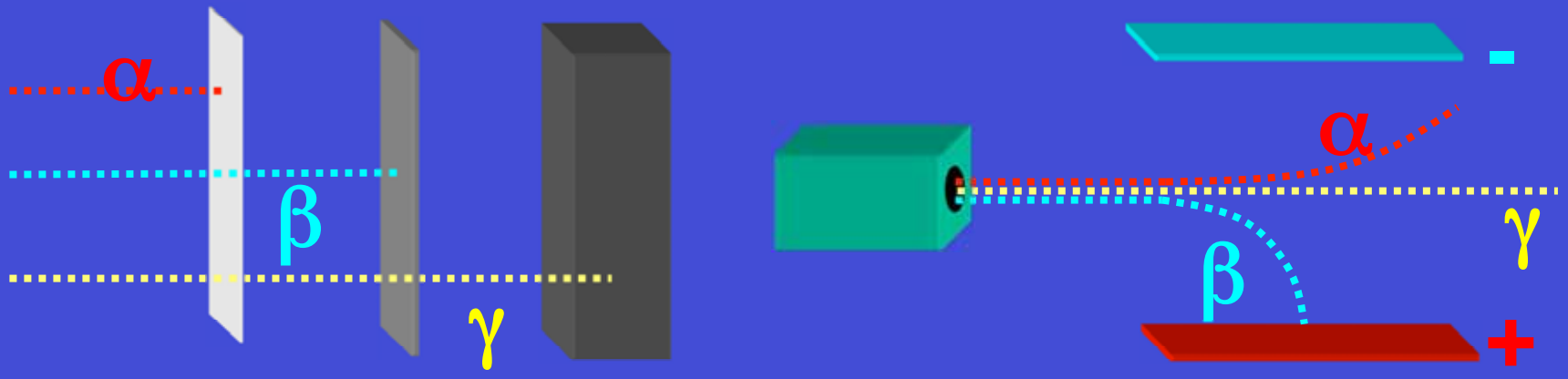
RADIOGRAFIA MANO SINISTRA DI ANNA BERTHA RÖNTGEN

SCOPERTA RAGGI GAMMA

P.U. VILLARD
1860-1934

1900 VILLARD SCOPRE I RAGGI GAMMA





V2

28/01/1949 NEW MEXICO UN V2 RILEVA RADIAZIONE X DAL SOLE

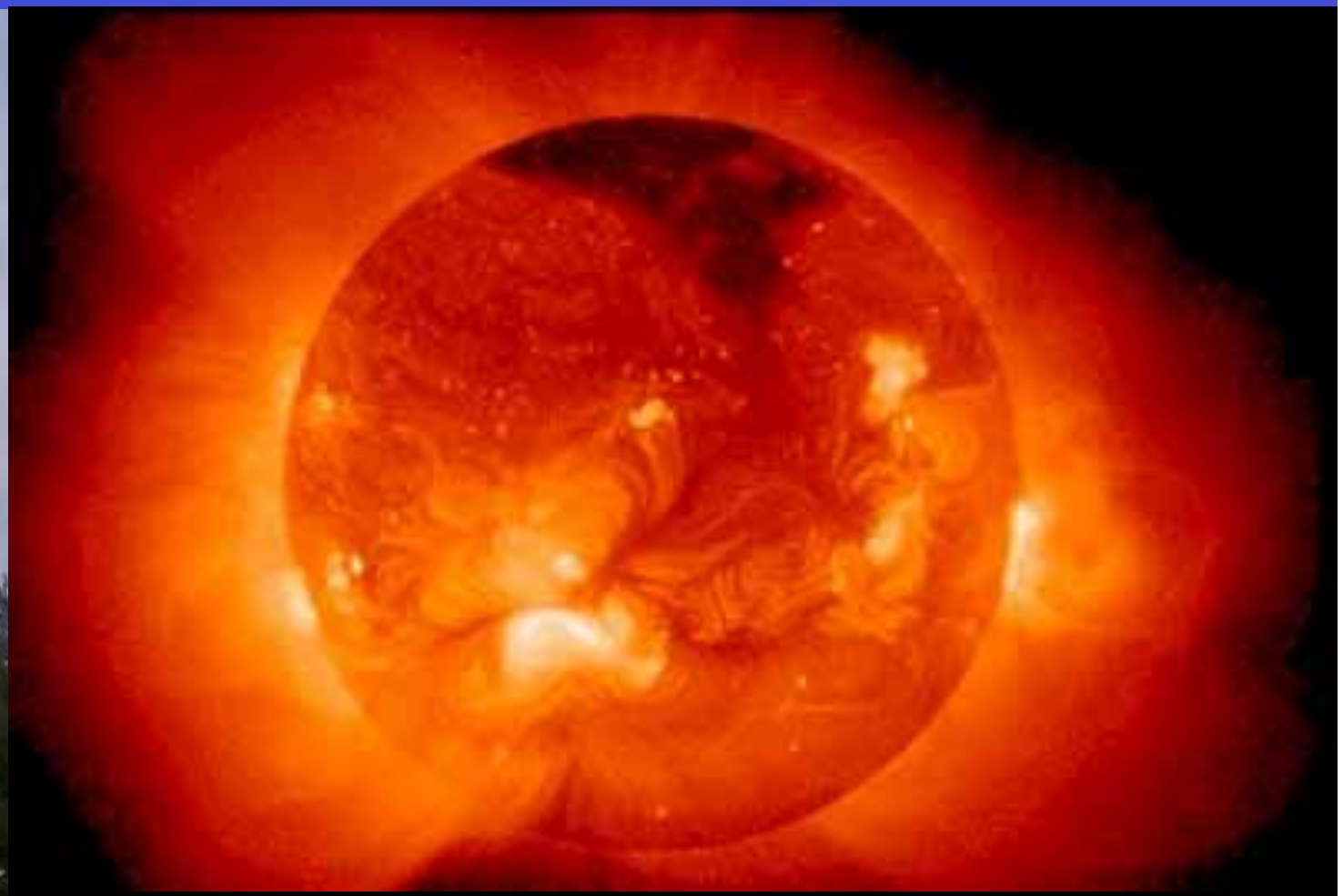


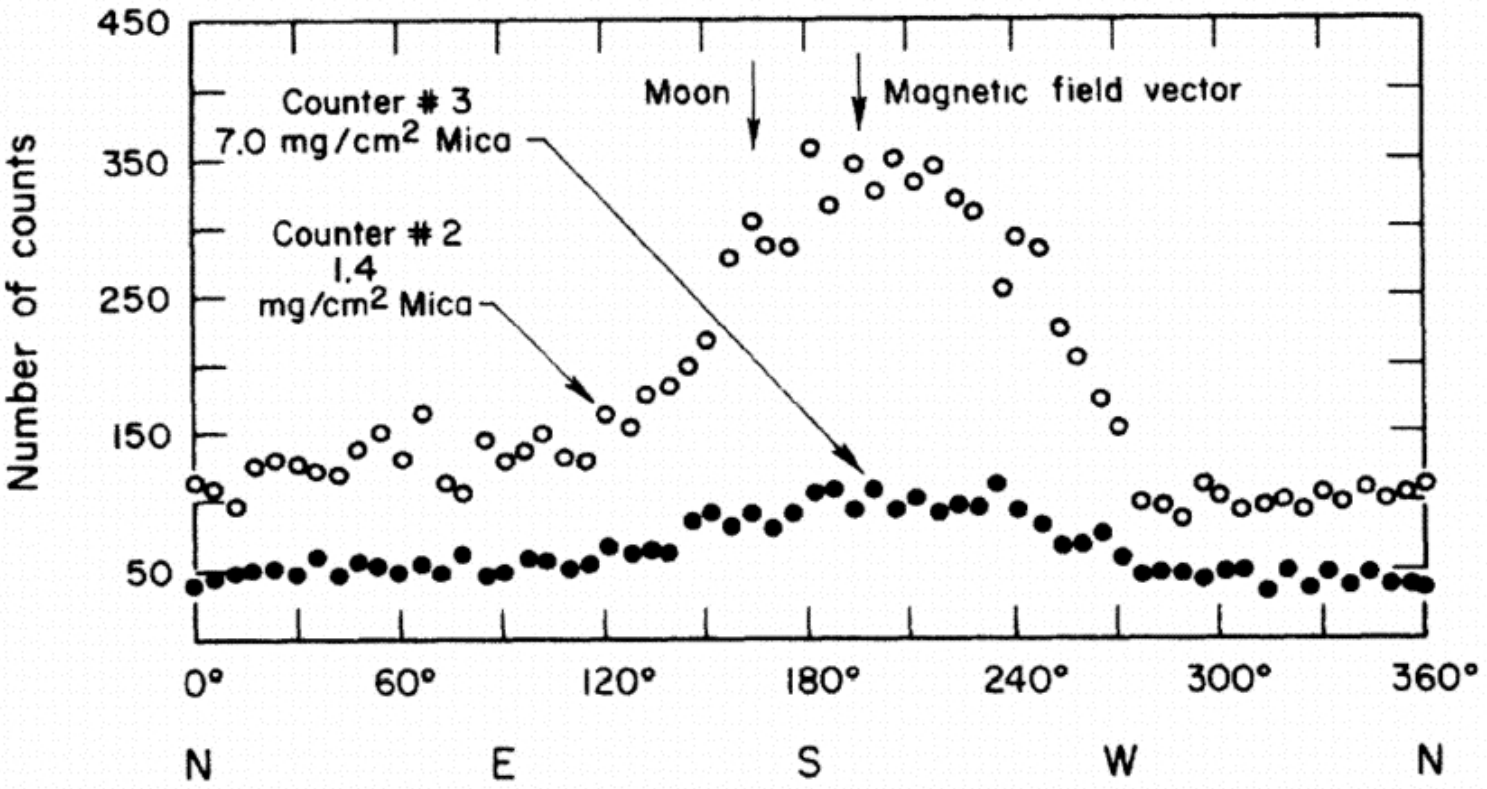
IMMAGINE IN RAGGI X DEL SOLE Courtesy XRT

AEROBEE

12/06/1962 SCOPERTA PRIMA SORGENTE X EXTRASOLARE

GRAFICO DELLA SCOPERTA DI SCO X-1 P. C. 2-10 keV

Credit: Giacconi, R., Gursky, H. Paolini, F., & Bruno Rossi, 1962, Physical Review Letters, volume 9, pg. 439



PALLONI E RAZZI

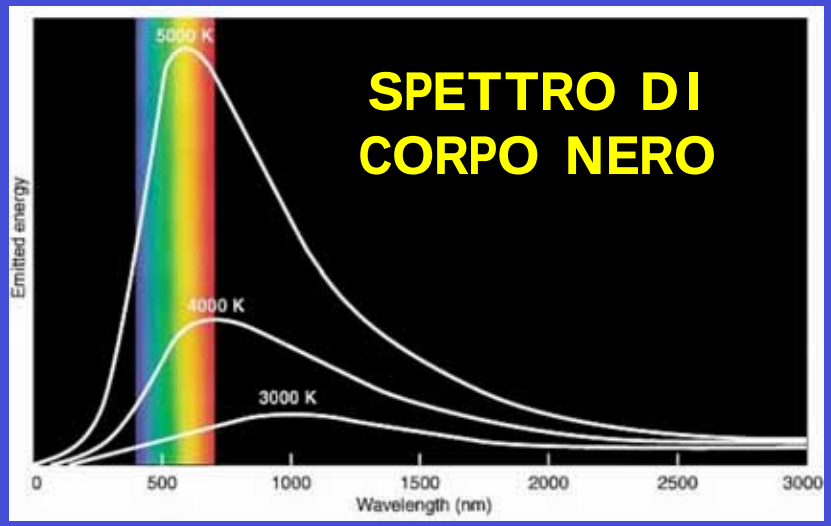
1963-70 PALLONI E RAZZI PC 0,2-10 keV SC 10-40 keV

PALLONE +RAZZO=ROCKOON NASA

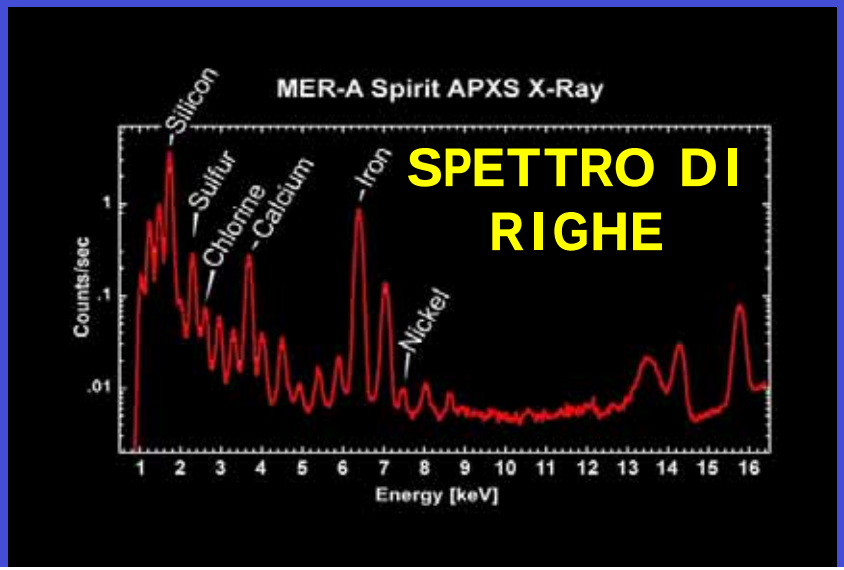
FRED BARTMAN, RAZZO ALWAYNIKE-DEACON

PRODURRE X E GAMMA

EMISSIONE TERMICA

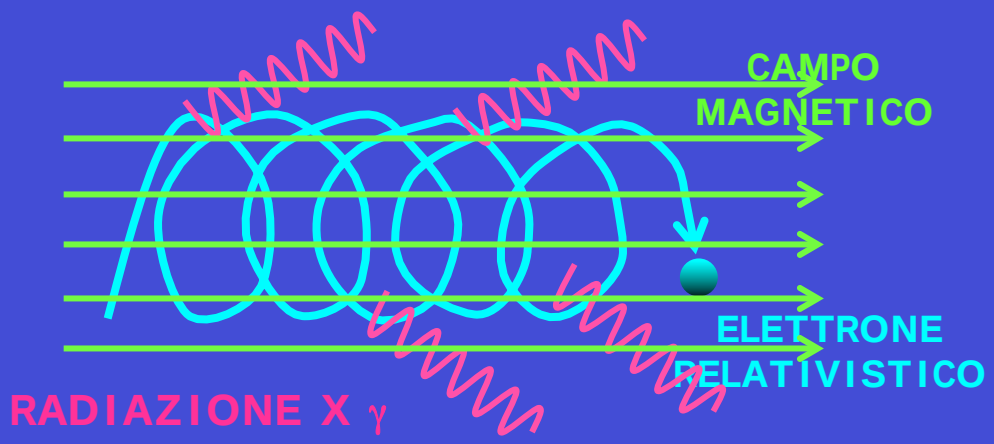


SPETTRO DI CORPO NERO



SPETTRO DI RIGHE

EMISSIONE NON TERMICA



RADIAZIONE DI SINCROTRONE

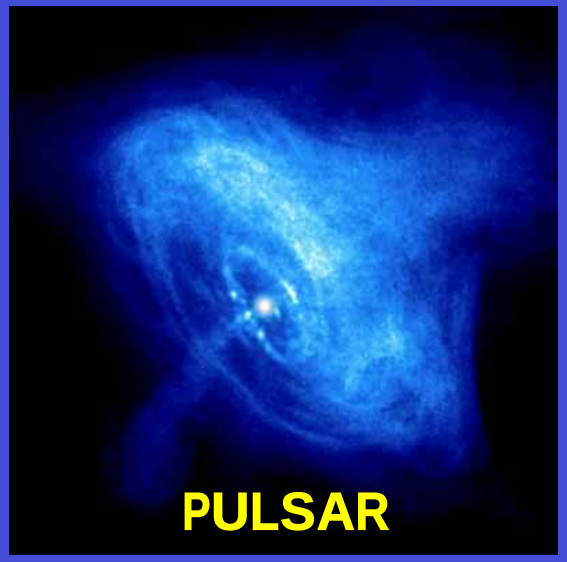
EFFETTO COMPTON INVERSO

CHI EMETTE?

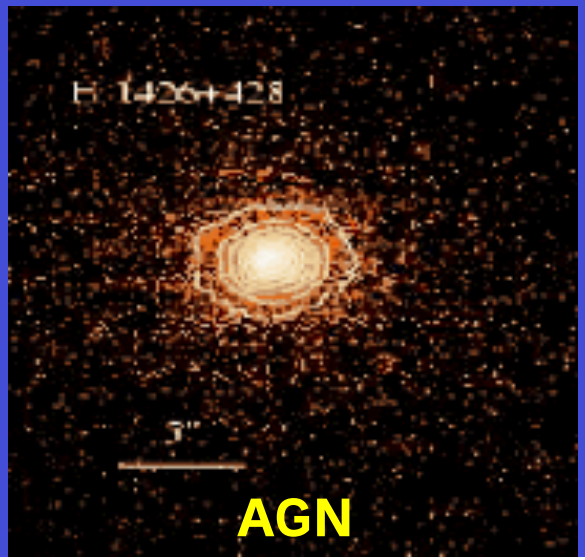
PRINCIPALI SORGENTI X E GAMMA COSMICHE


SOLE

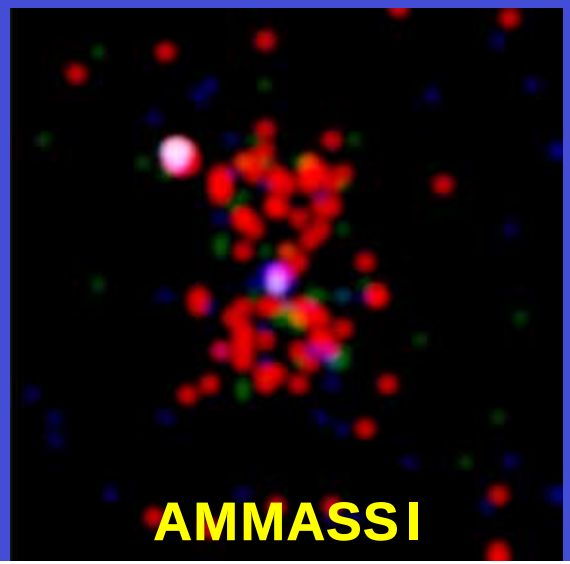

SN REMNANT


PULSAR


CENTRO GALATTICO

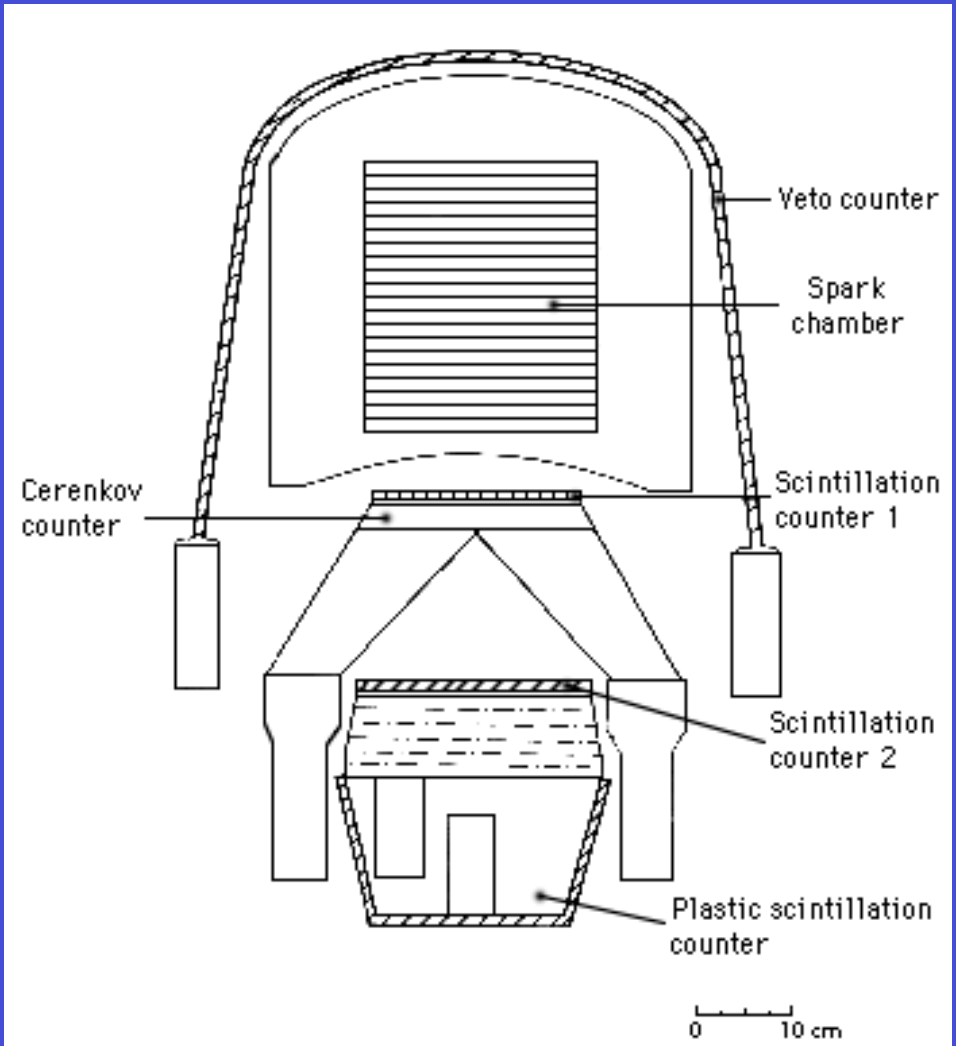


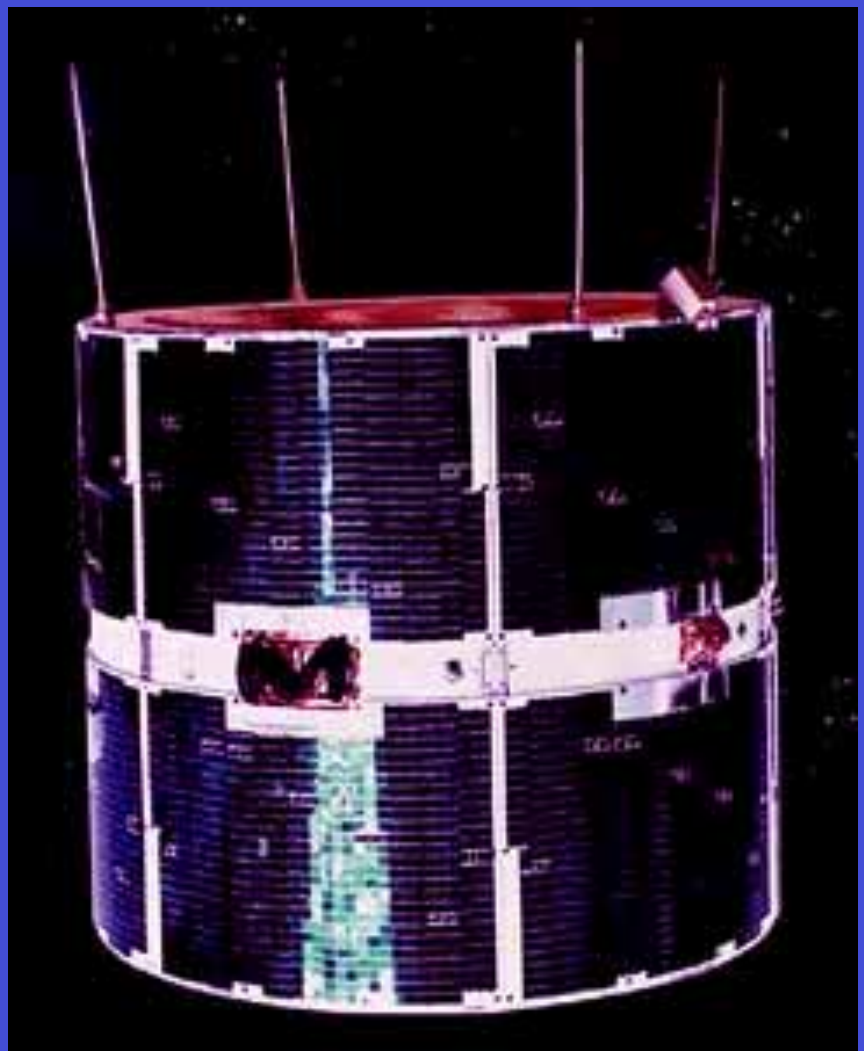
AGN


AMMASSI

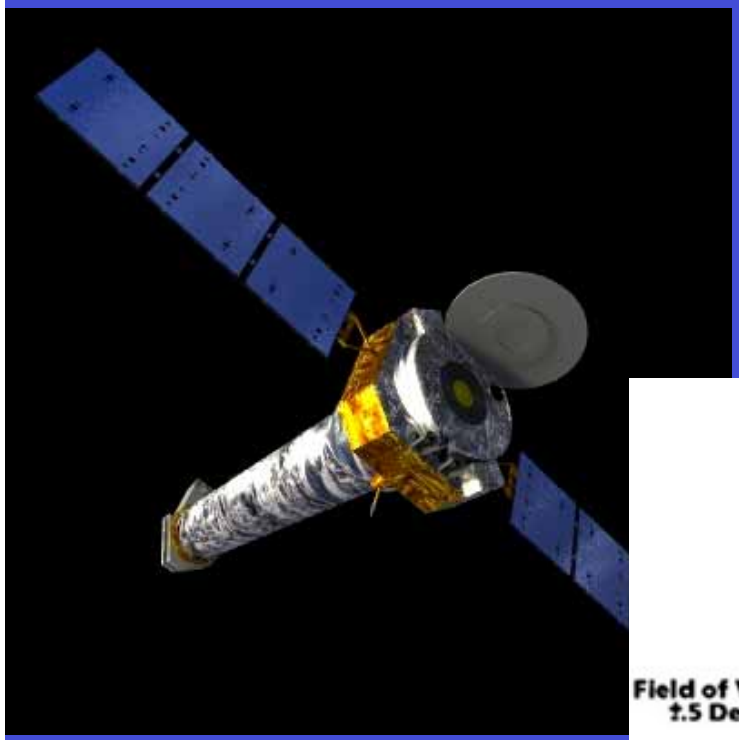
RILEVATORI

STRUTTURA DEL SATELLITE COS B ESA



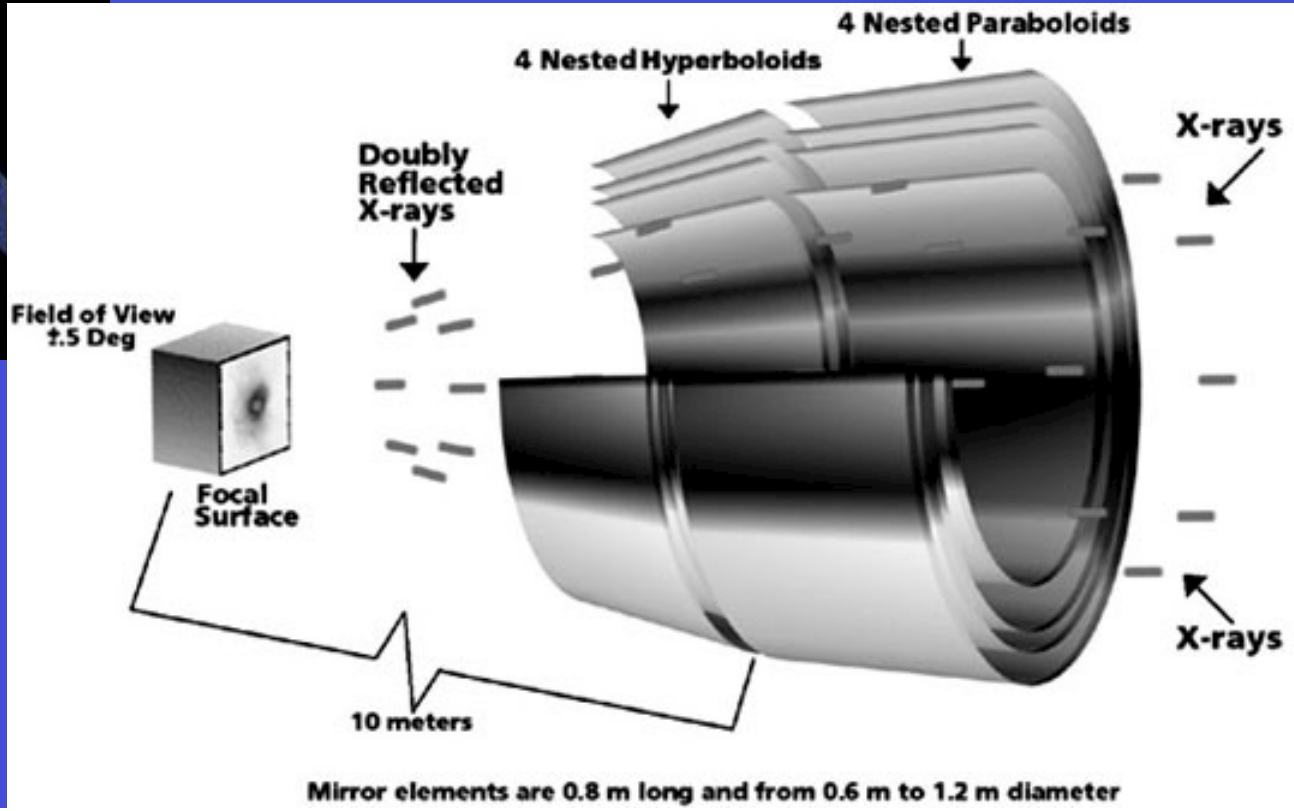


TELESCOPI



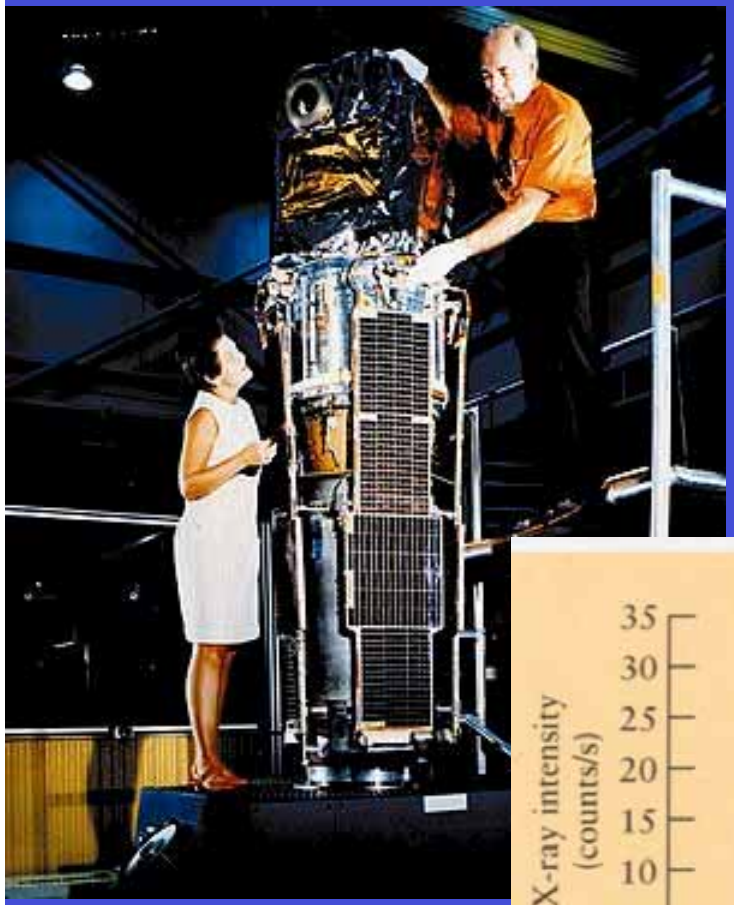
SATELLITE PER ASTRONOMIA X CHANDRA LANCIATO NEL 1999 NASA/ CXC/SAO

STRUTTURA DEL TELESCOPIO X MONTATO SU CHANDRA NASA/CXC/SAO

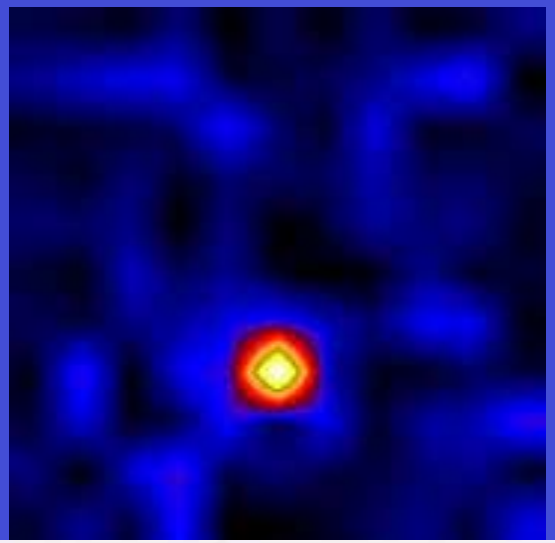


LIBERTA'

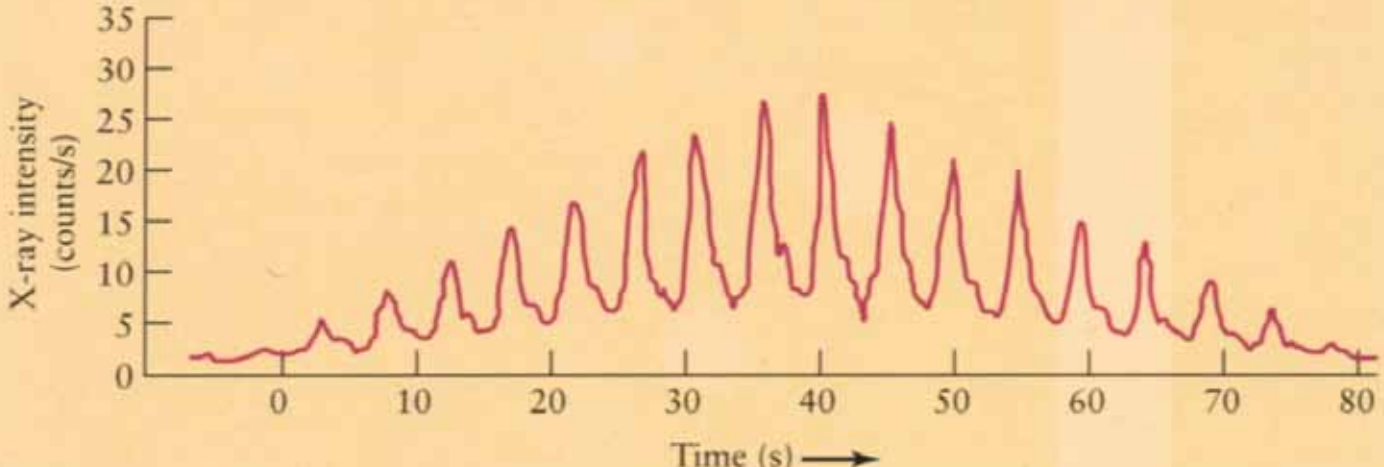
1970-73 UHURU CP 2-20 keV ~400 SORGENTI



B. ROSSI E M. TOWNSEND CON UHURU



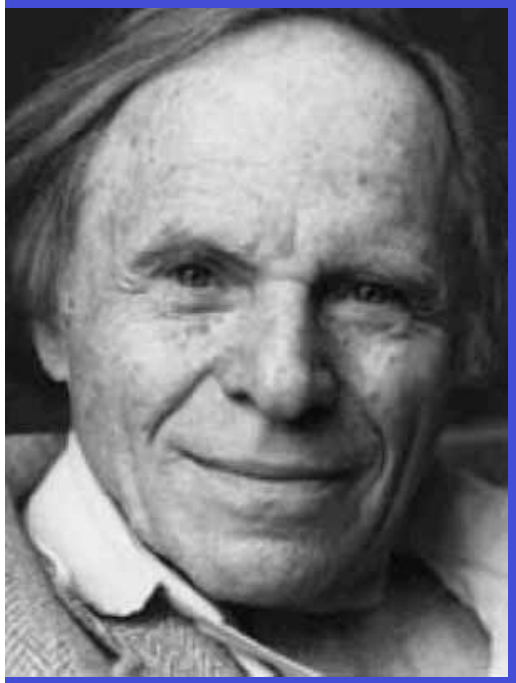
SCOPERTA LA SORGENTE X CYGNUS X-1 PRIMO SERIO CANDIDATO BUCO NERO 6 kly



IMPULSI X DA CEN X-3 PLS+BYN

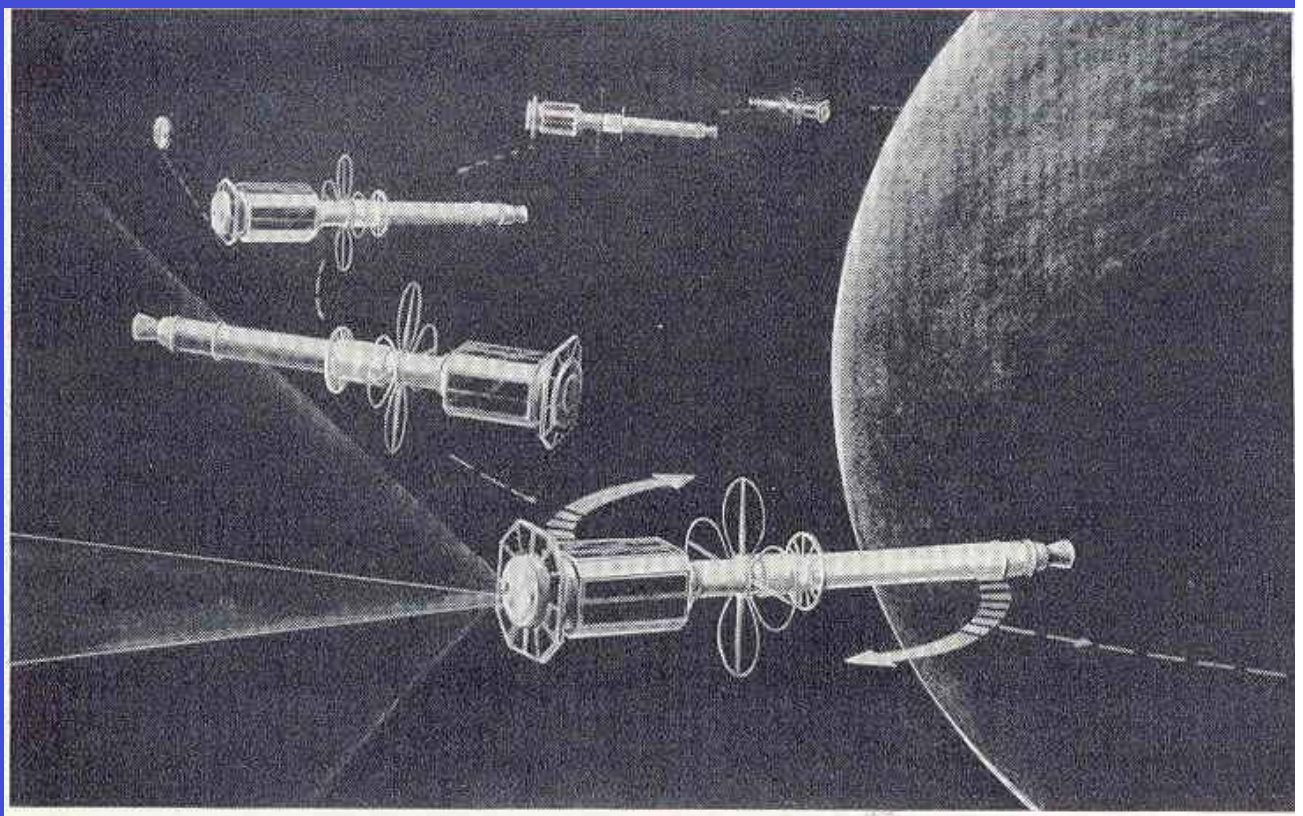
UN “PERICOLOSO” COMUNISTA

‘50 P. MORRISON ET AL. ESISTENZA DI SORGENTI GAMMA



P. MORRISON
1915-2005

1961 EXPLORER 11 RILEVA EMISSIONE GAMMA 100 MeV DAL PIANO GALATTICO



Immediately after launching, Explorer XI began to spin around its long axis. The satellite's tumbling motion, sketched here, was needed for its telescope to scan both Earth and sky. To add inertia around a transverse axis, the fourth stage was left attached. A hollow doughnut containing liquid mercury was mounted above the rocket's nozzle to dissipate rotational energy. The small aluminum disk shown leaving the payload is a meteoric bombardment shield, removable by ground command. The 88-inch-long package weighs 95 pounds. National Aeronautics and Space Administration picture.

VELA

1965 I SATELLITI MILITARI VELA RILEVANO IMPULSI GAMMA

SATELLITE VELA
12XDETECTORS
18NEUTRON AND
GAMMADETECTORS

VELA

1965 I SATELLITI MILITARI VELA RILEVANO IMPULSI GAMMA

THE ASTROPHYSICAL JOURNAL, 182:L85–L88, 1973 June 1

1973 ANNUNCIO SCOPERTA ALLA COMUNITA' SCIENTIFICA

OBSERVATIONS OF GAMMA-RAY BURSTS OF COSMIC ORIGIN

RAY W. KLEBESADEL, IAN B. STRONG, AND ROY A. OLSON

University of California, Los Alamos Scientific Laboratory, Los Alamos, New Mexico
Received 1973 March 16; revised 1973 April 2

SATELLITE VELA
12XDETECTORS
18NEUTRON AND
GAMMADETECTORS

VELA

1965 I SATELLITI MILITARI VELA RILEVANO IMPULSI GAMMA

SATELLITE VELA
12XDETECTORS
18NEUTRON AND
GAMMADETECTORS

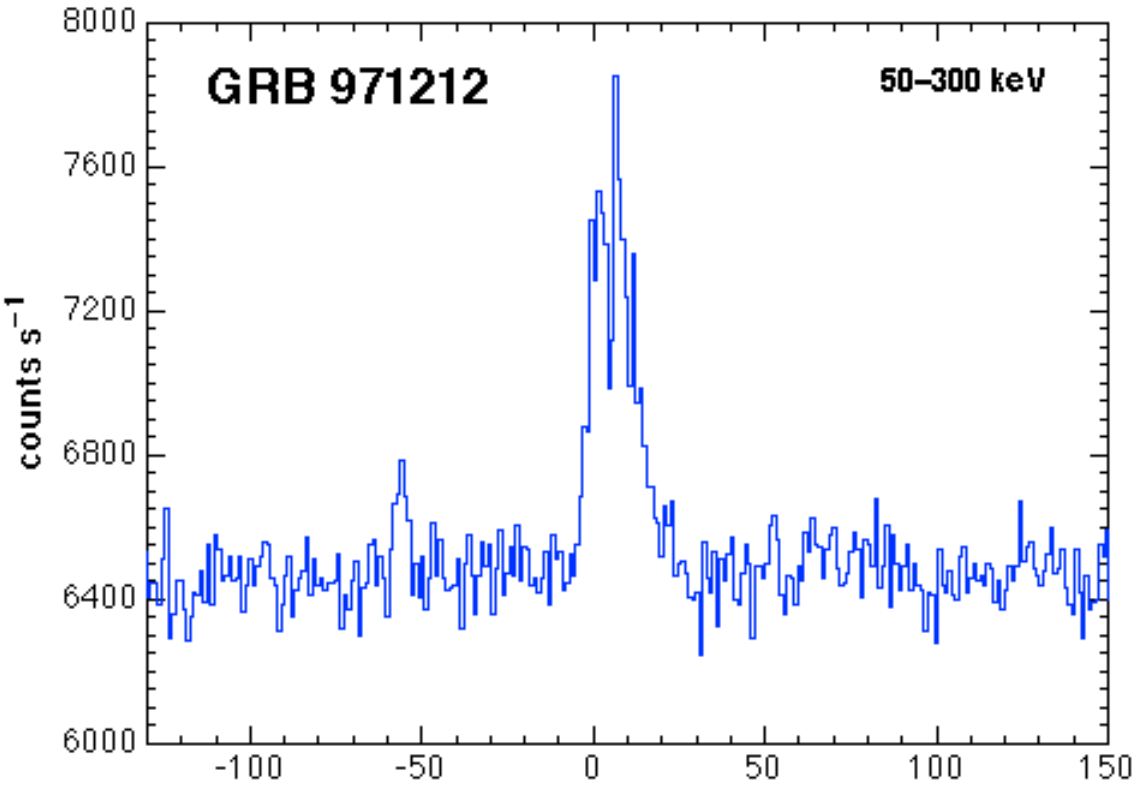
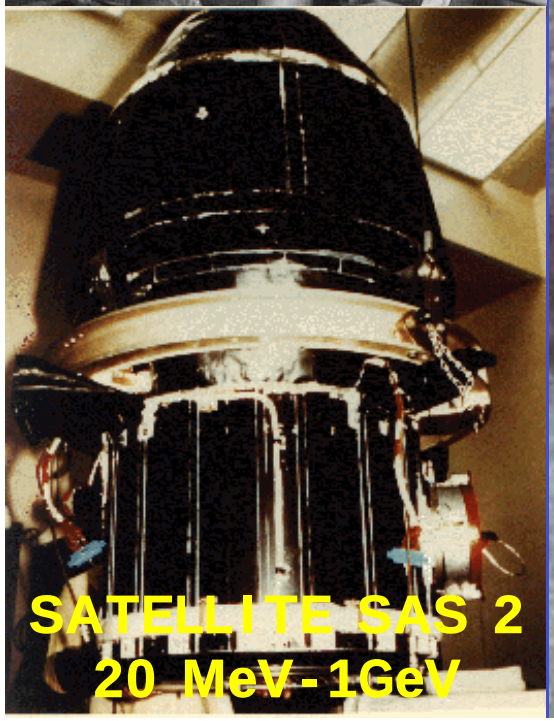


DIAGRAMMA TEMPORALE DI UN GRB

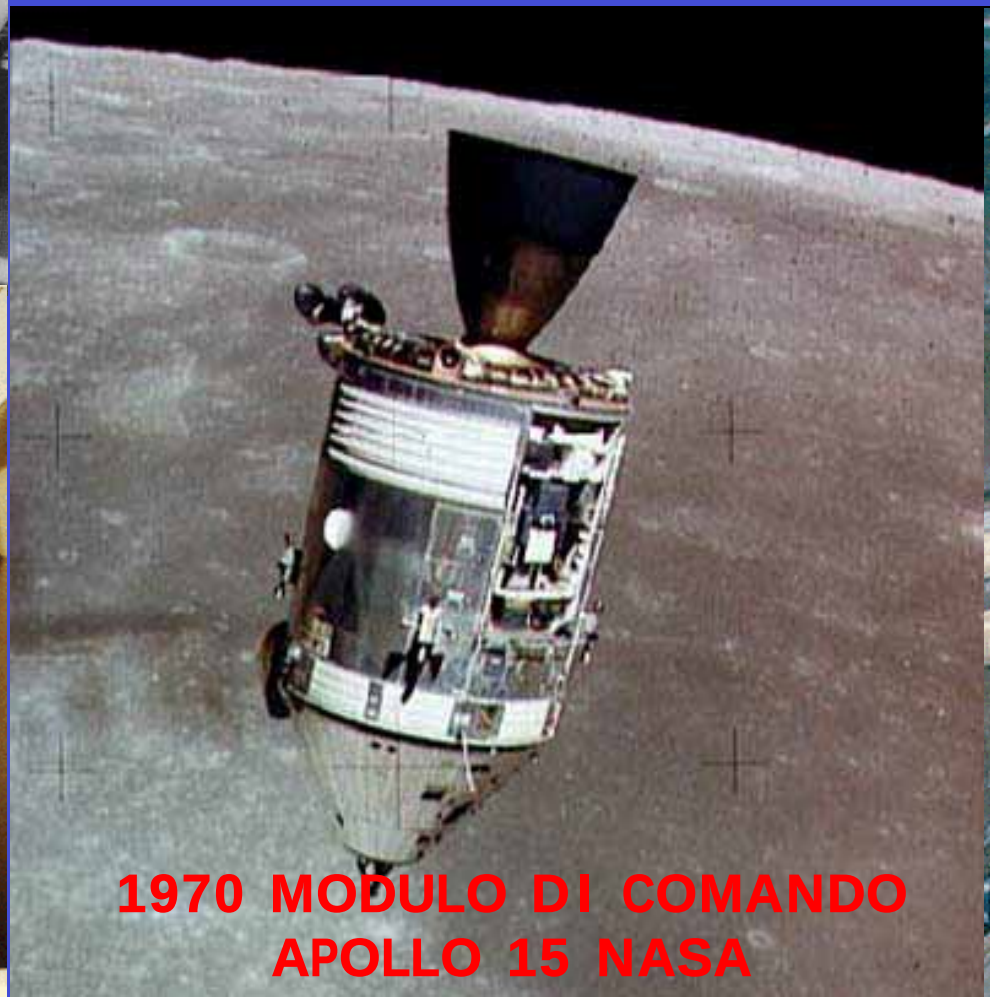
67-73

1967-73 RIGHE GAMMA, LUNA, FONDO GAMMA, GALASSIA, PULSAR, SORGENTE PUNTIFORME NON IDENTIFICATA

SATELLITE OSO 3

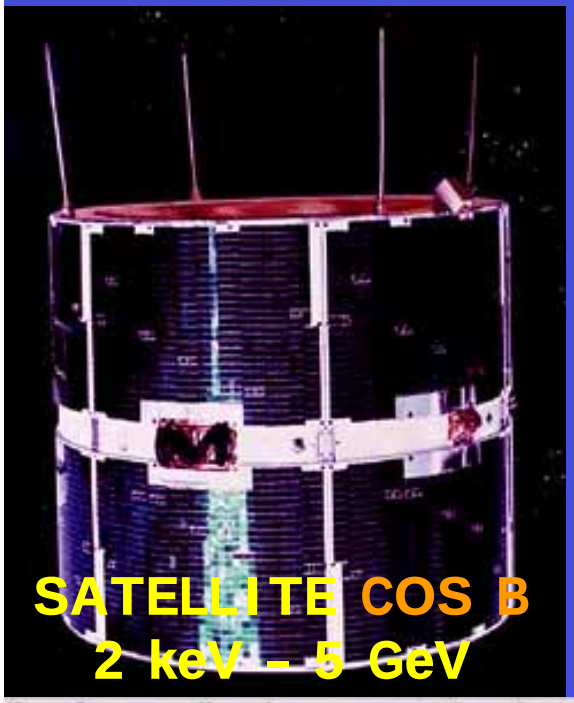


SATELLITE SAS 2
20 MeV - 1GeV



1970 MODULO DI COMANDO
APOLLO 15 NASA

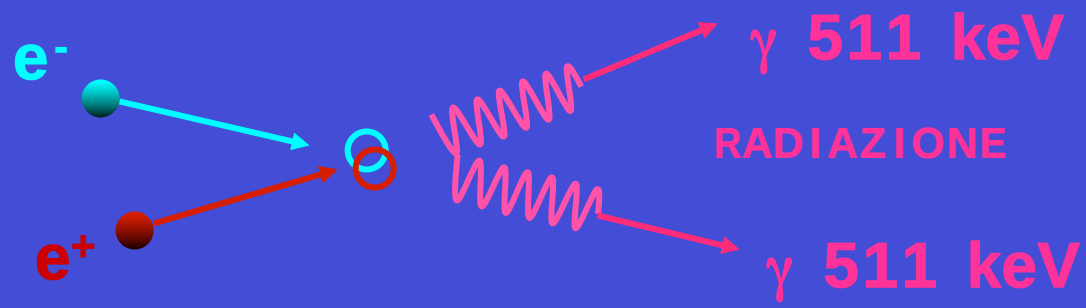
COS B



SATELLITE COS B
2 keV – 5 GeV

1975-82 COS B ESA NUOVE SORGENTI GAMMA
QSO 3C273 E NUBE MOLECOLARE RHO OPH

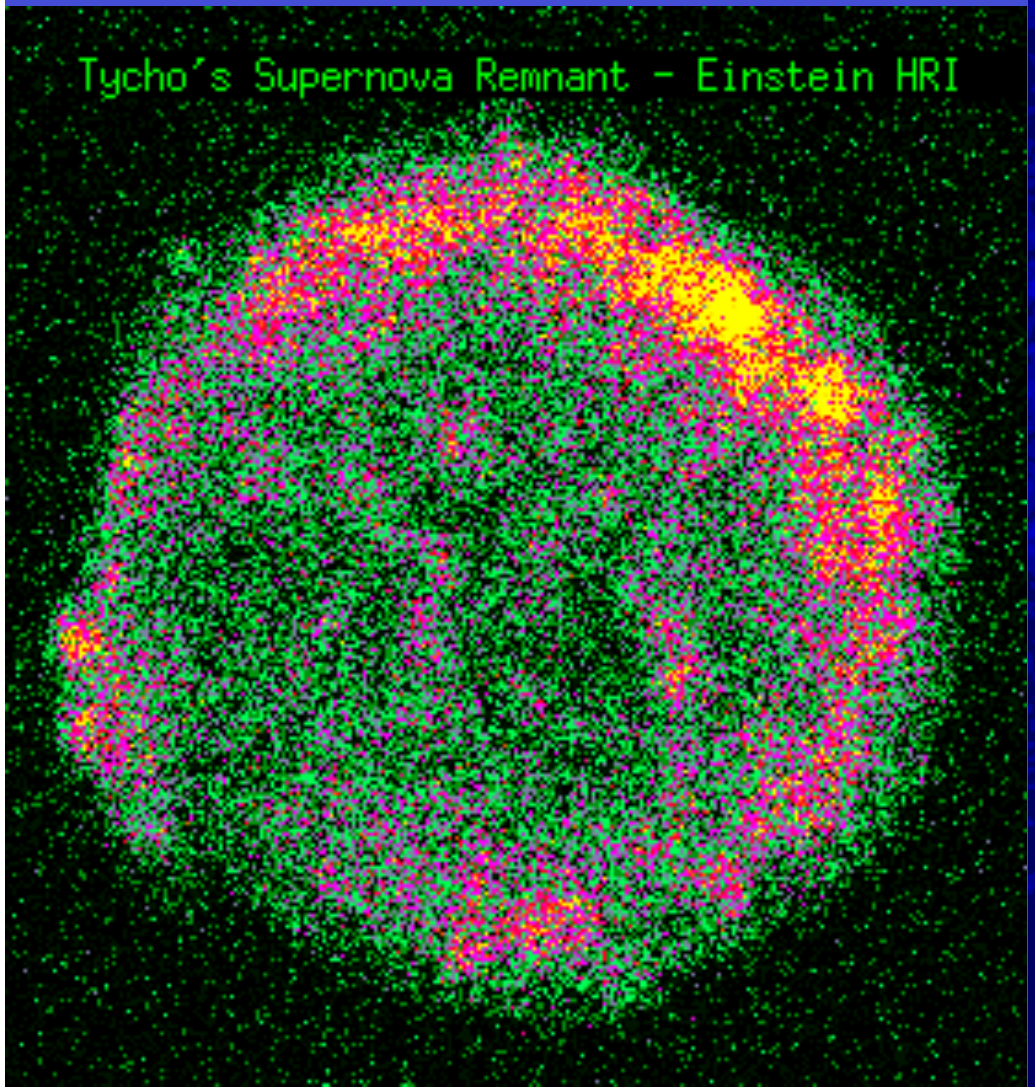
1979-81 HEAO 3 RIGA A 511 keV

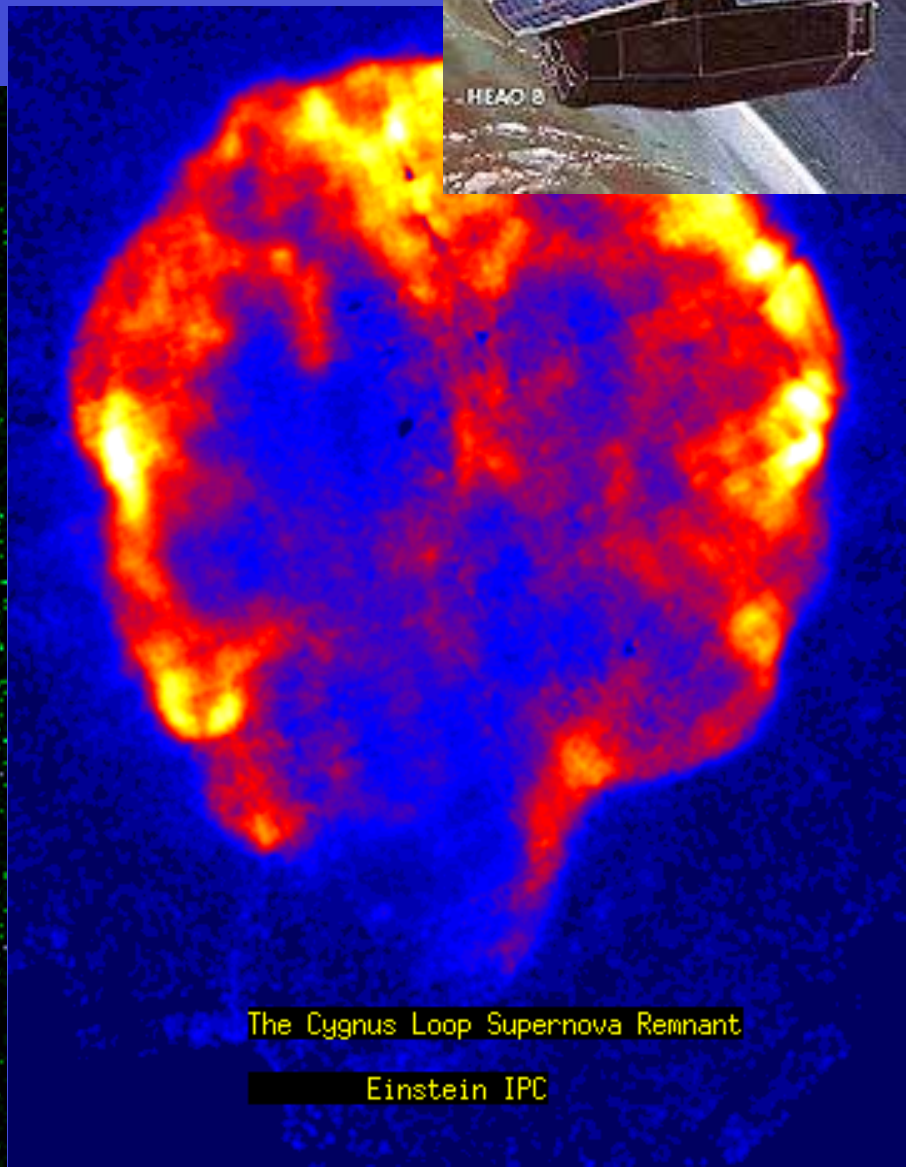


MAPPA GAMMA DELLA GALASSIA COS B

EINSTEIN

1978-81 HEAO 2 “EINSTEIN” NASA ONDE DI SHOCK IN SN REM





GEMINGA

1990 ROSAT SATELLITE X TEDESCO

DAL CONFRONTO TRA I DATI DI ROSAT E "EINSTEIN" SI ARRIVA A IDENTIFICARE LA SORGENTE "GEMINGA" COME UNA PULSAR 0,1 kly RADIOQUIETA

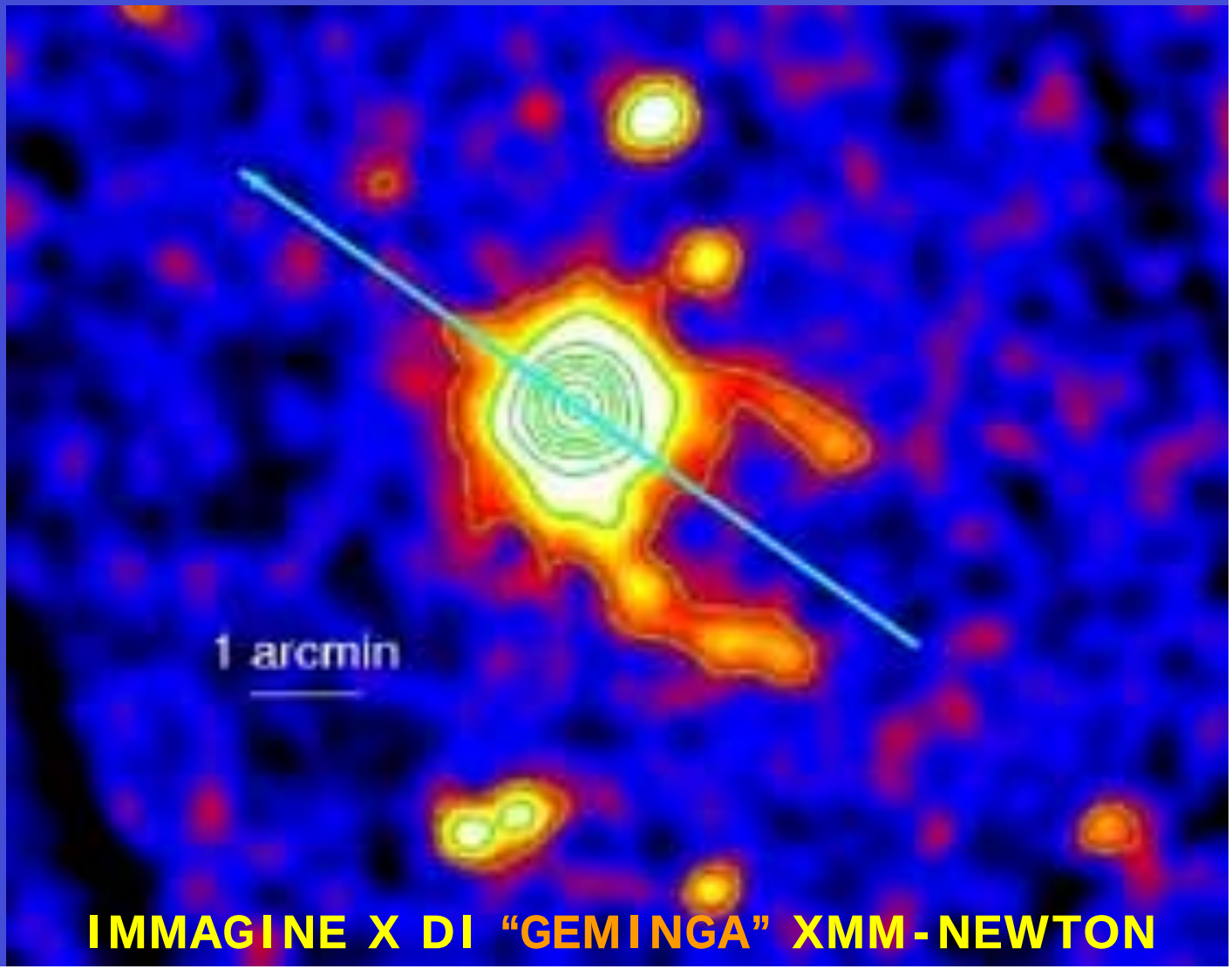
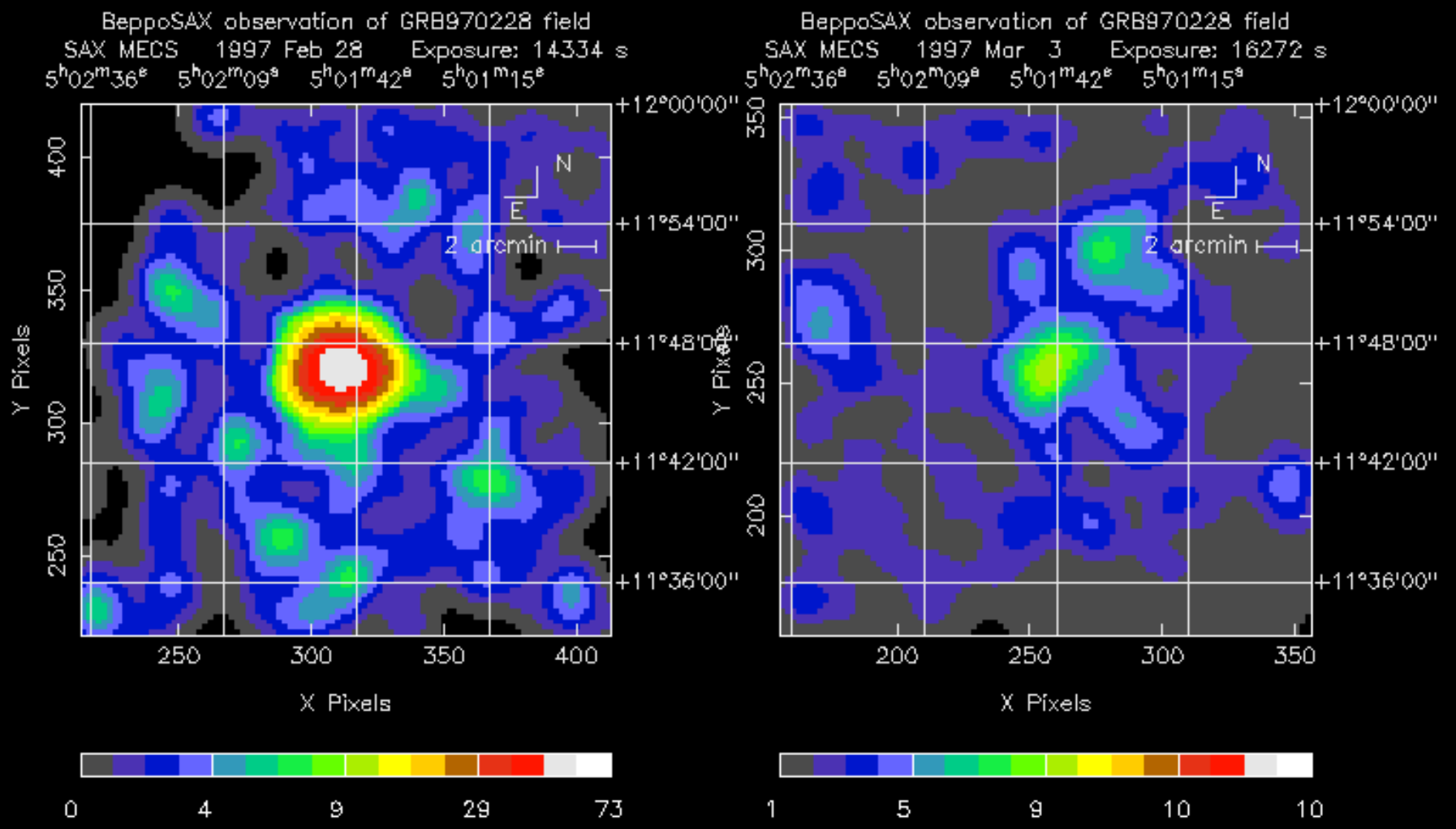


IMMAGINE X DI "GEMINGA" XMM-NEWTON

BEPPO SAX

1996-02 BEPPO-SAX IT-NL 0,1-300 keV



28/02/1997 BEPPO-SAX OSSERVA UN GRB IN X E GAMMA

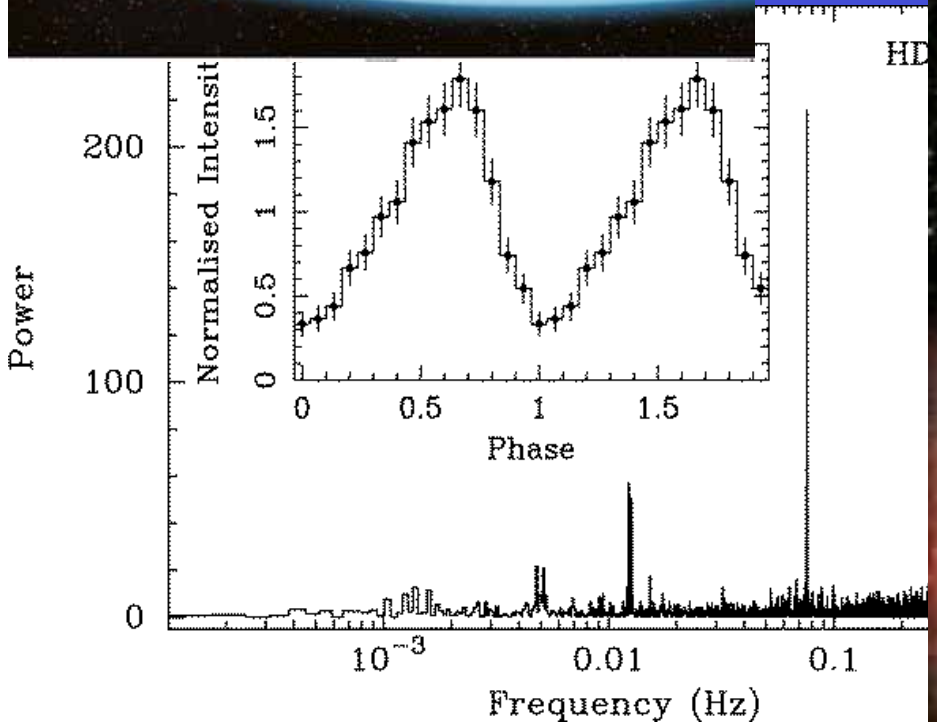
ROSSI X RAY TIMING EXP

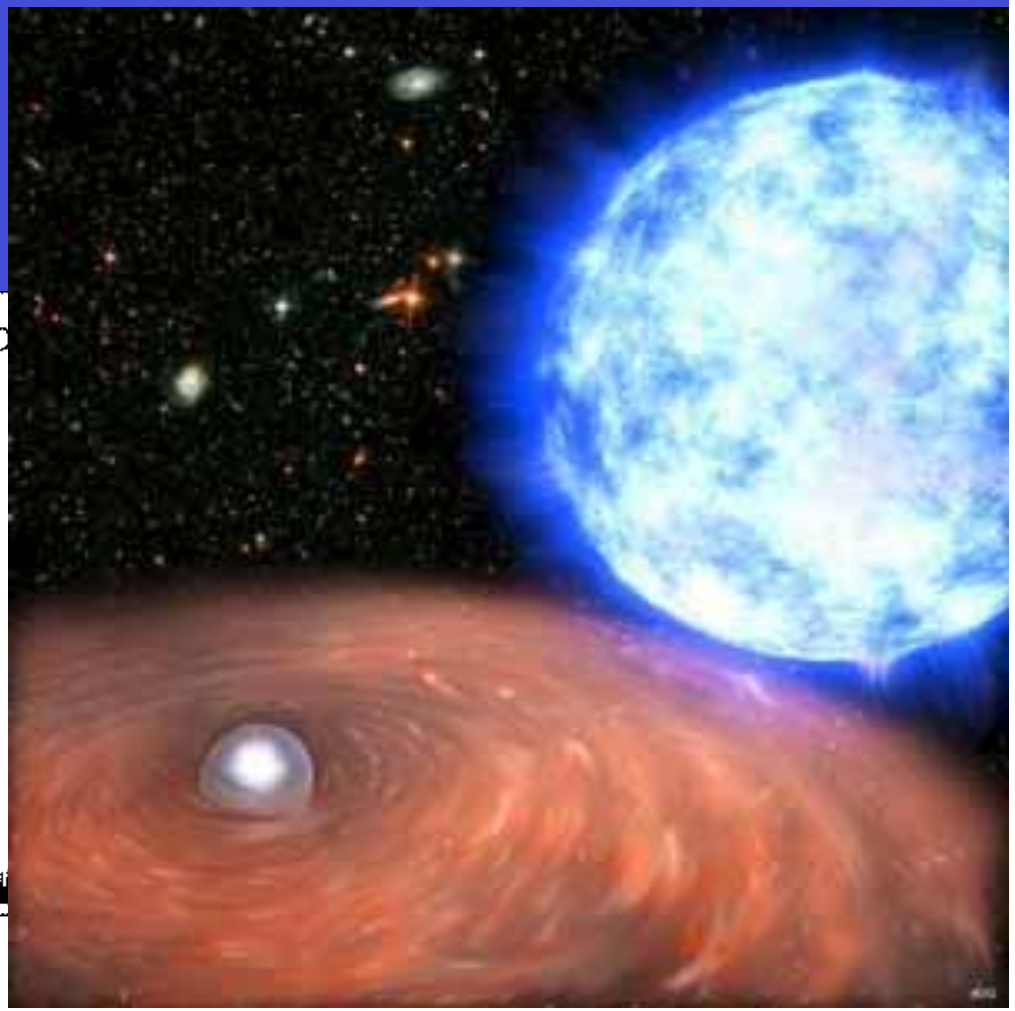
1995 ROSSI XRTE 1,5-250 keV NASA/CXC/SAO

MAPPA X (ISOLINEE) E IR DELLA VIA LATTEA NASA/CXC/SAO

XMM-NEWTON

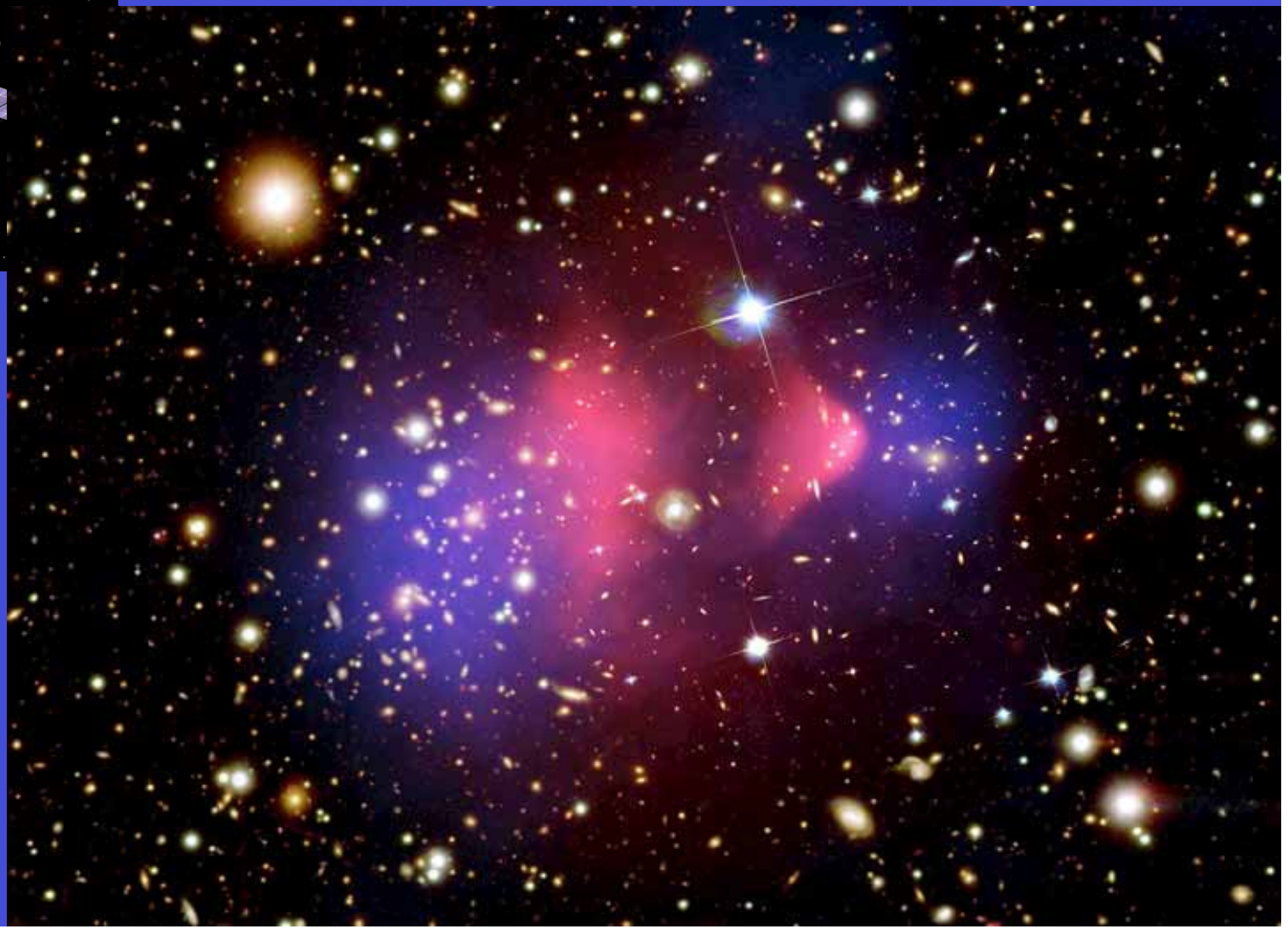
1999 XMM-NEWTON 0,2-12 keV ESA





CHANDRA

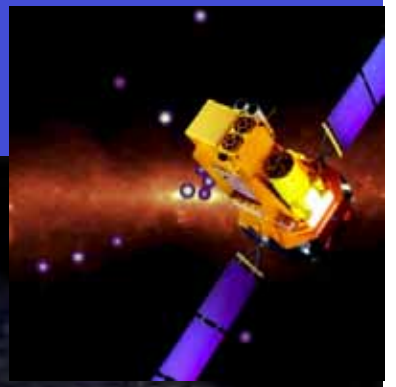
1999 CHANDRA 0,1-10 keV NASA/CXC/SAO



AMMASSO "BULLET" RISULTATO DELLA COLLISIONE DI DUE AMMASSI DI GALASSIE

INTEGRAL

2002 INTEGRAL 15-60 keV ESA



RIGA Al^{26}

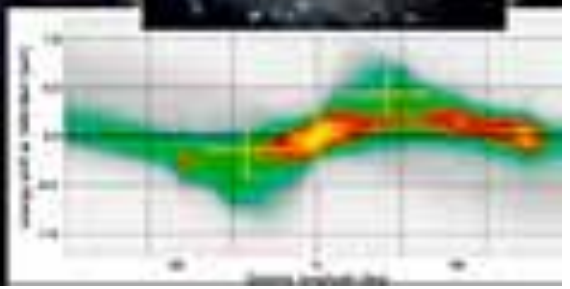
Al

Proton → Neutron

Mg^*

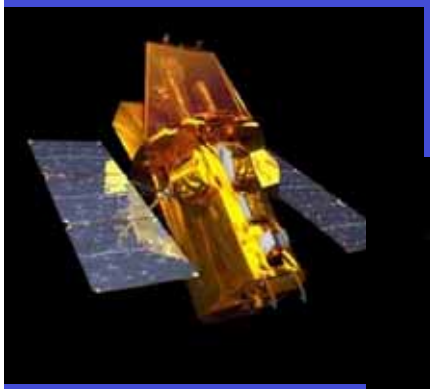
γ

Mg



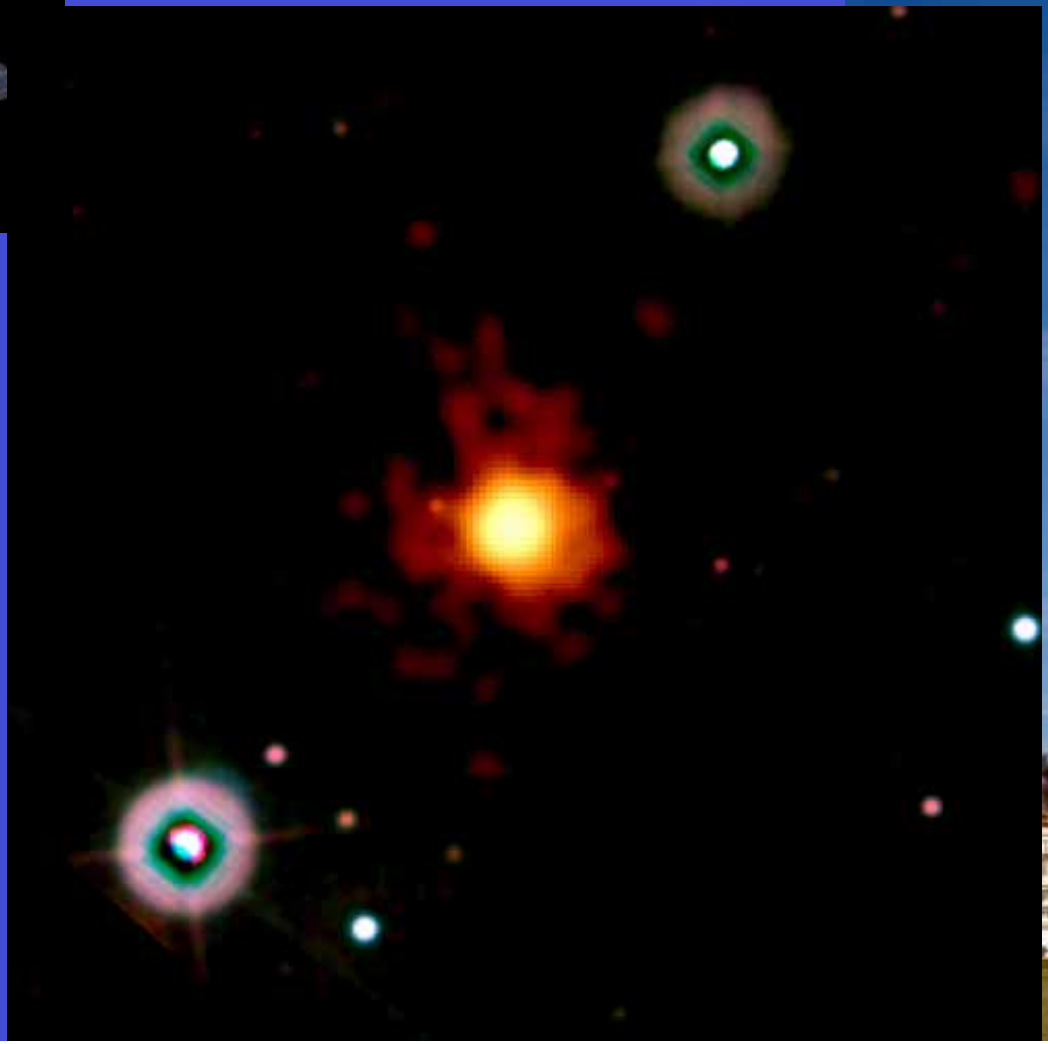
TASSO DI FORMAZIONE DI SUPERNOVAE

SWIFT

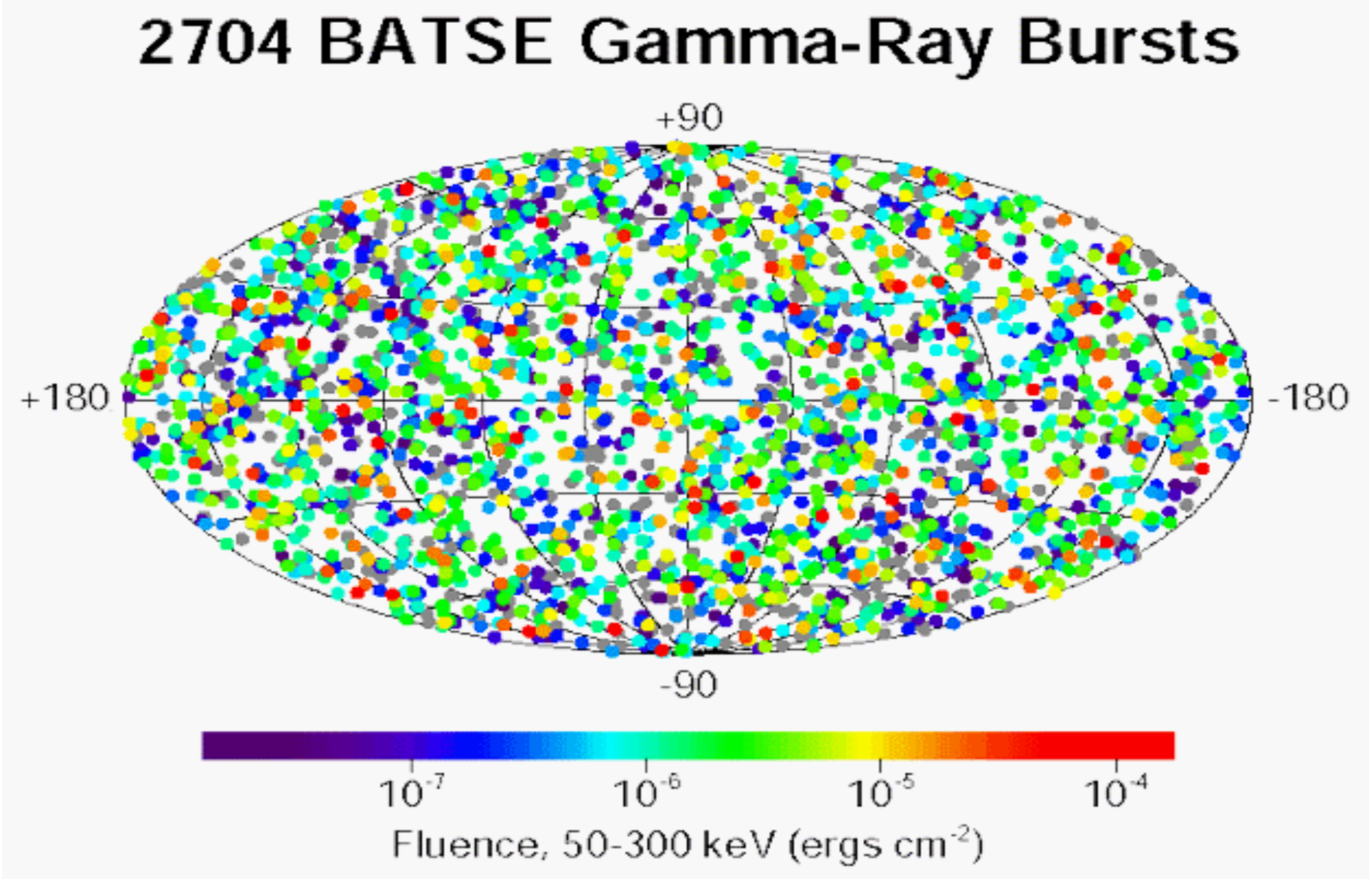


2004 SWIFT GAMMA, X, UV, VIS NASA/CXC/SAO

GRB 090423 AS SEEN BY NASA'S SWIFT SATELLITE CREDIT: NASA/ SWIFT/ STEFAN IMMLER

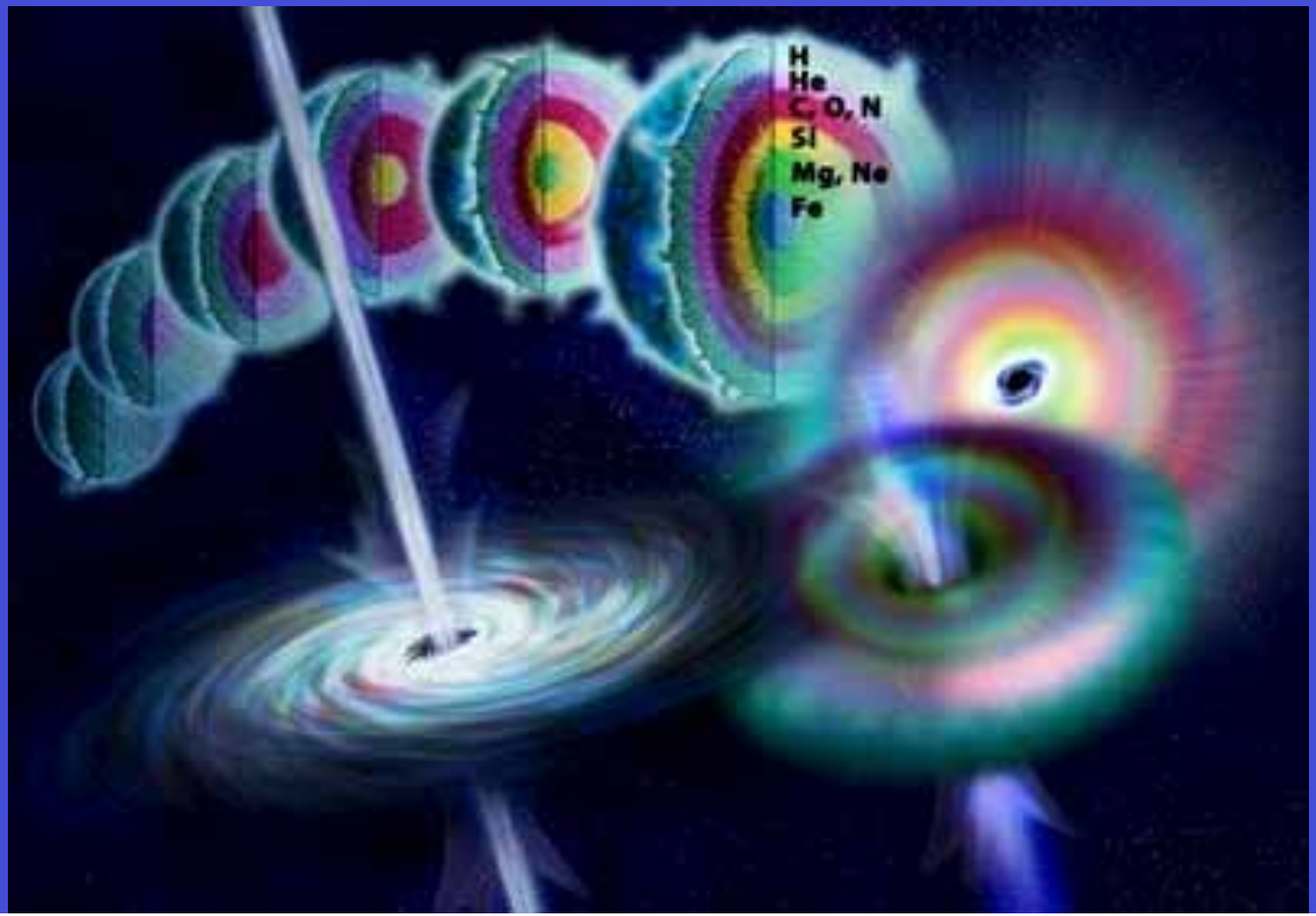


GRB OVUNQUE


2704 BATSE Gamma-Ray Bursts
+90
+180
-180
-90
10^{-7}
10^{-6}
10^{-5}
10^{-4}
Fluence, 50-300 keV (ergs cm^{-2})

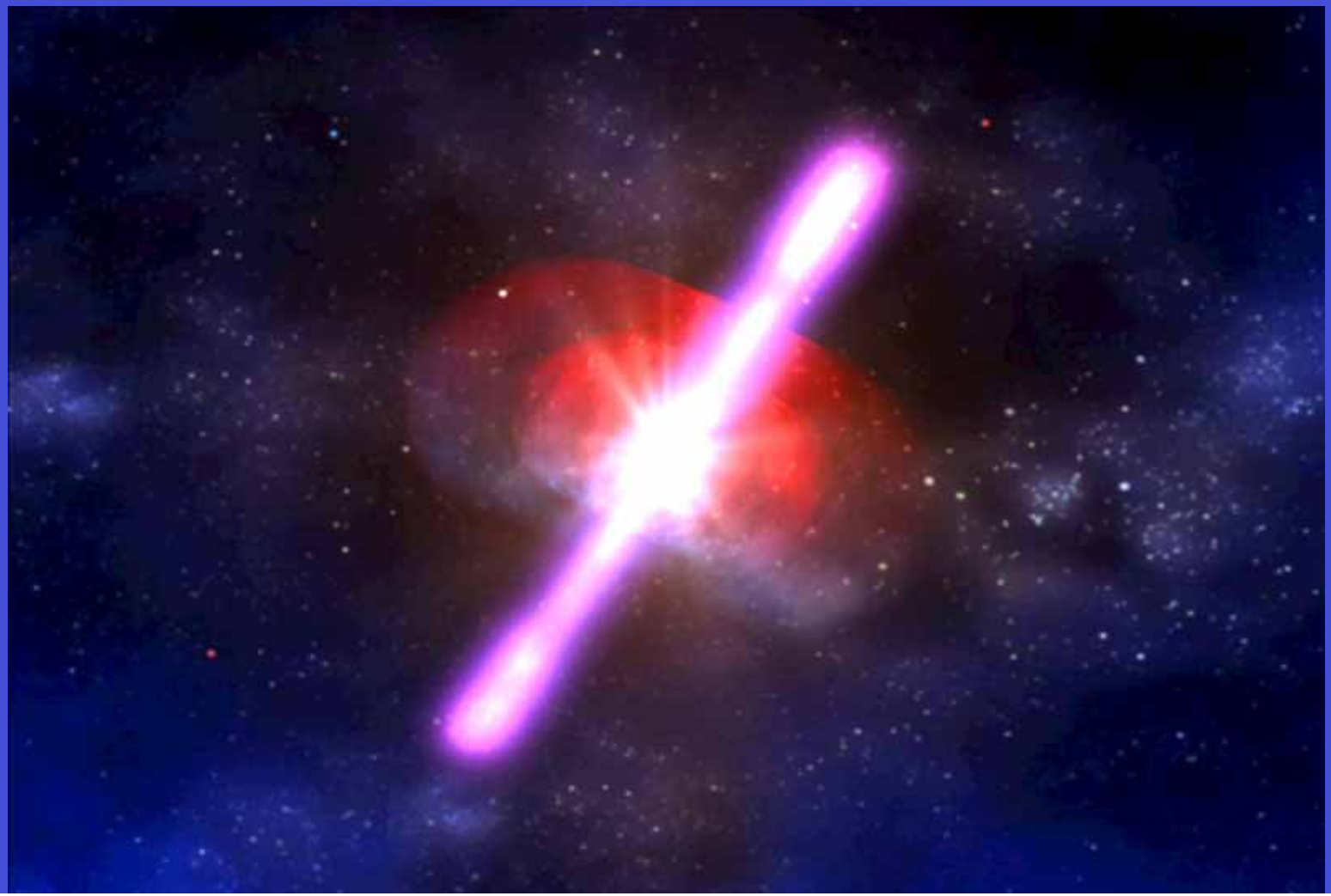
CHI PRODUCE GRB?

FORMAZIONE DI UN GRB IN BASE AI DATI FORNITI DA SWIFT
credit NASA/CXC/SAO

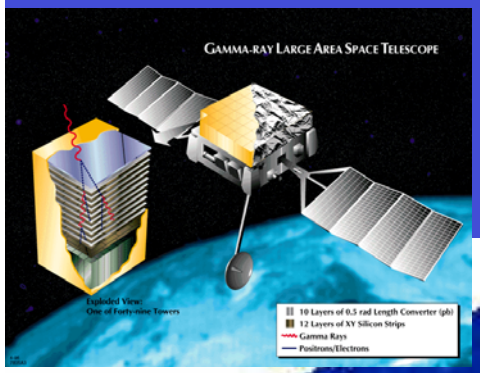


CHI PRODUCE GRB?

FORMAZIONE DI UN GRB IN BASE AI DATI FORNITI DA SWIFT
credit NASA/CXC/SAO

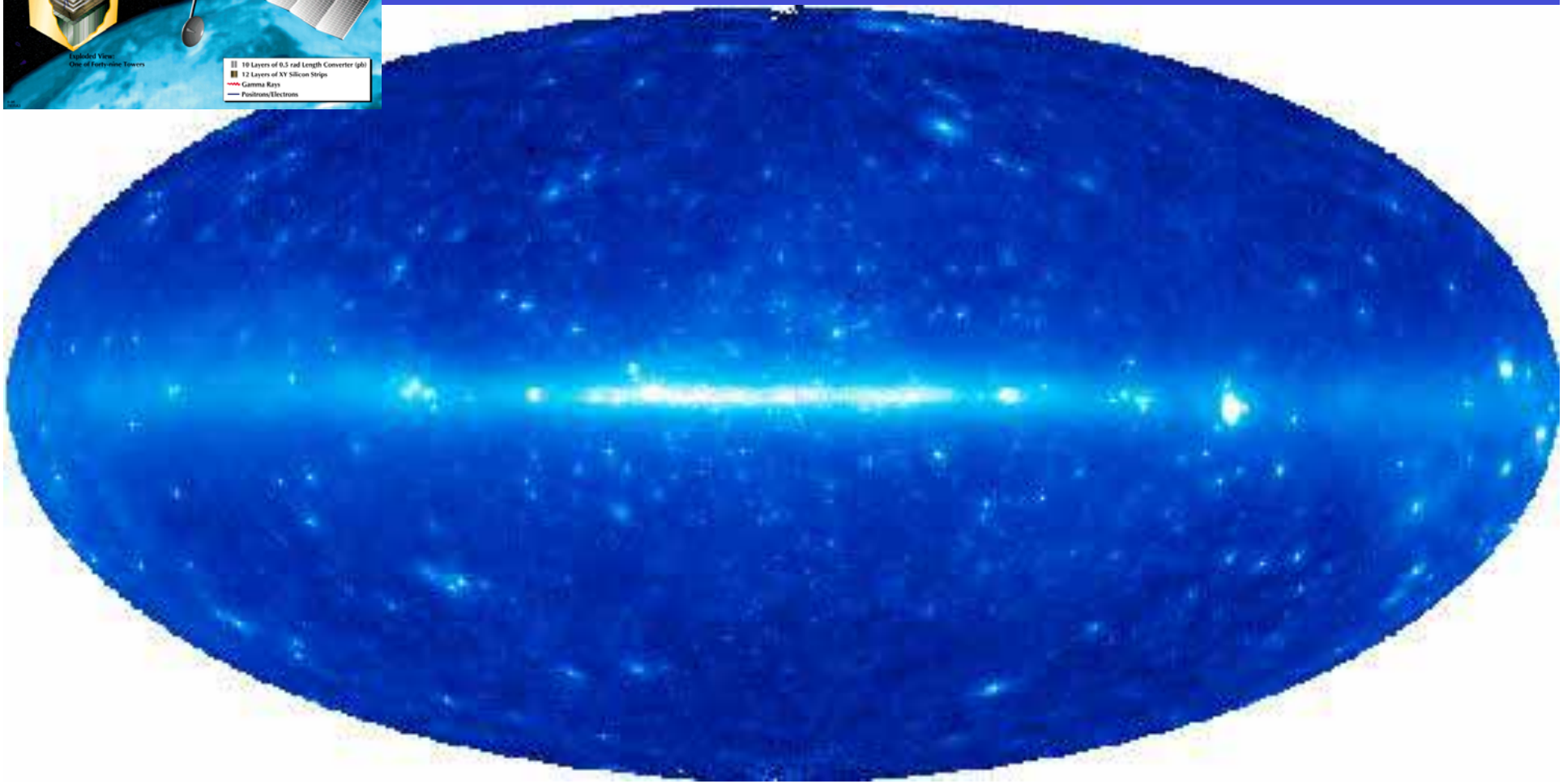


FERMI



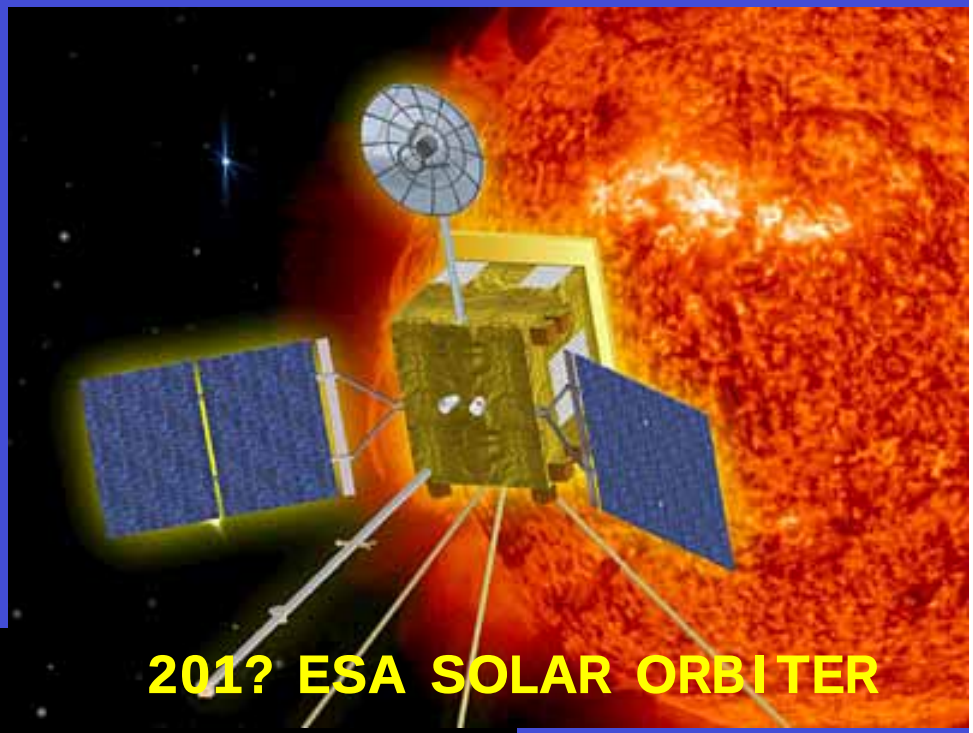
2008 GLAST "FERMI" NASA+EU

IMMAGINE GAMMA DELLA VOLTA CELESTE

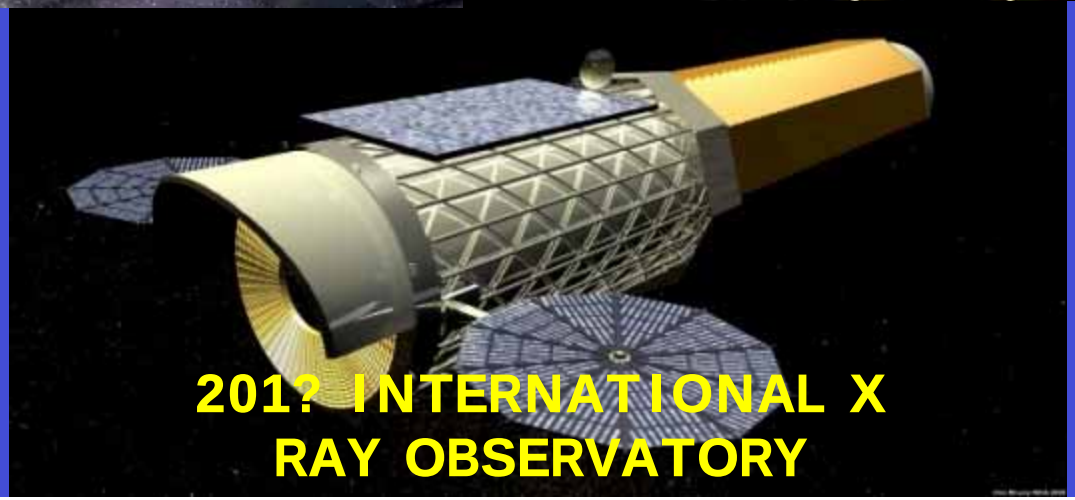


FUTURO

201? CONSTELLATION-X
ESA-NASA



201? ESA SOLAR ORBITER



201? INTERNATIONAL X
RAY OBSERVATORY

SOLE

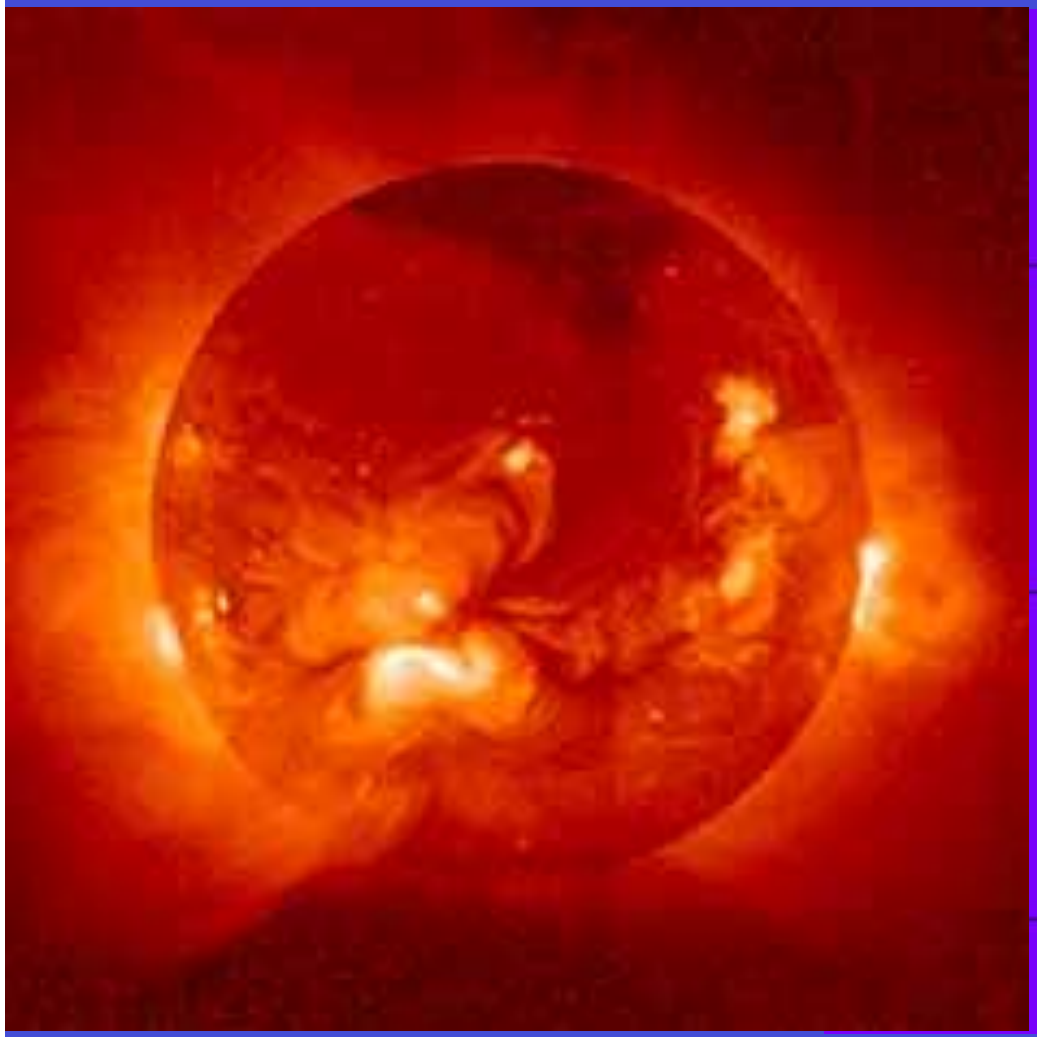
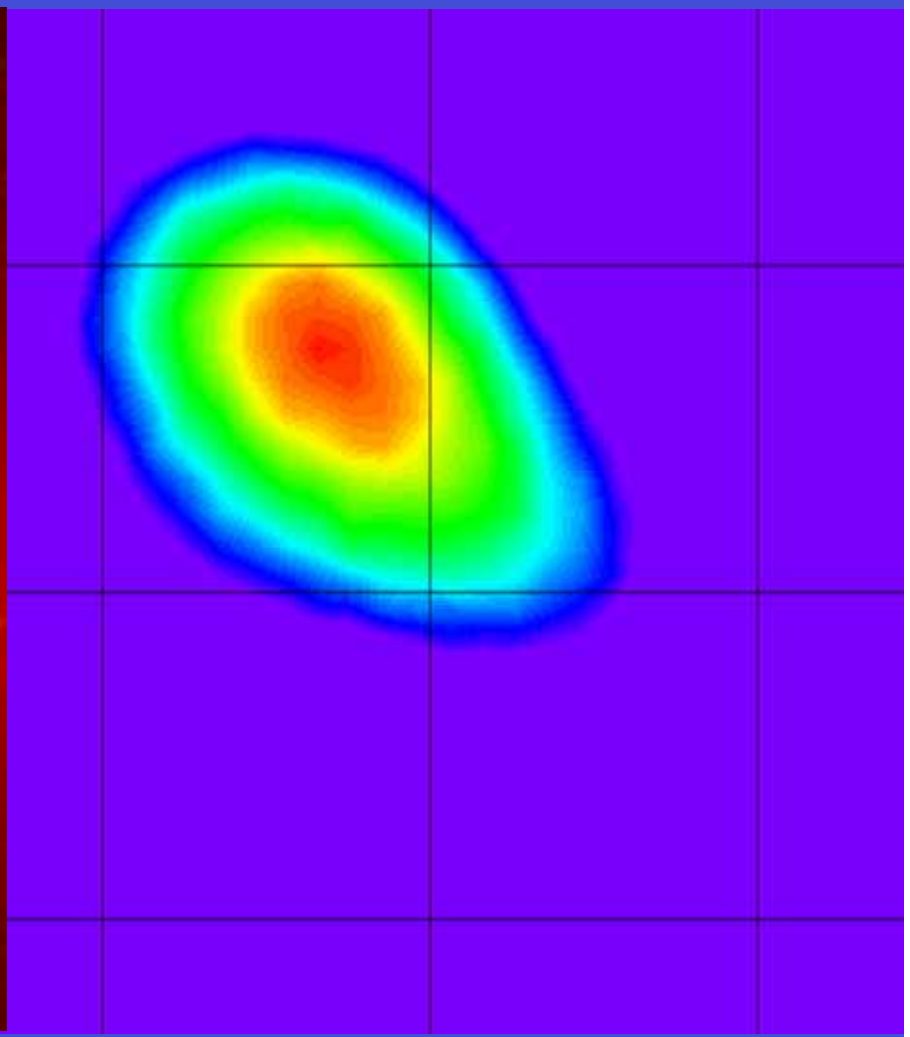


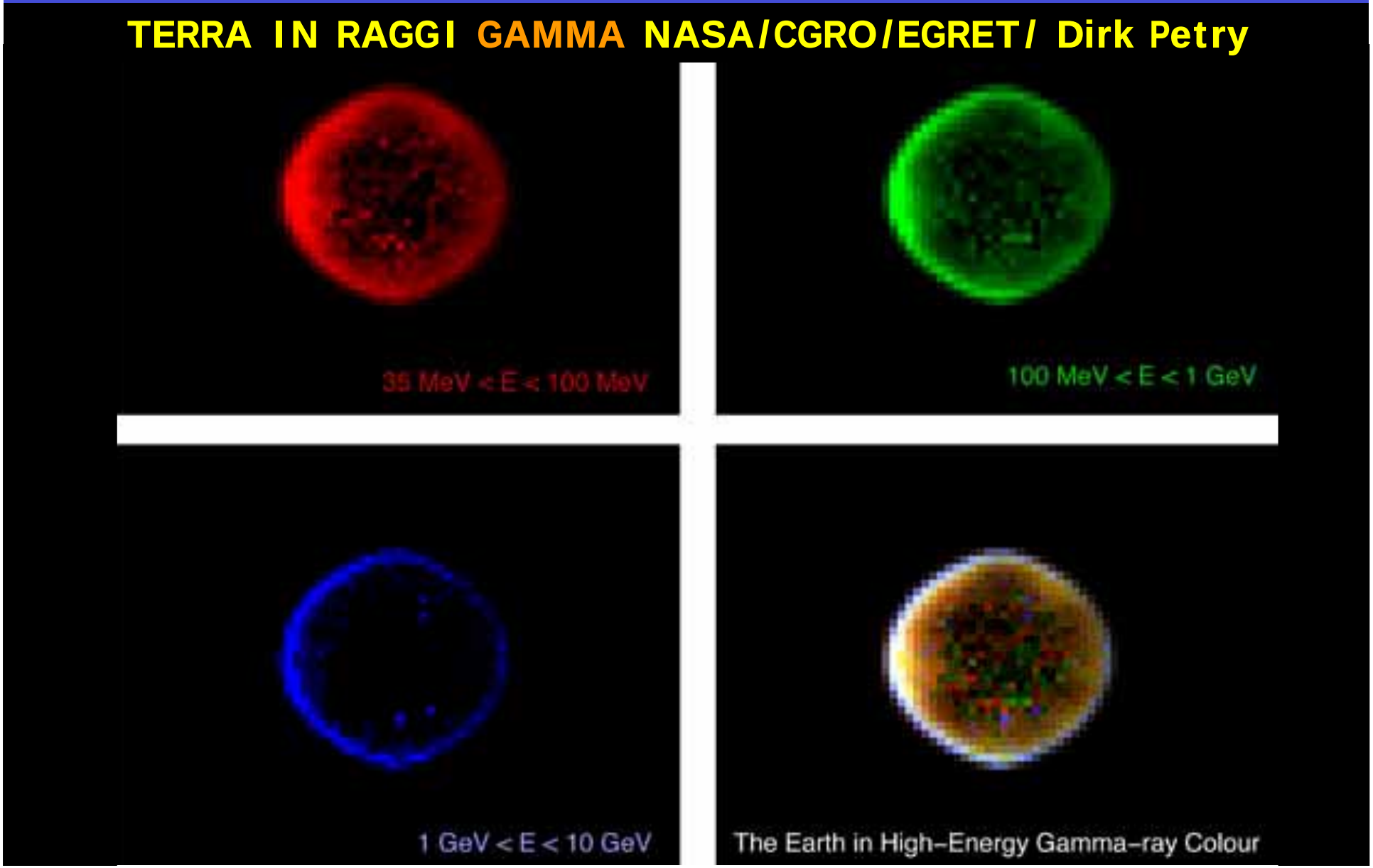
IMMAGINE X SRT YOHKOH



FLARE IN GAMMA 1991
COMPTEL

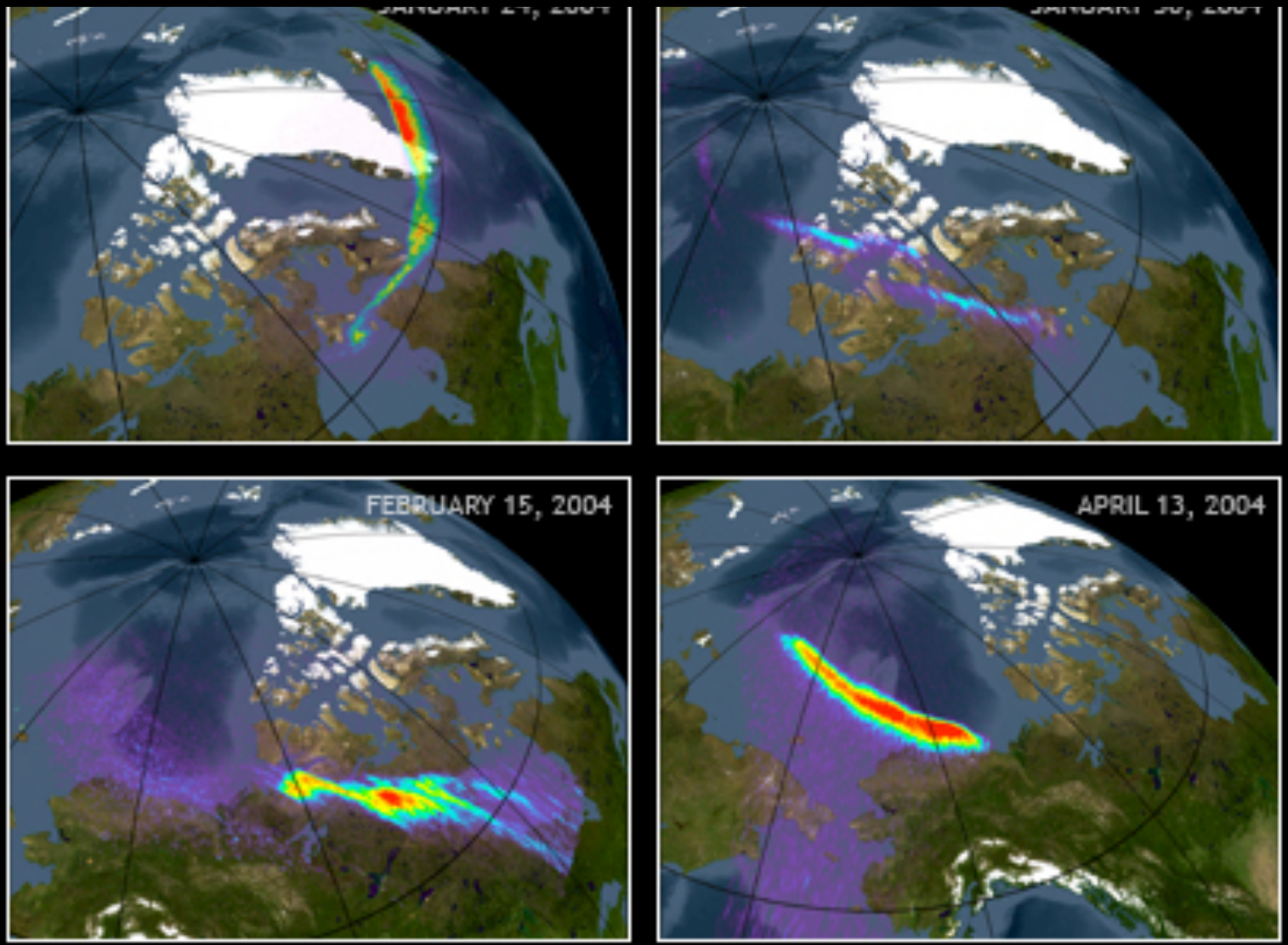
TERRA

TERRA IN RAGGI GAMMA NASA/CGRO/EGRET/ Dirk Petry



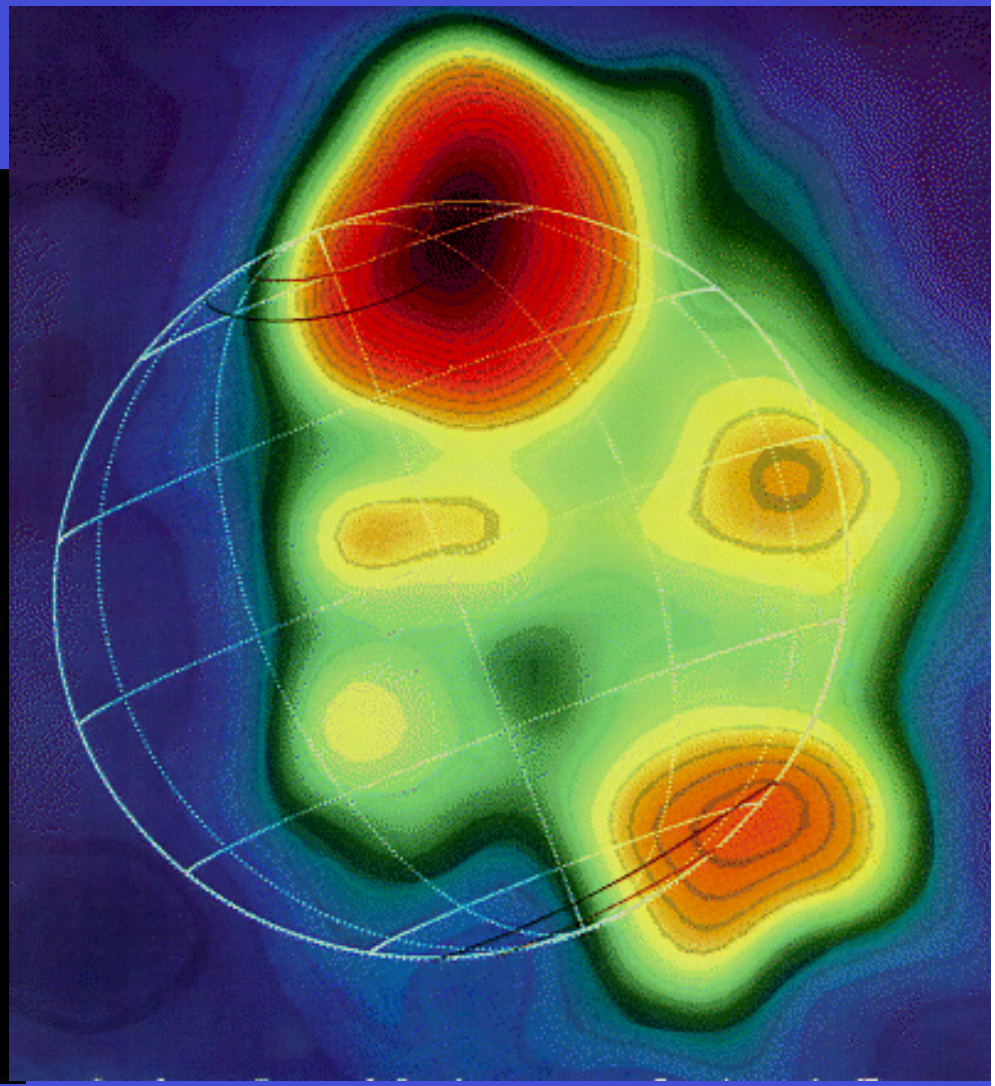
TERRA X

AURORE BOREALI EMISSIONE X CHANDRA NASA



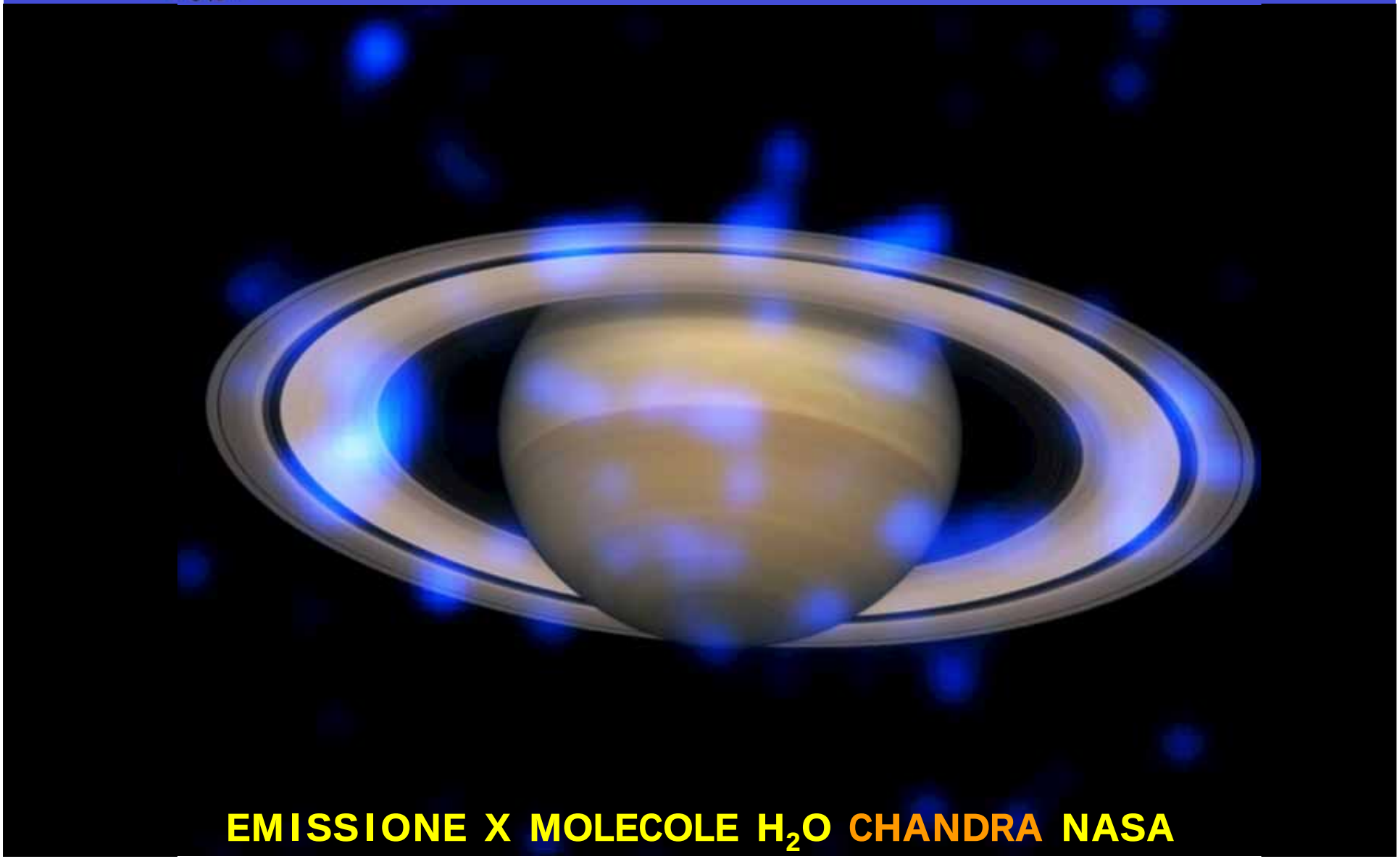
GIOVE

EMISSIONE X AURORA
CHANDRA NASA



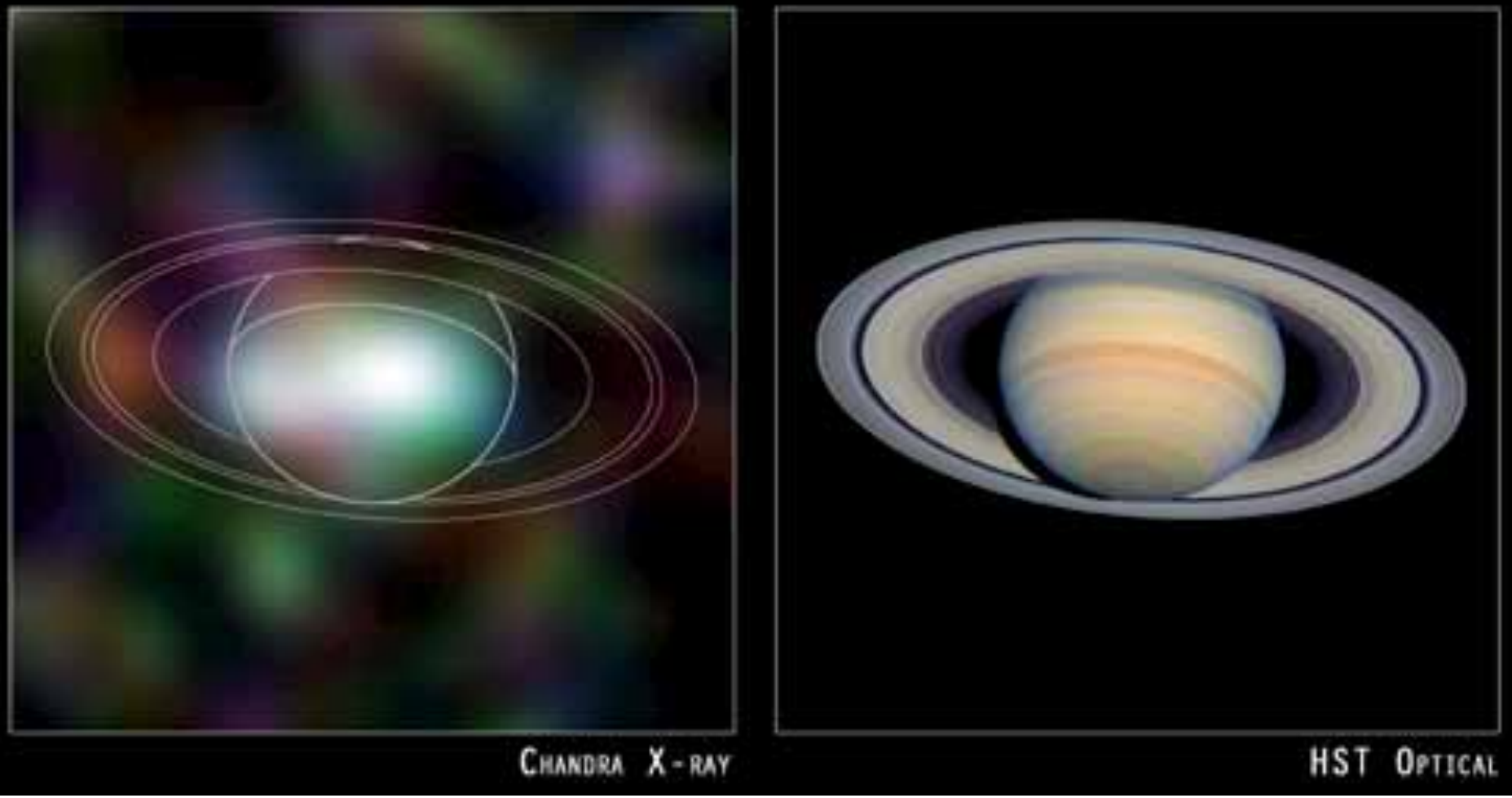
1995 EMISSIONE X IMPATTO
SHOEMAKER-LEVY ROSAT

SATURNO X



EMISSIONE X MOLECOLE H_2O CHANDRA NASA

LAMPI X



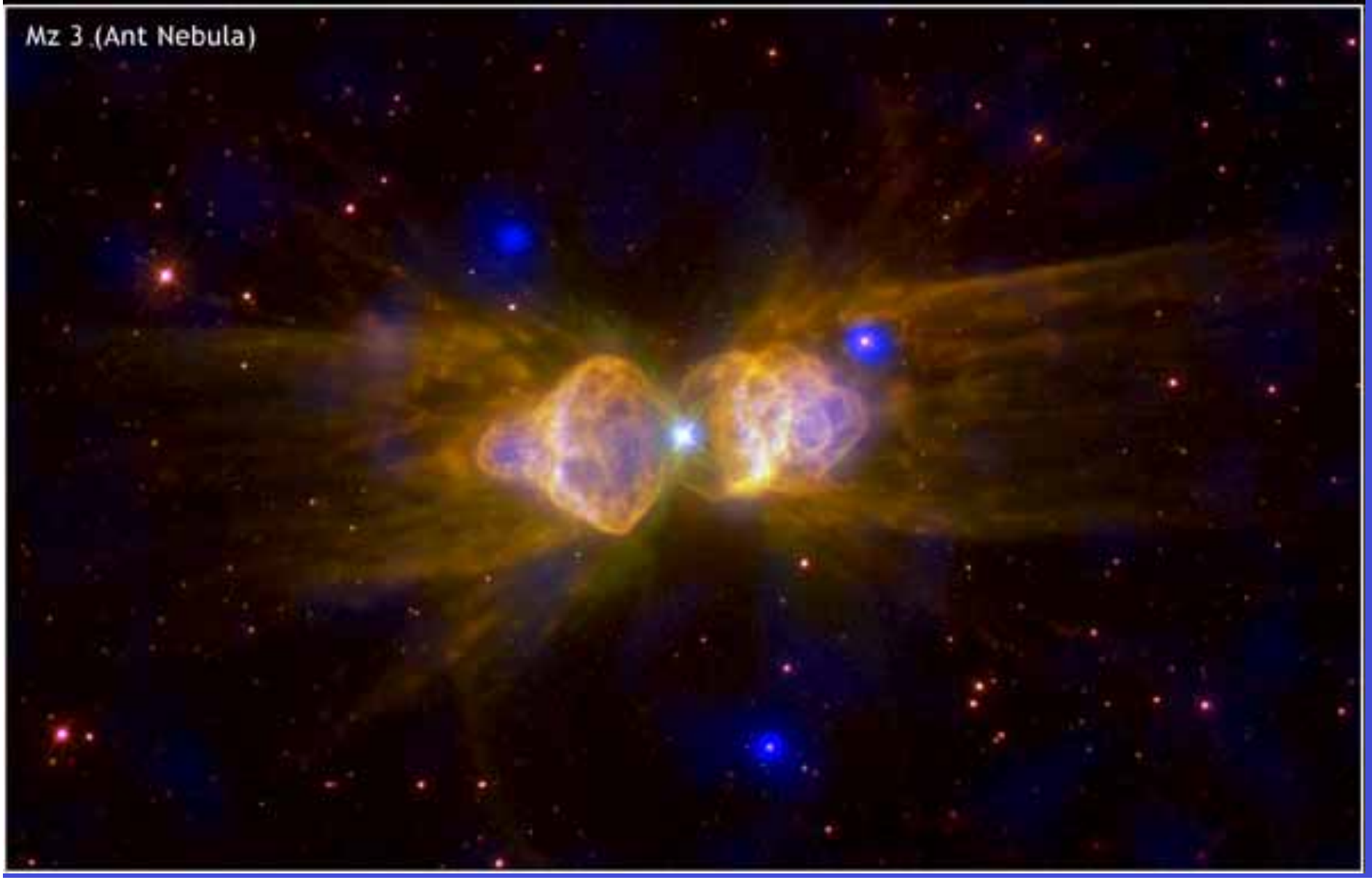
COMETE

COMETA LULIN RIPRESA IN UV (BLU) E X (ROSSO) SWIFT

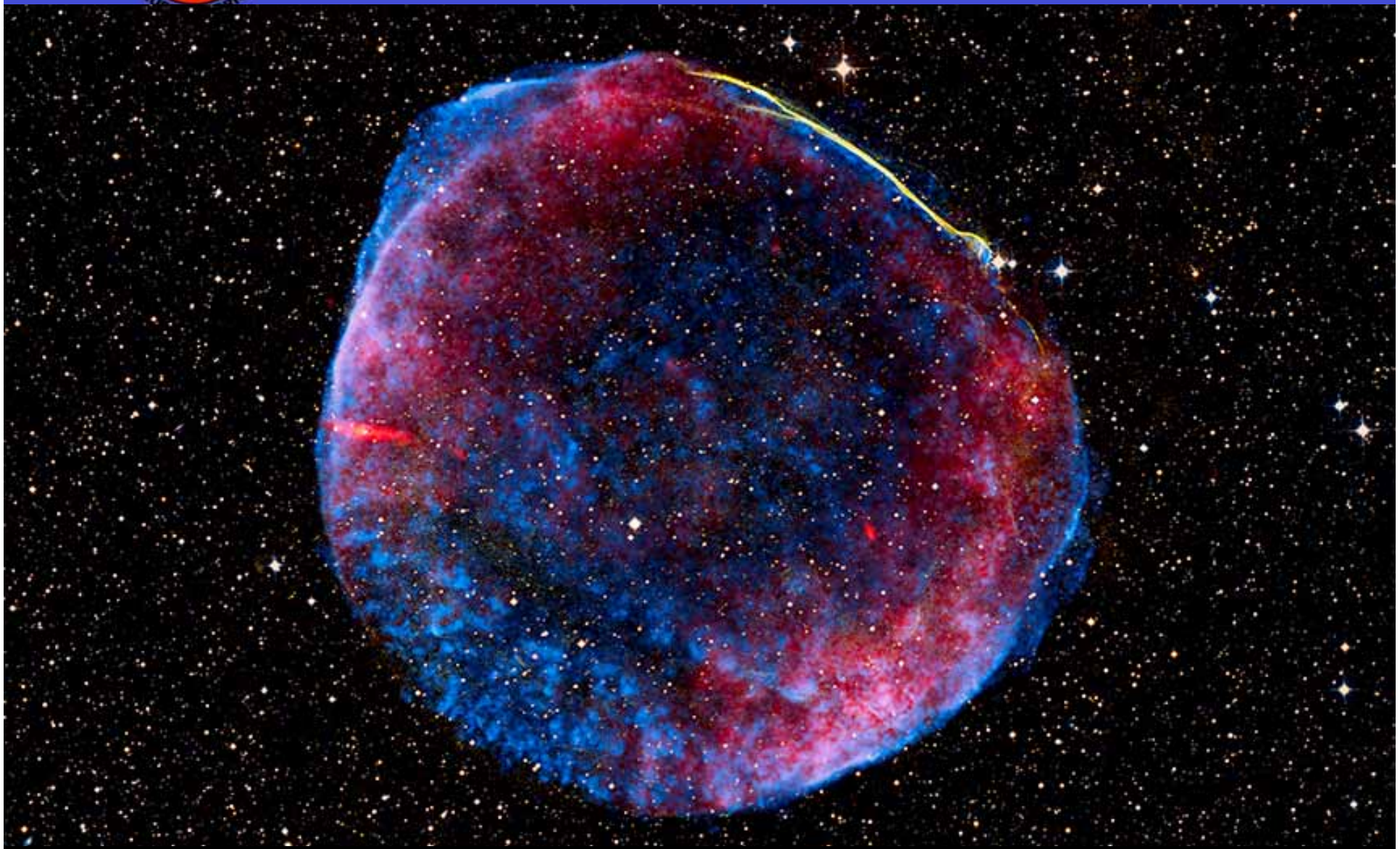
OCCHIO DI GATTO

NEBULOSA PLANETARIA “OCCHIO DI GATTO” 3 kly CHANDRA

LA FORMICA

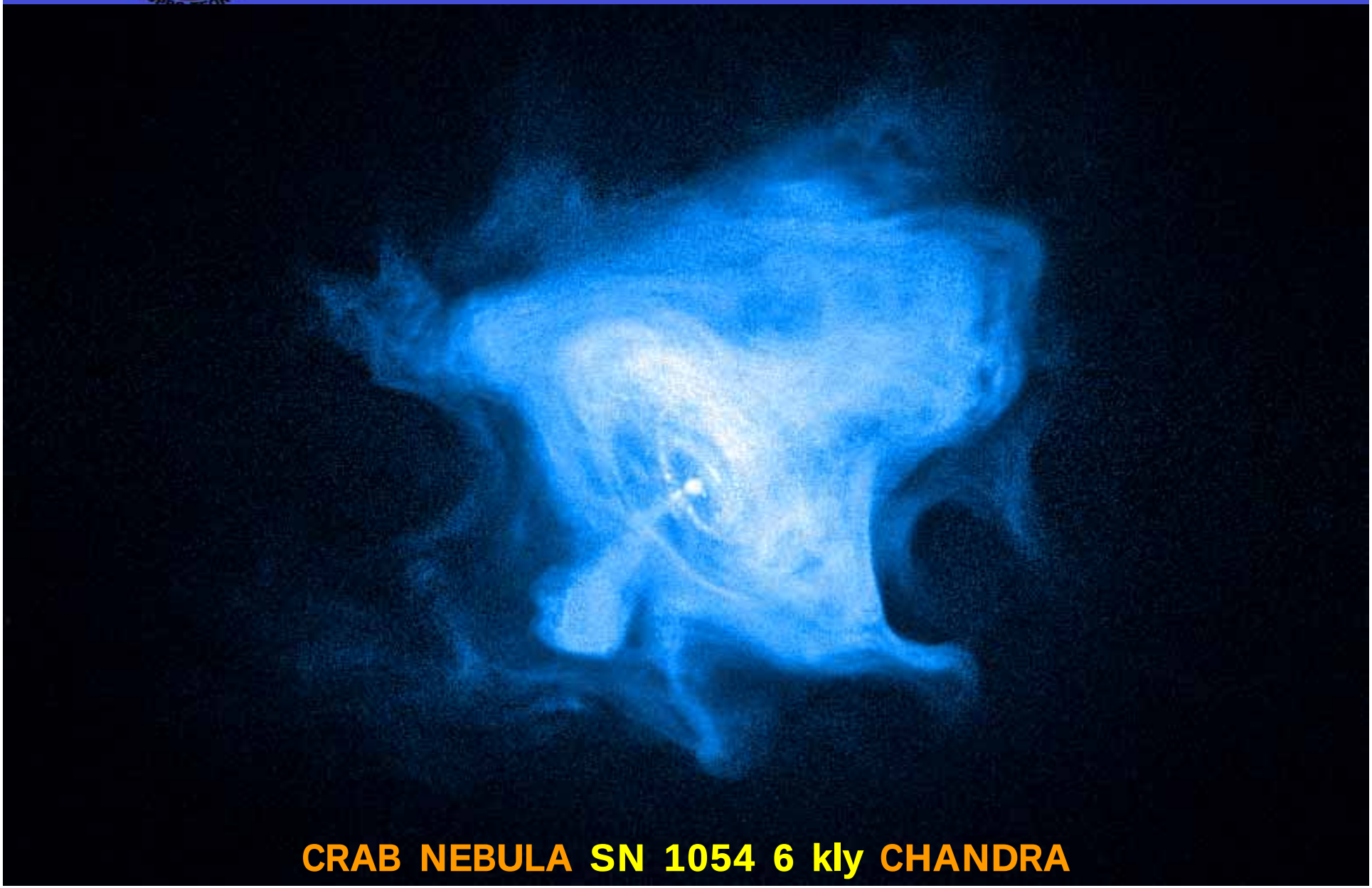


SN 1006



SN 1006 REMNANT 7 kly CHANDRA

CRAB

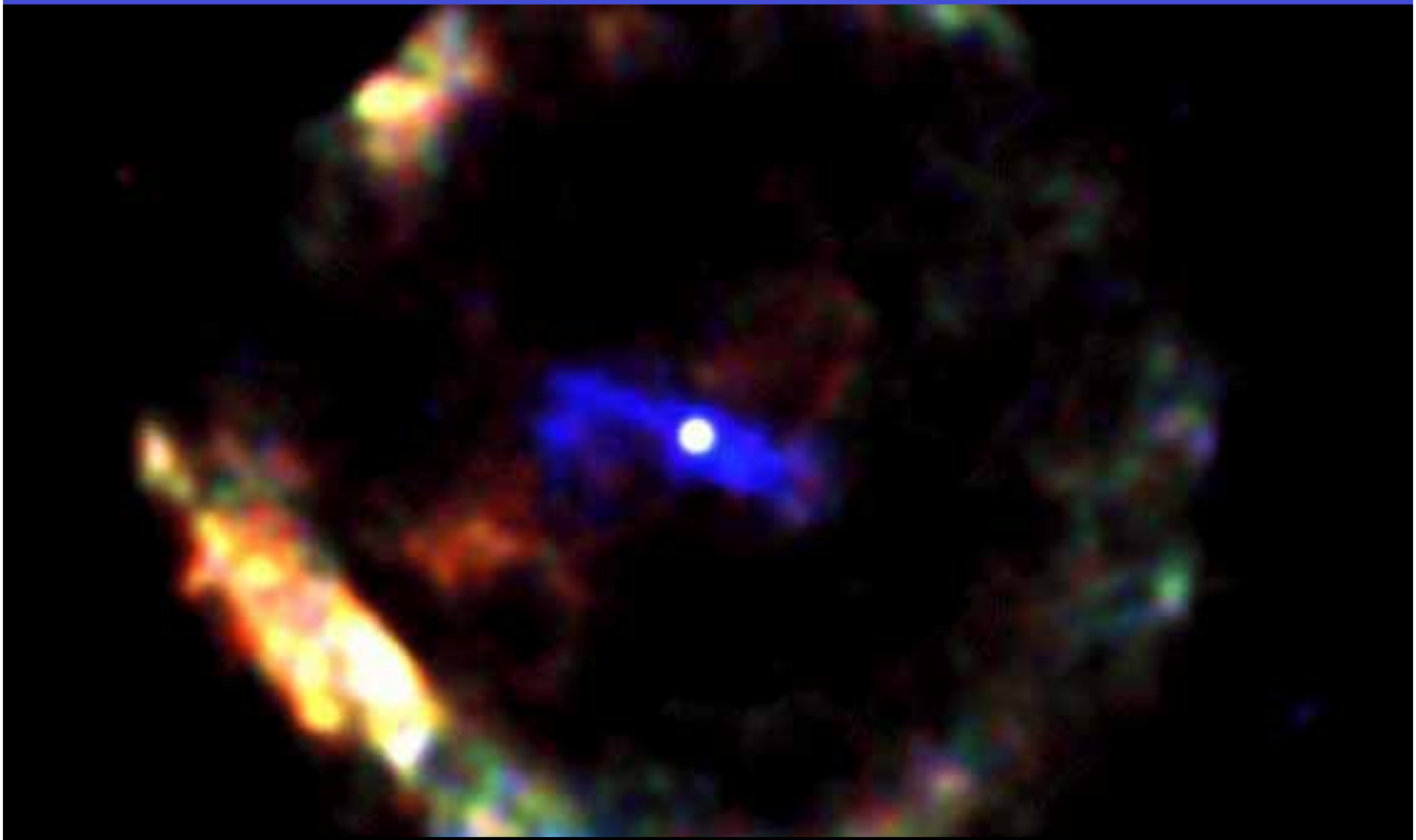


CRAB NEBULA SN 1054 6 kly CHANDRA

FORNAX A

SN 1987A NEB. TARANTOLA LMC 170 kly CHANDRA

PULSAR



G11.2-0.3. 386 AD 16 kly SGR CHANDRA

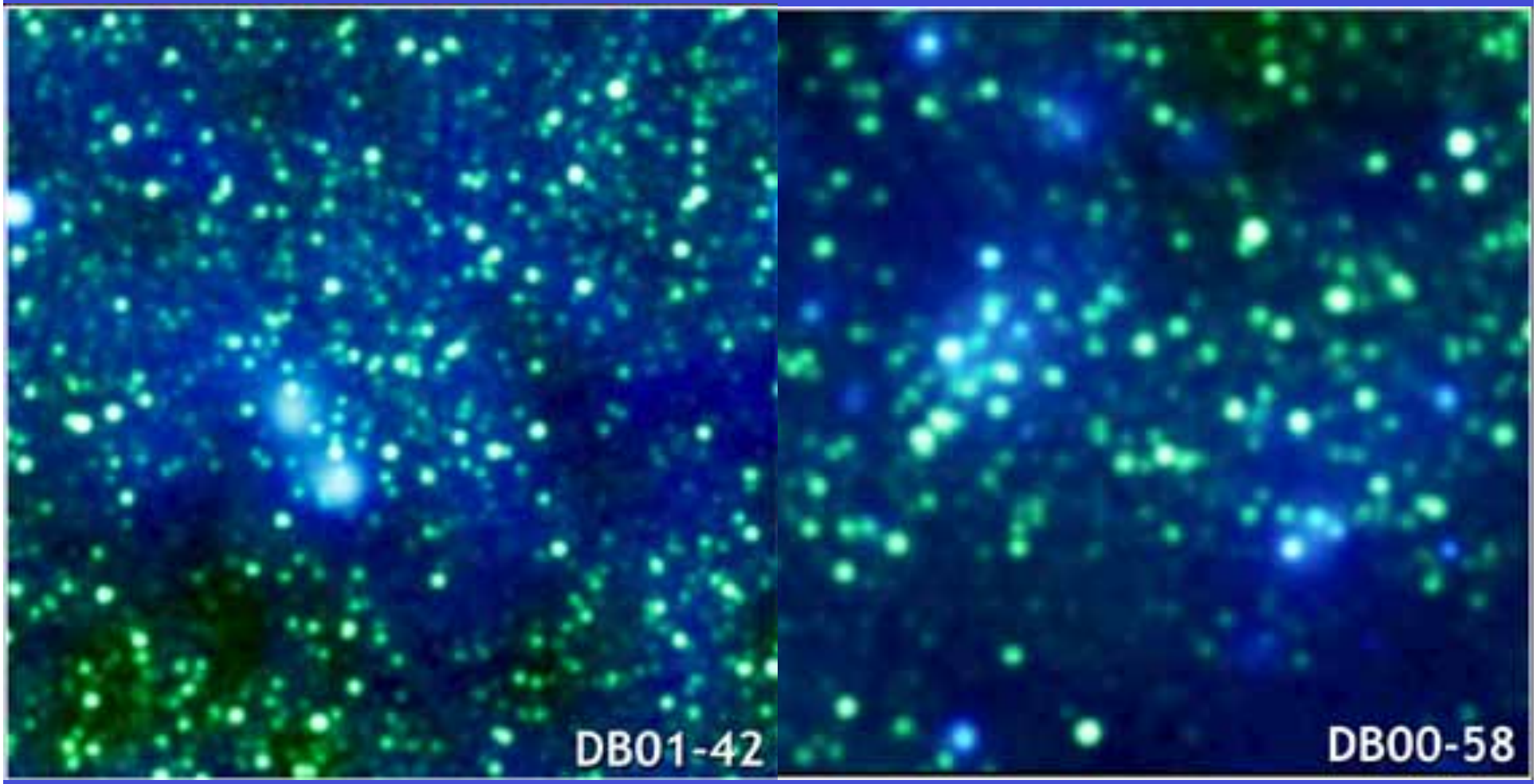
CYG X-1

CYG X-1 6 kly CHANDRA

CYG X-1

CYG X-1 6 kly BH MODELLO

AMMASSI APERTI



AMMASSI APERTI IN DIREZIONE DEL CENTRO GALATTICO
CHANDRA

SGR A

M101

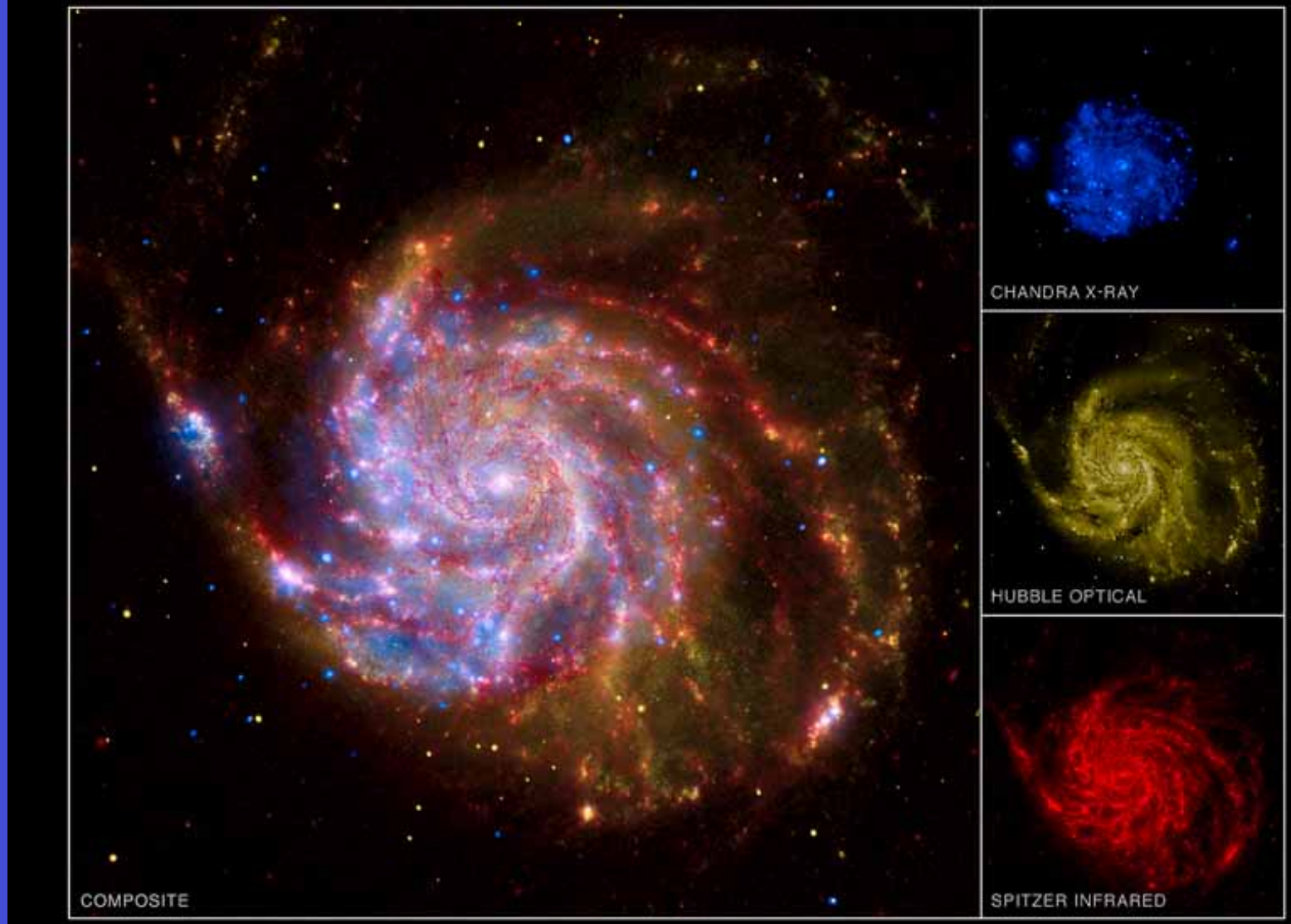
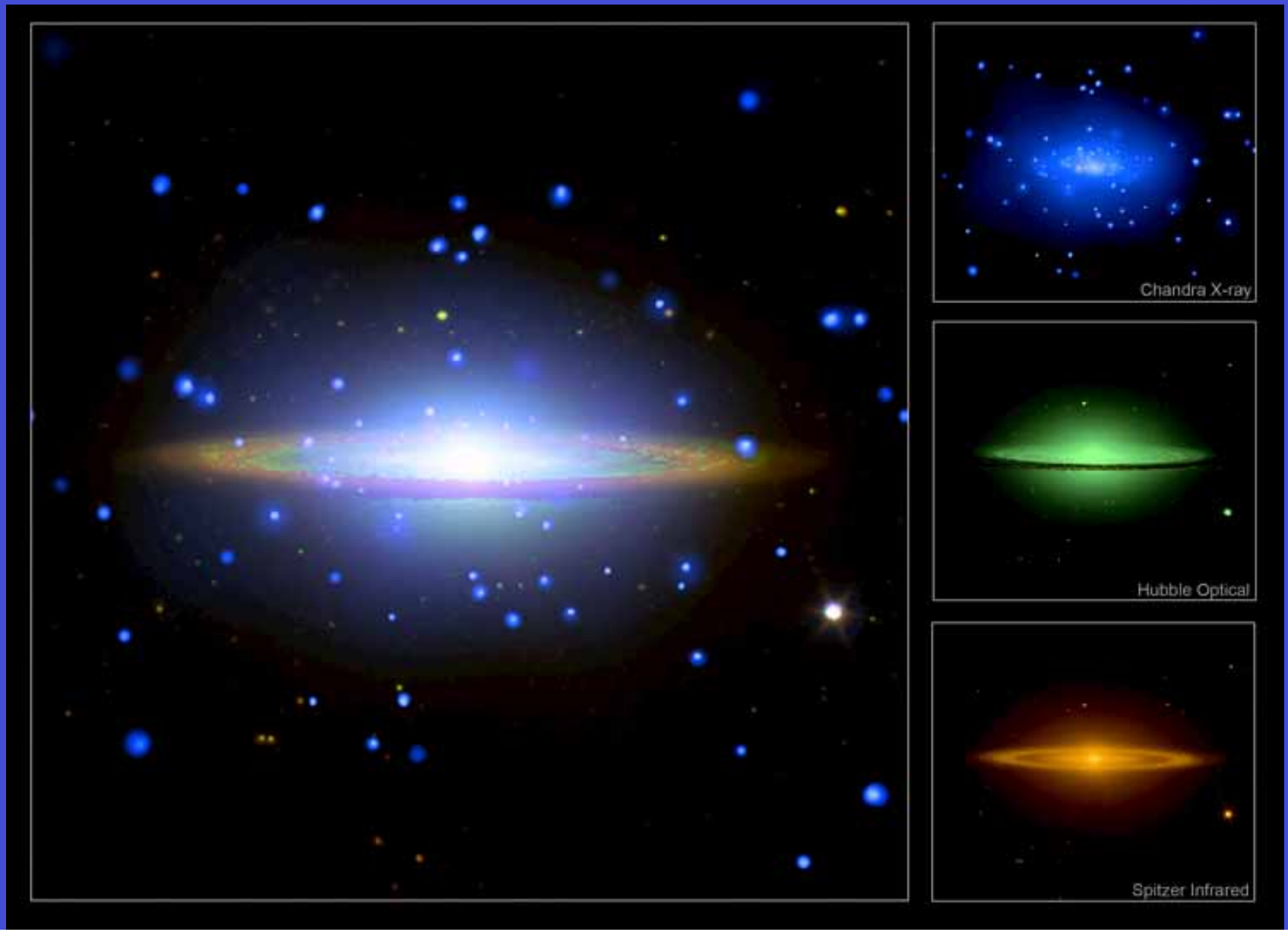


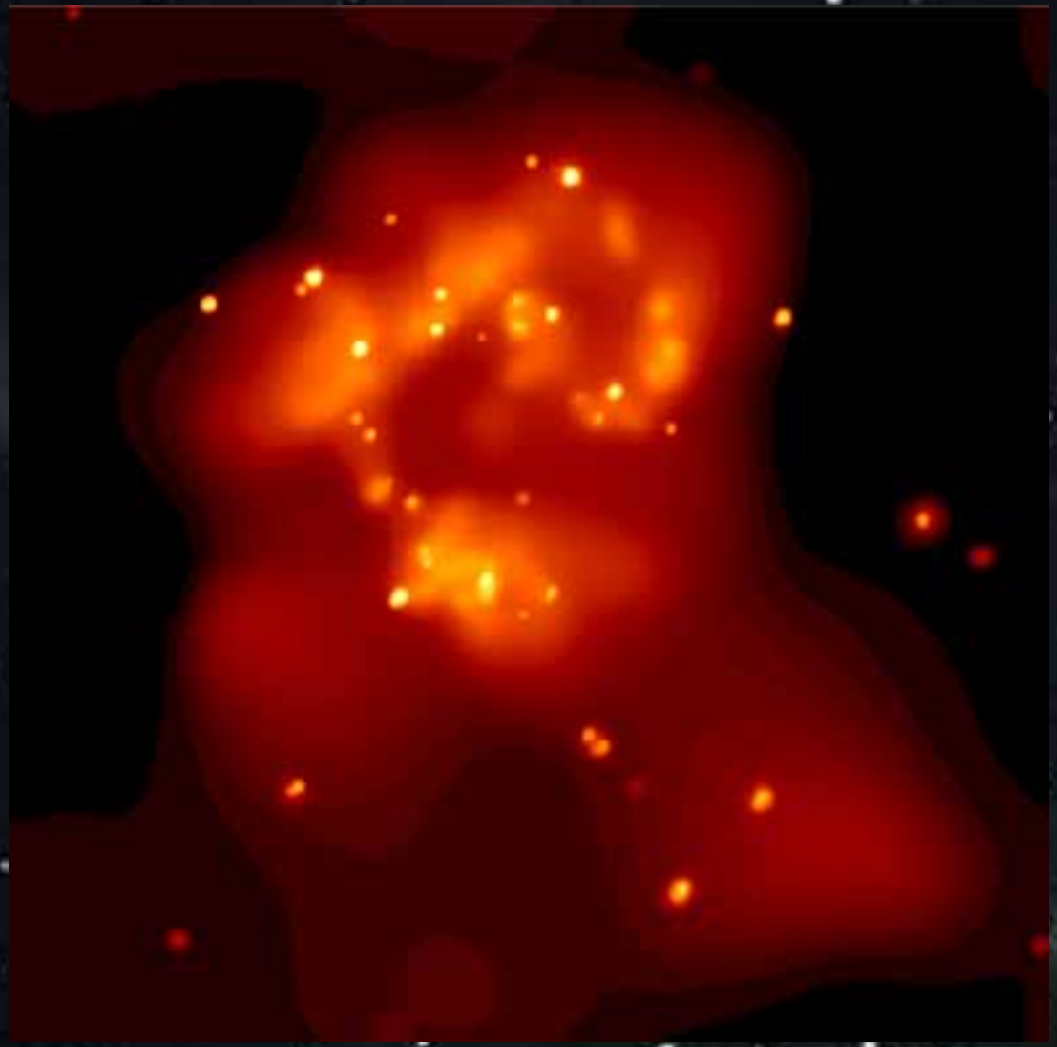
IMMAGINE MULTISPETTRALE DI M101

SOMBRERO

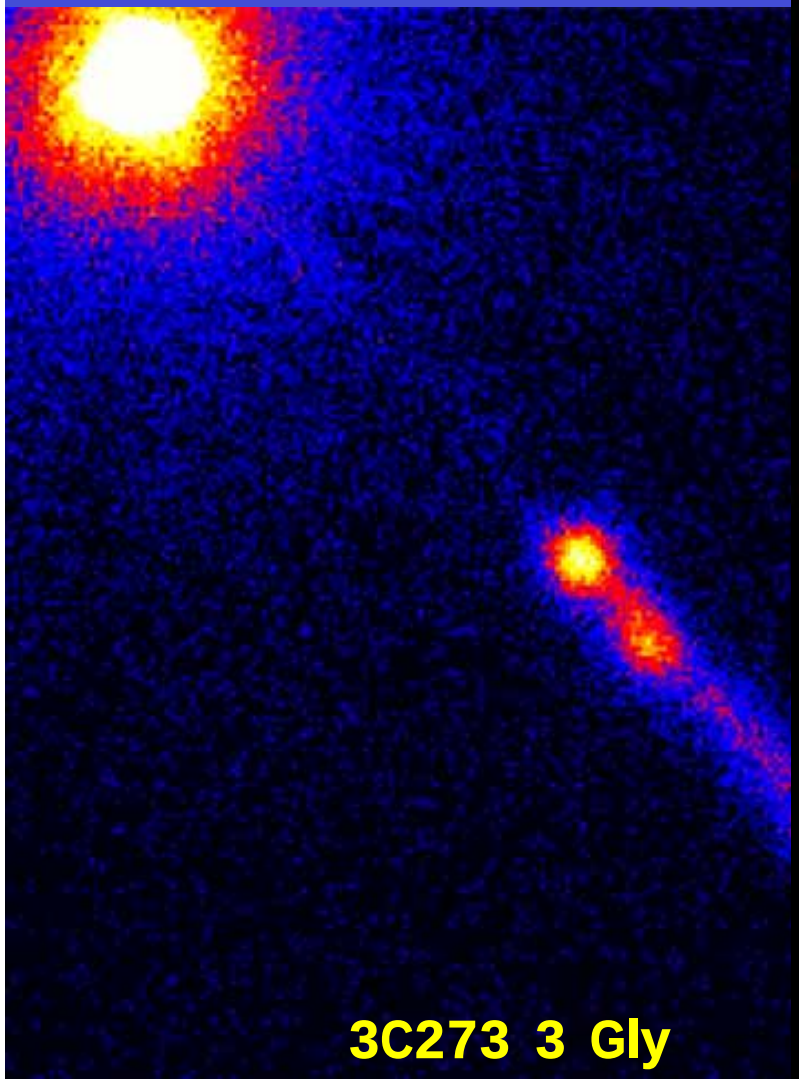


M82

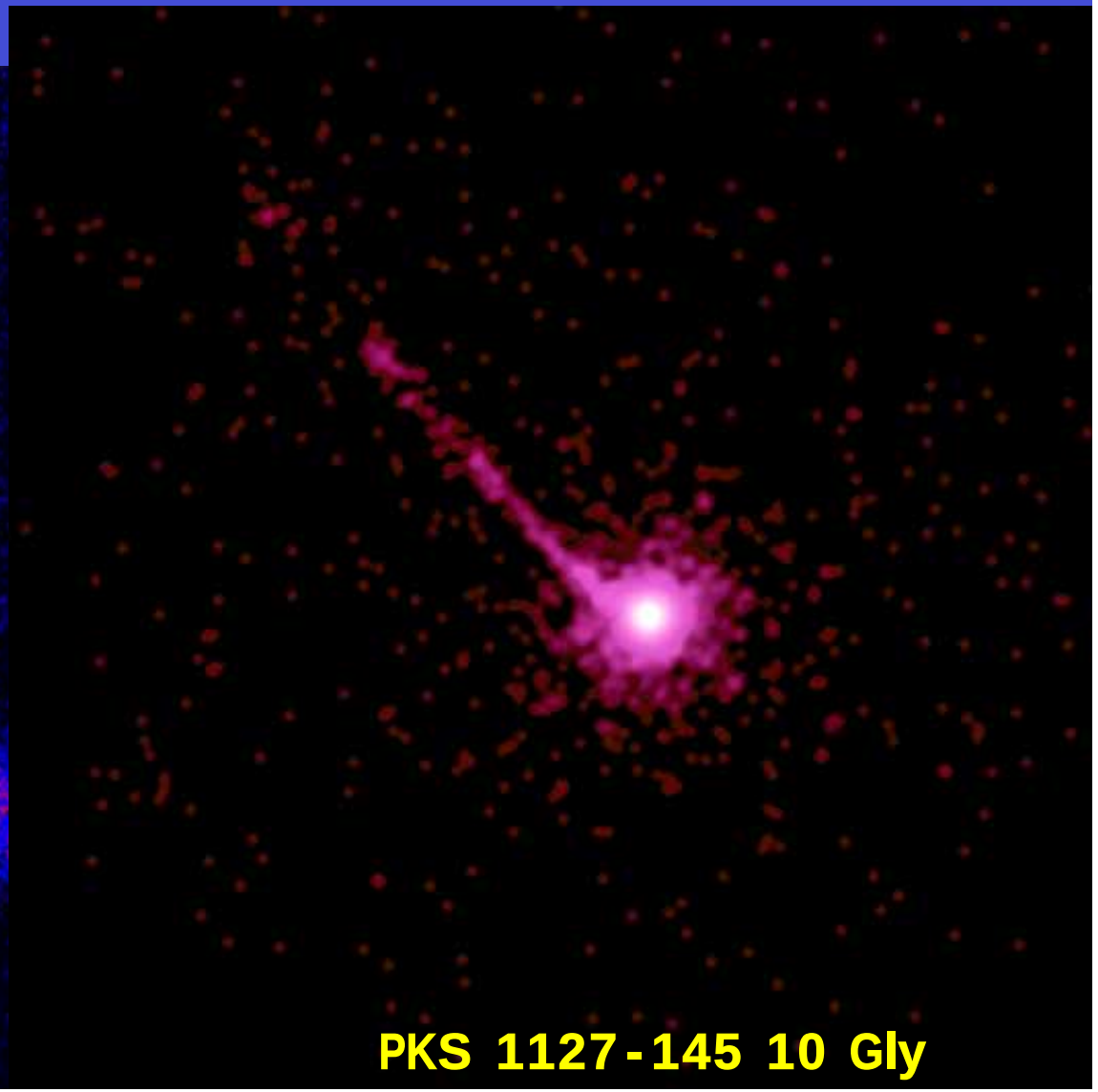
ANTENNAE



QSO

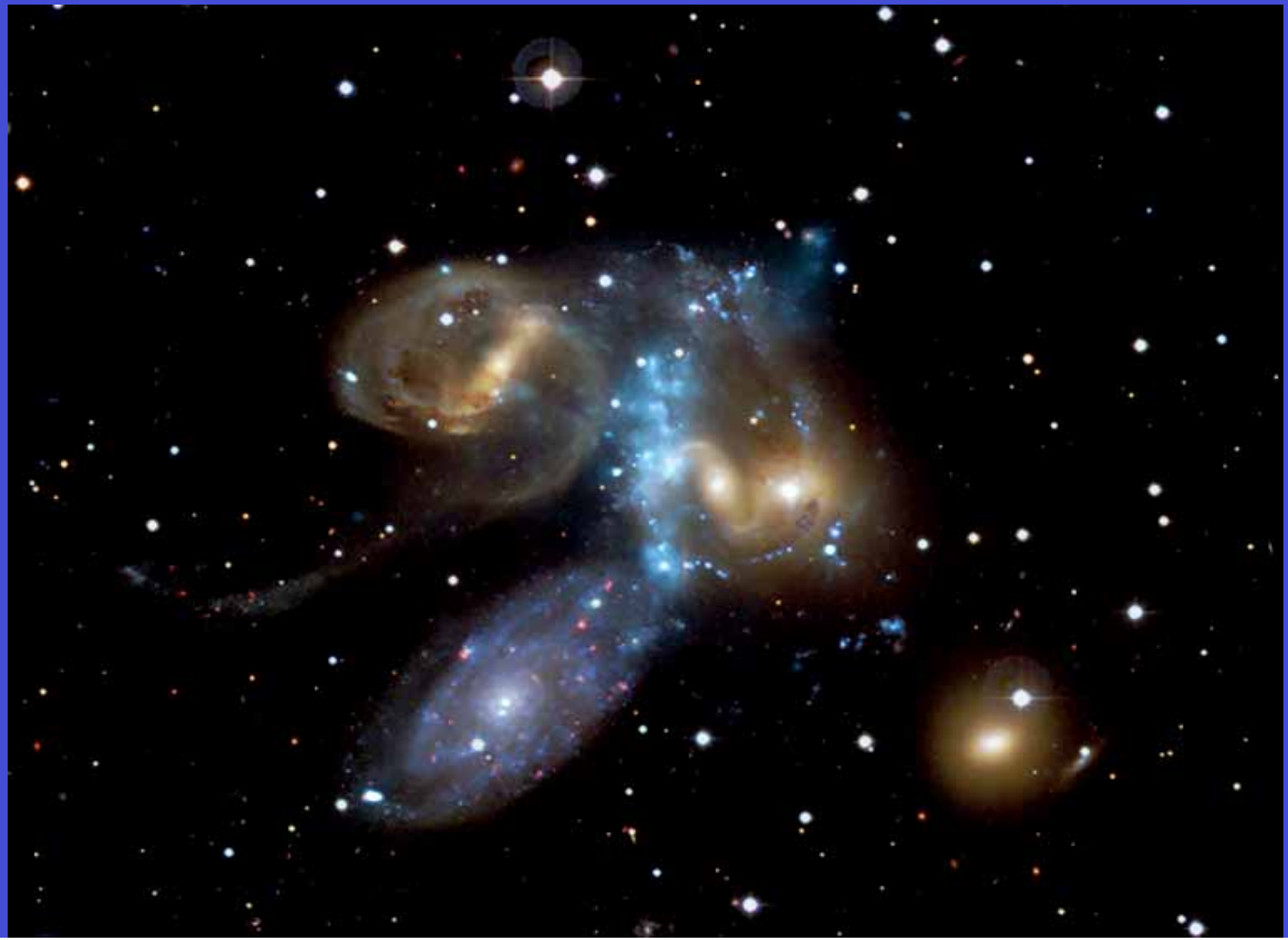


3C273 3 Gly

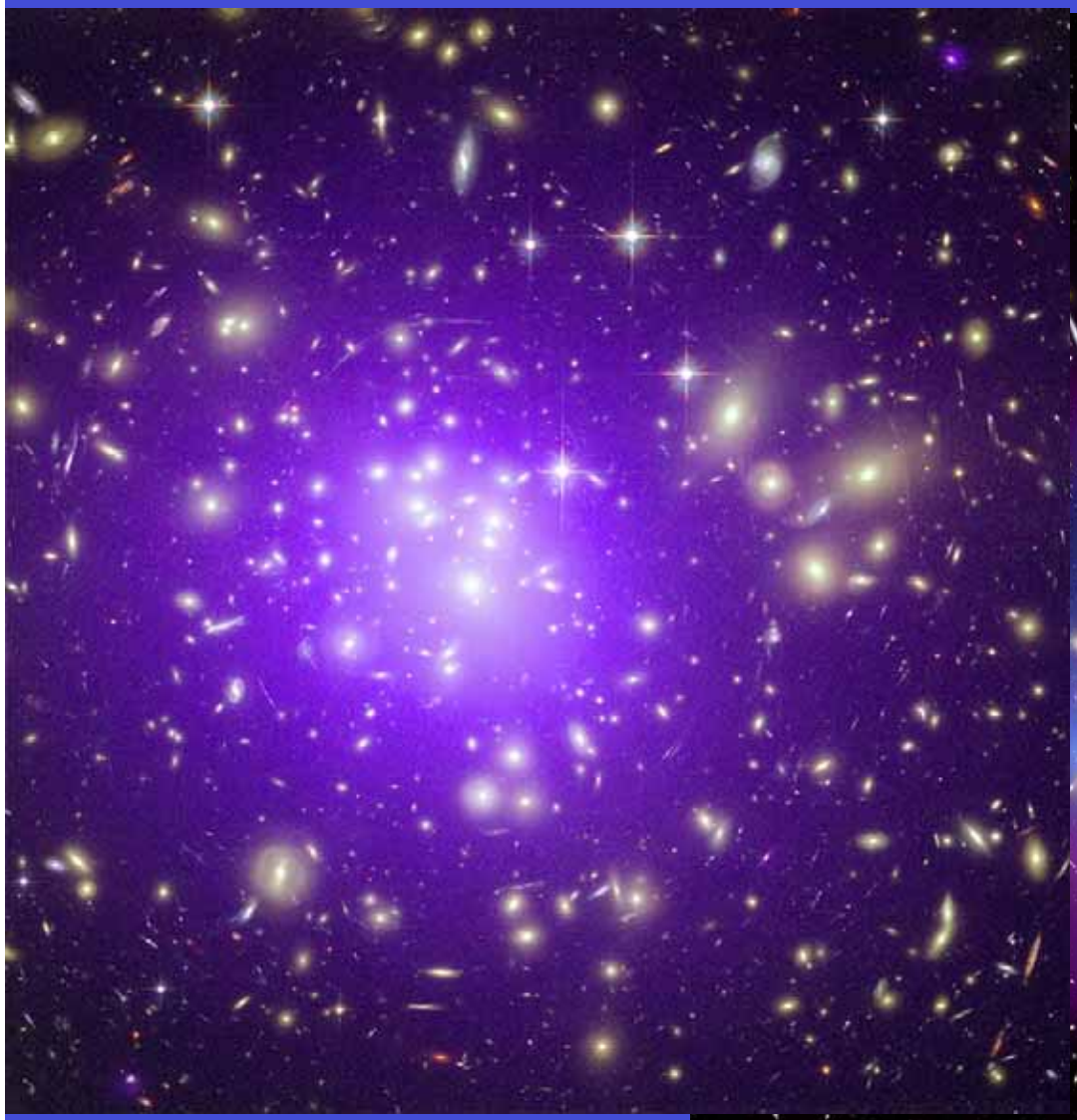


PKS 1127-145 10 Gly

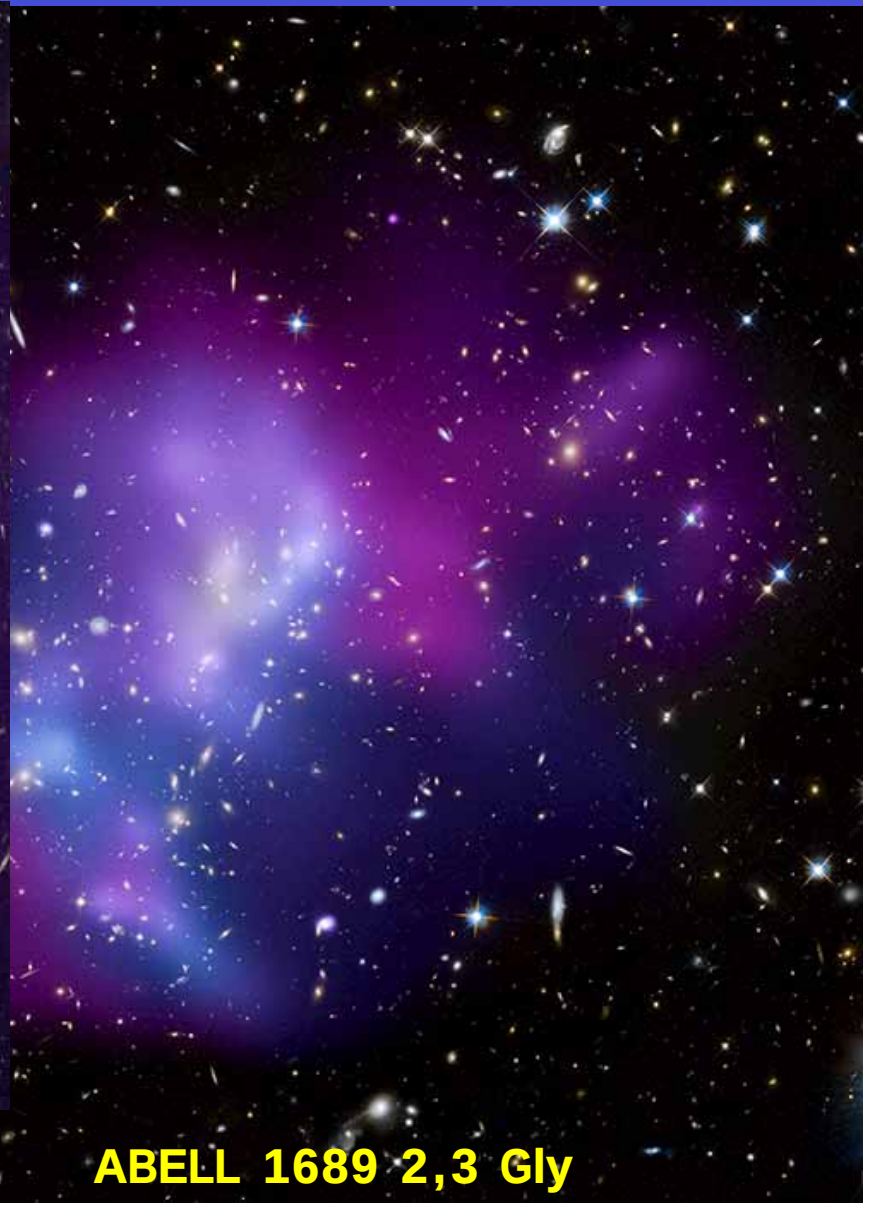
STEPHAN QUINTET



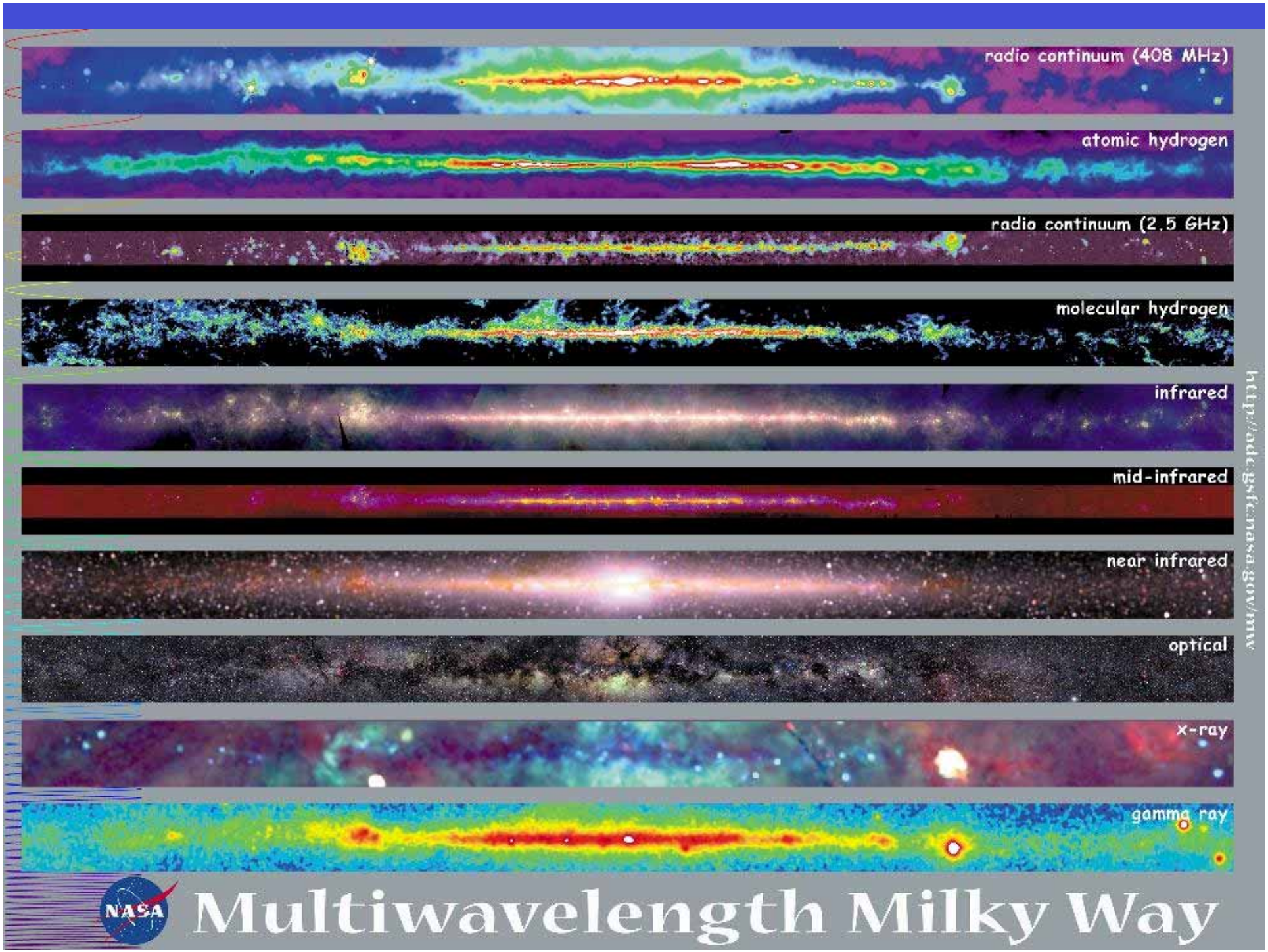
AMMASSI



MACSJ0717 5,4 Gly



ABELL 1689 2,3 Gly


radio continuum (408 MHz)
atomic hydrogen
radio continuum (2.5 GHz)
molecular hydrogen
infrared
mid-infrared
near infrared
optical
x-ray
gamma ray
http://adc.gsfc.nasa.gov/mw
NASA
Multiwavelength Milky Way


radio continuum (408 MHz)
atomic hydrogen
radio continuum (2.5 GHz)
molecular hydrogen
infrared
mid-infrared
near infrared
optical
x-ray
gamma ray
GRAZIE PER L'ATTENZIONE!!!
DOMANDE?
http://adc.gsfc.nasa.gov/mw
NASA
Multiwavelength Milky Way