

La Scienza Universale



I GRB
Sonde per l'universo
cosmologico



Lecco

Martedì 24 novembre 2009

Stefano Covino

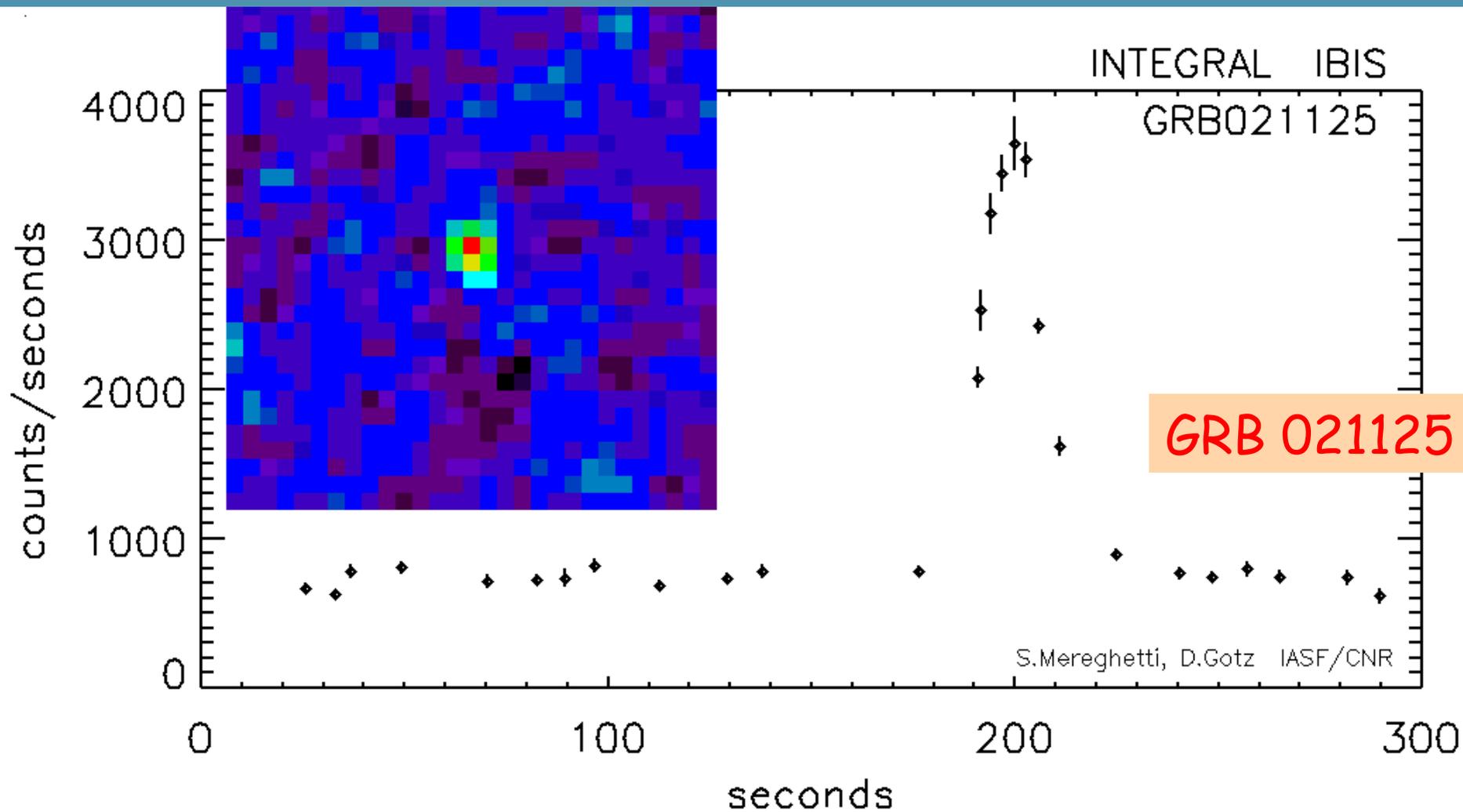
INAF / Osservatorio Astronomico di Brera

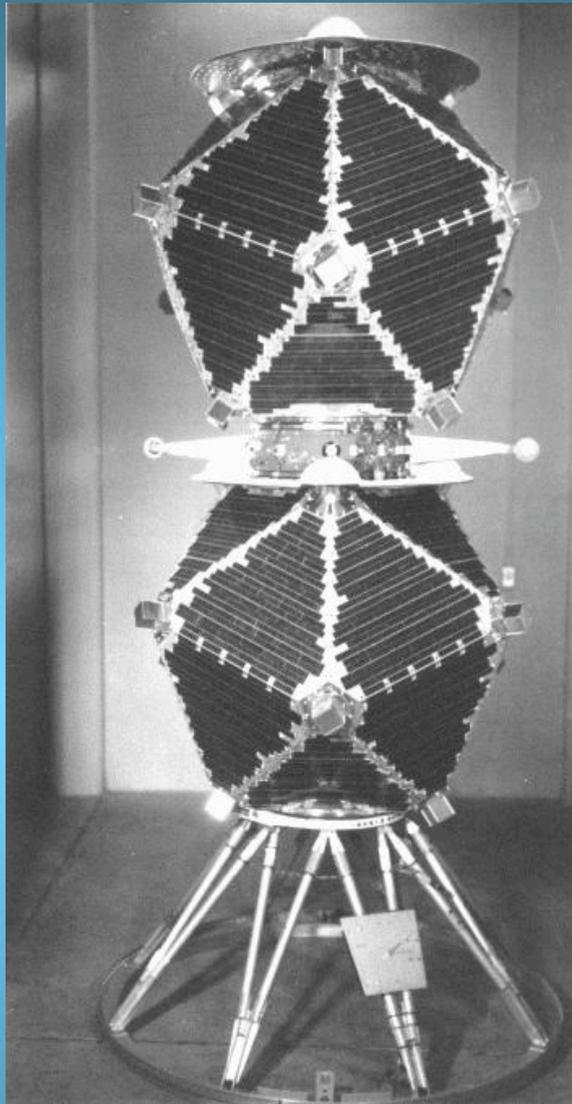
Dicesi *gamma-ray burst* (GRB)...

“Impulso **improvviso** ed **intenso** di raggi gamma,
“proveniente da una direzione casuale del cielo”



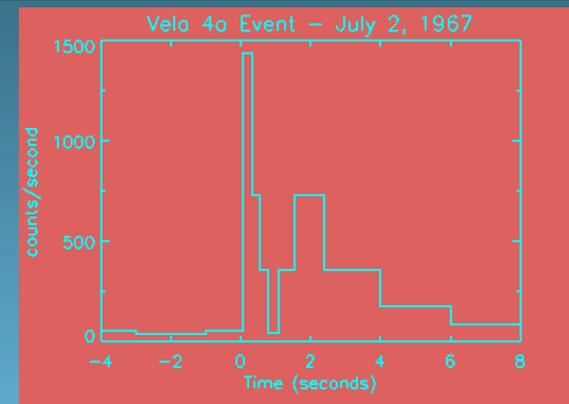
Cortesia di D. Gotz e S. Mereghetti, IASF Milano



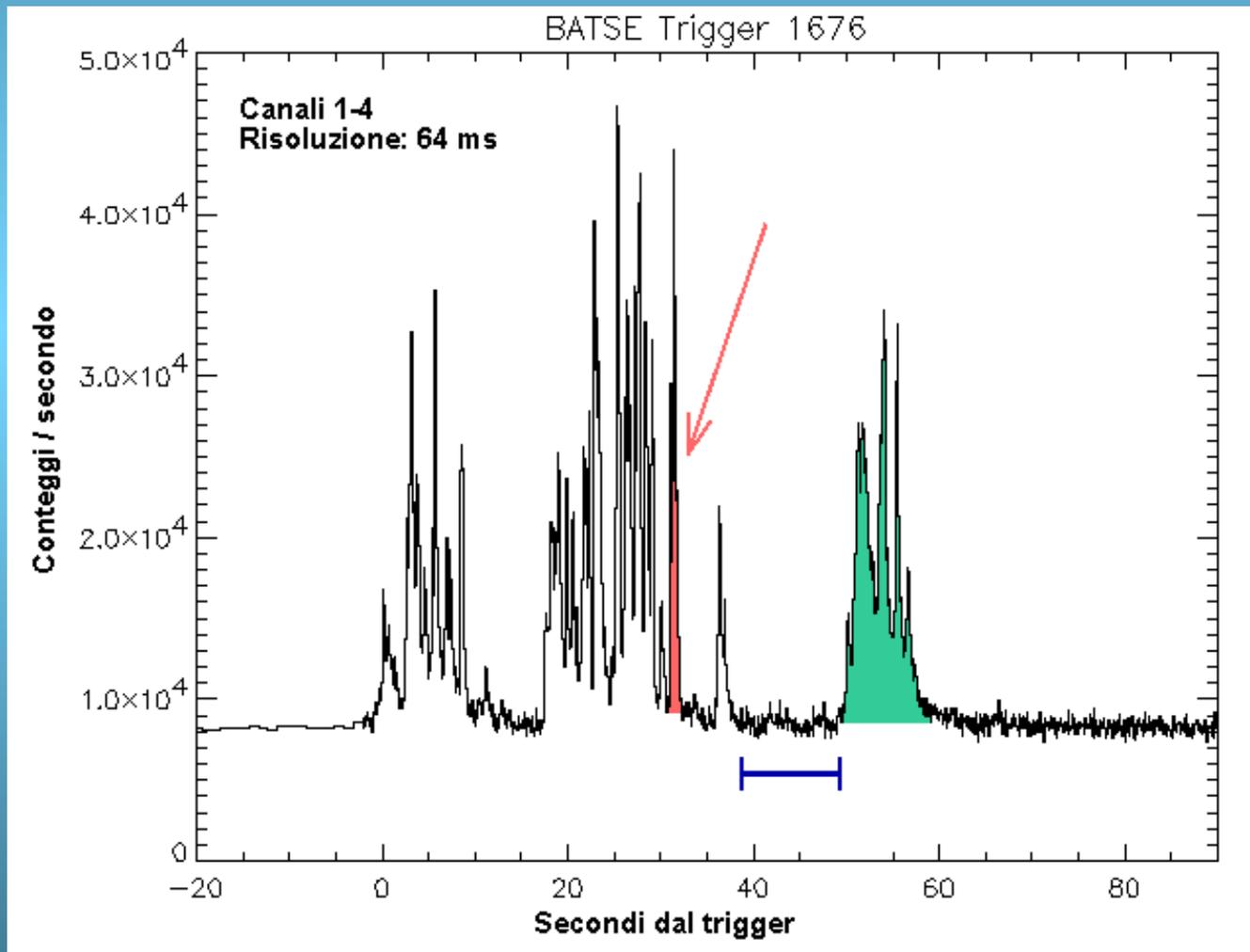


I satelliti Vela

Ed ecco i GRB...

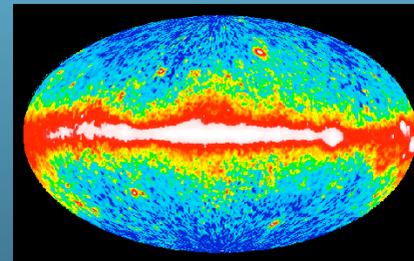
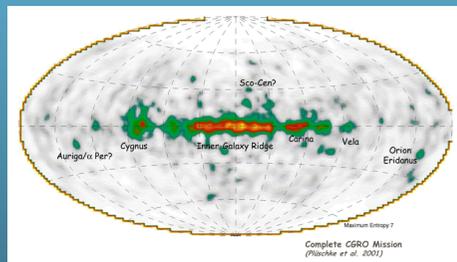
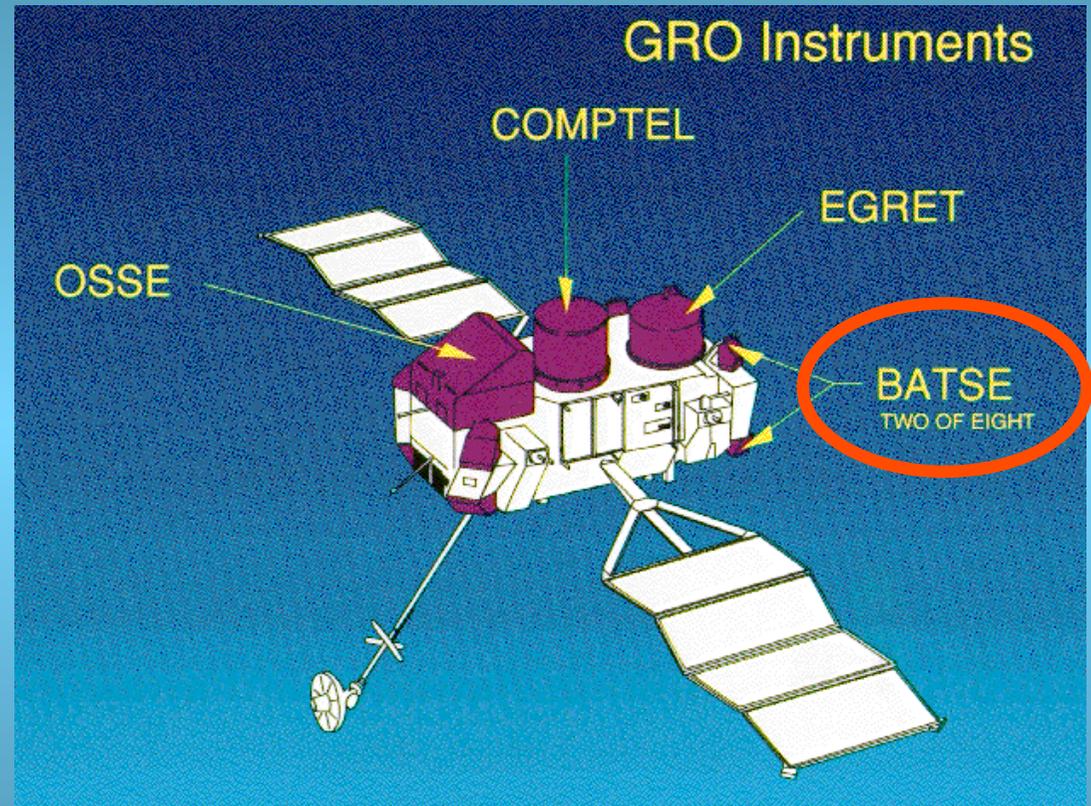
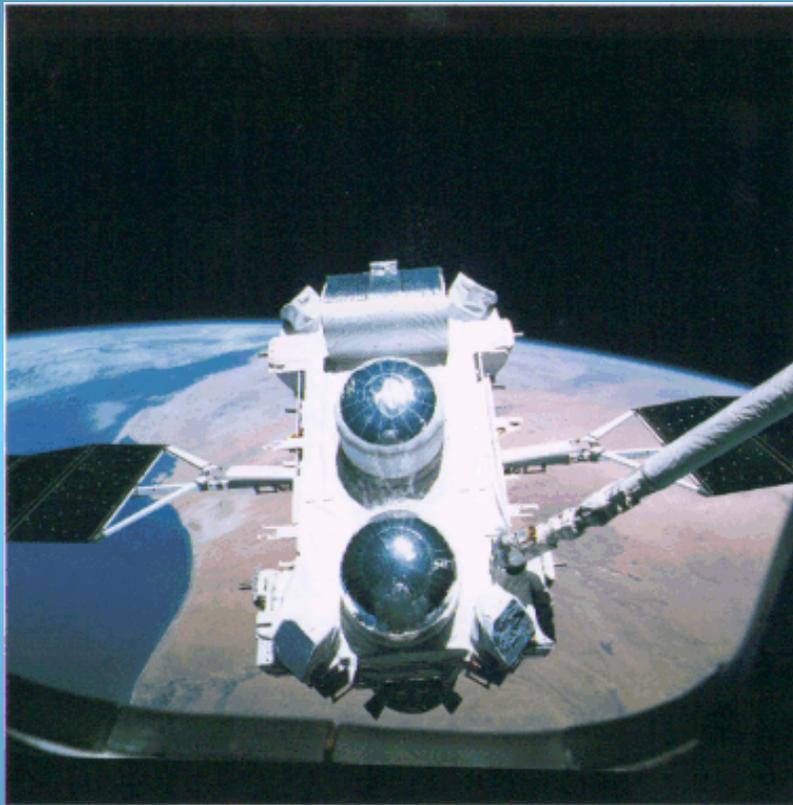


anni '60



anni '90

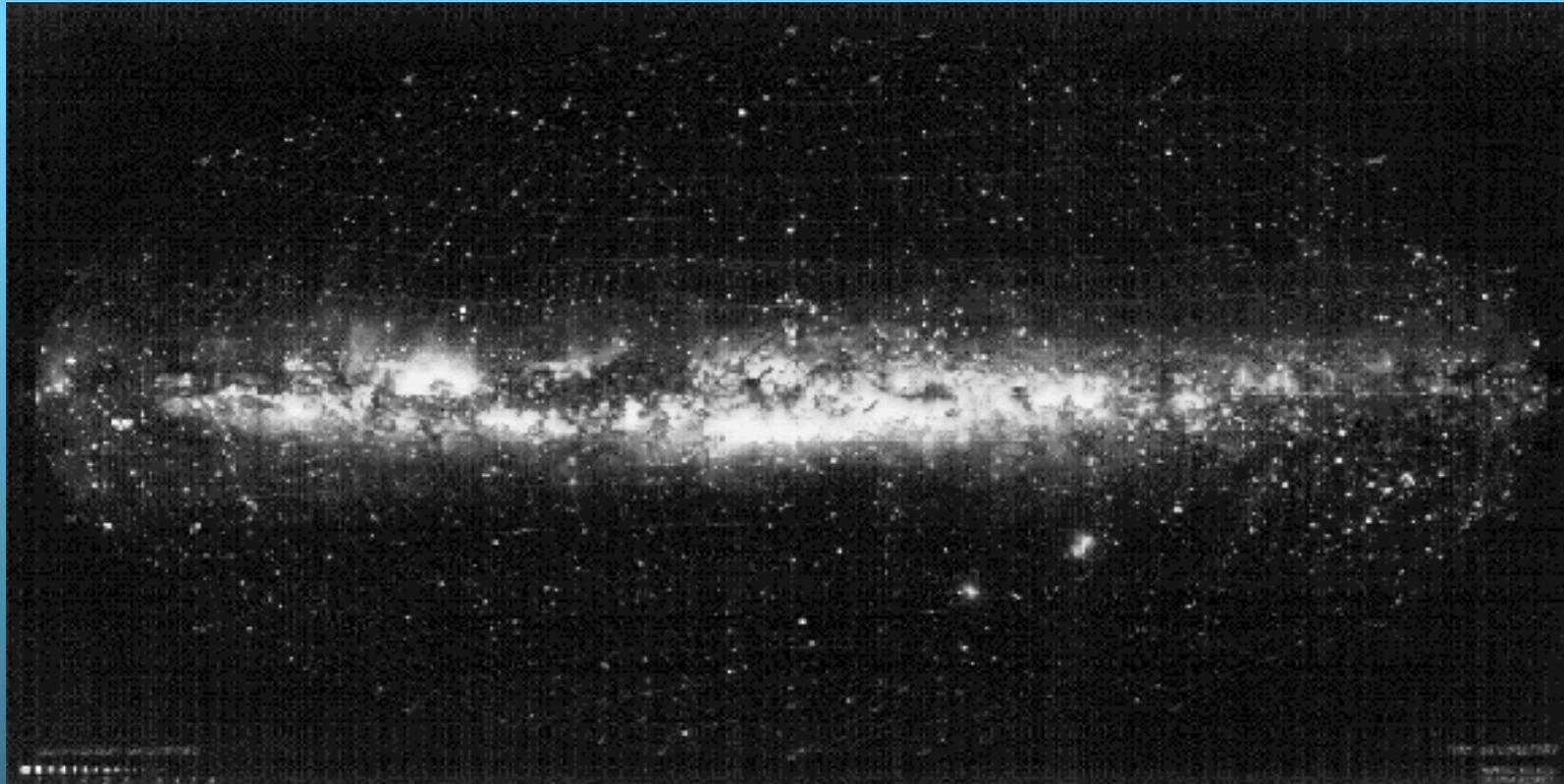
Compton - Gamma Ray Observatory





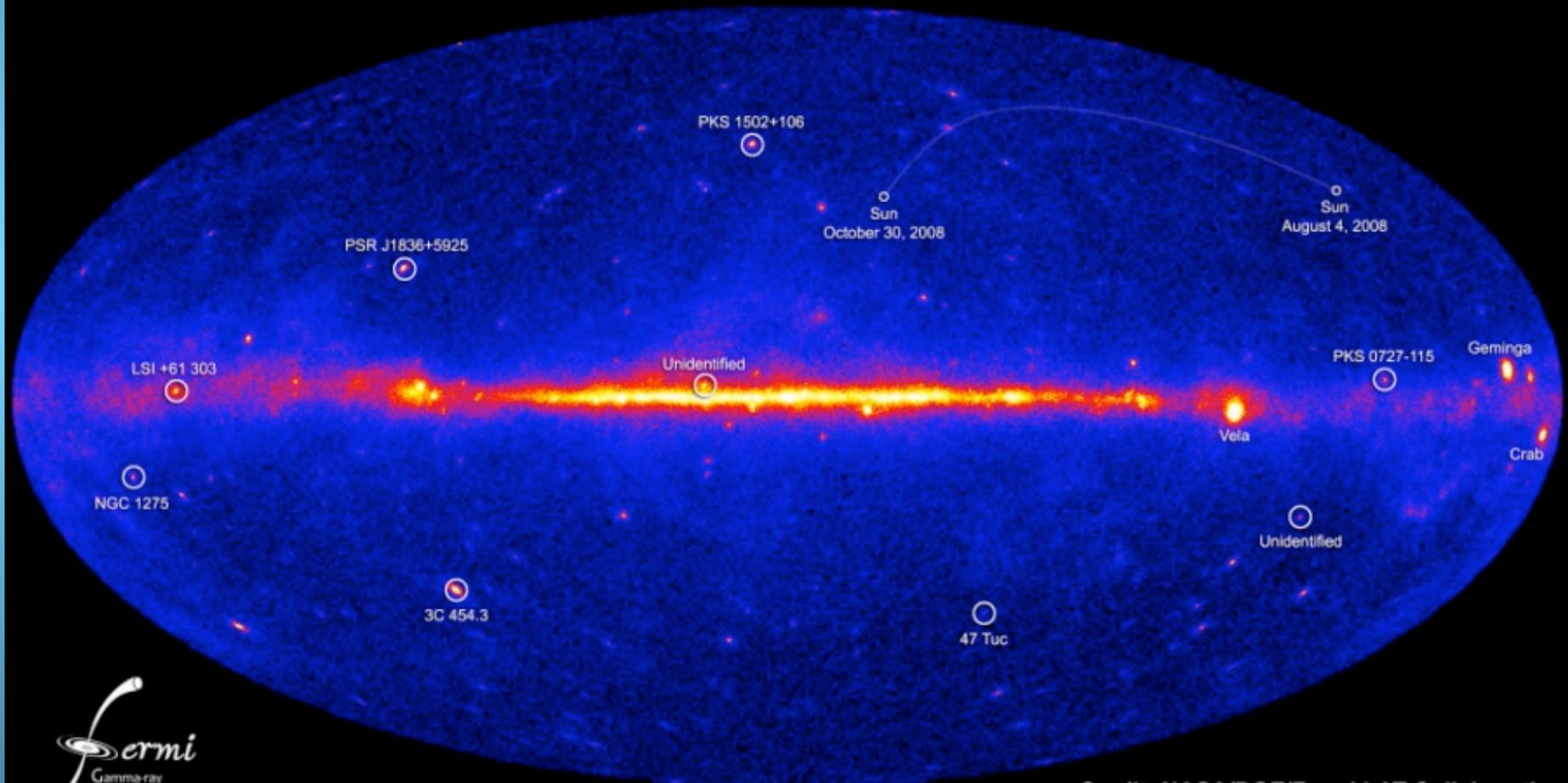
© Mark A. Garlick / space-art.co.uk

La Via Lattea dall'interno



Provengono dal piano galattico?

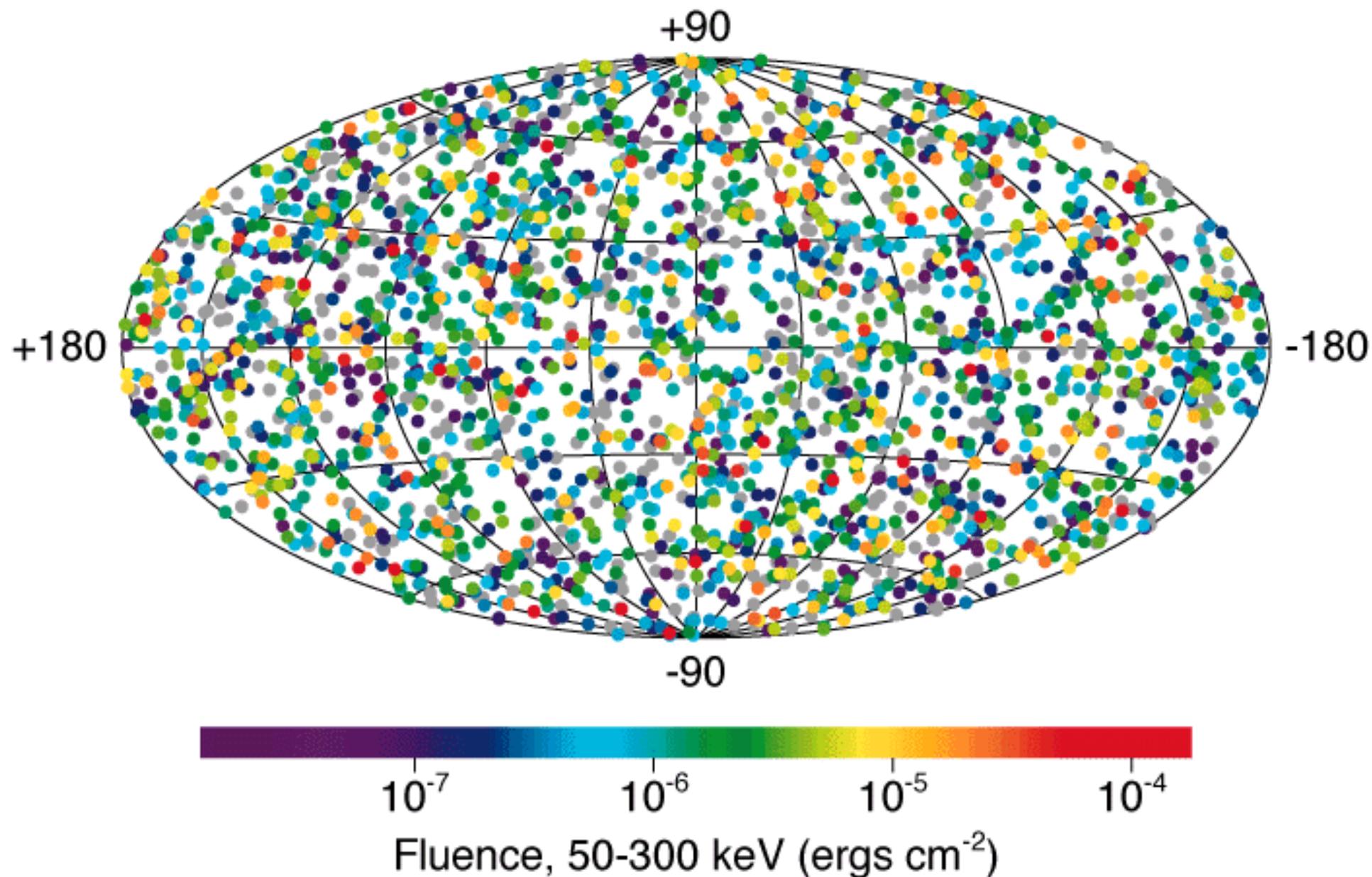
NASA's Fermi telescope reveals best-ever view of the gamma-ray sky



Fermi
Gamma-ray
Space Telescope

Credit: NASA/DOE/Fermi LAT Collaboration

2512 BATSE Gamma-Ray Bursts



1996

Beppo SAX deve il suo nome a Giuseppe "Beppo" Occhialini

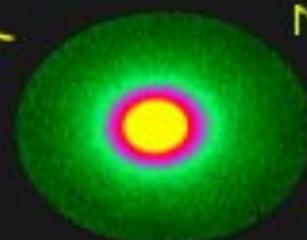
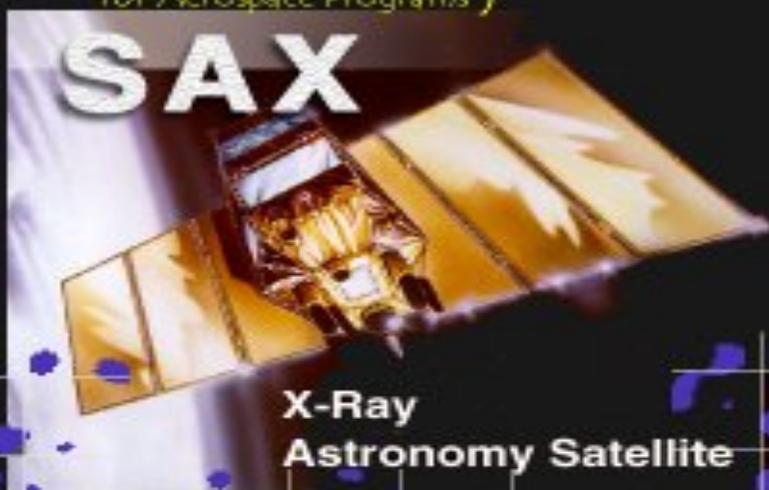
Beppo SAX

(Agenzia Spaziale Italiana con la partecipazione della Netherlands Agency for Aerospace Programs)

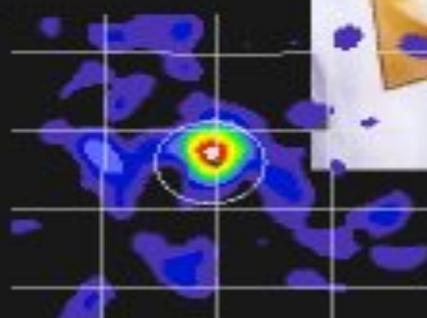
Energia:
0.1 - 300 keV

Beppo SAX studia anche

AGN...



Nane bianche, stelle di neutroni e buchi neri

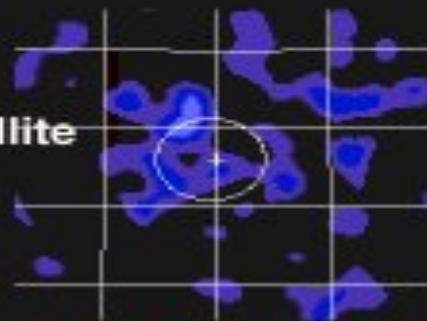


Beppo SAX

è il primo satellite



X-Ray Astronomy Satellite



di un lampo gamma

la controparte X

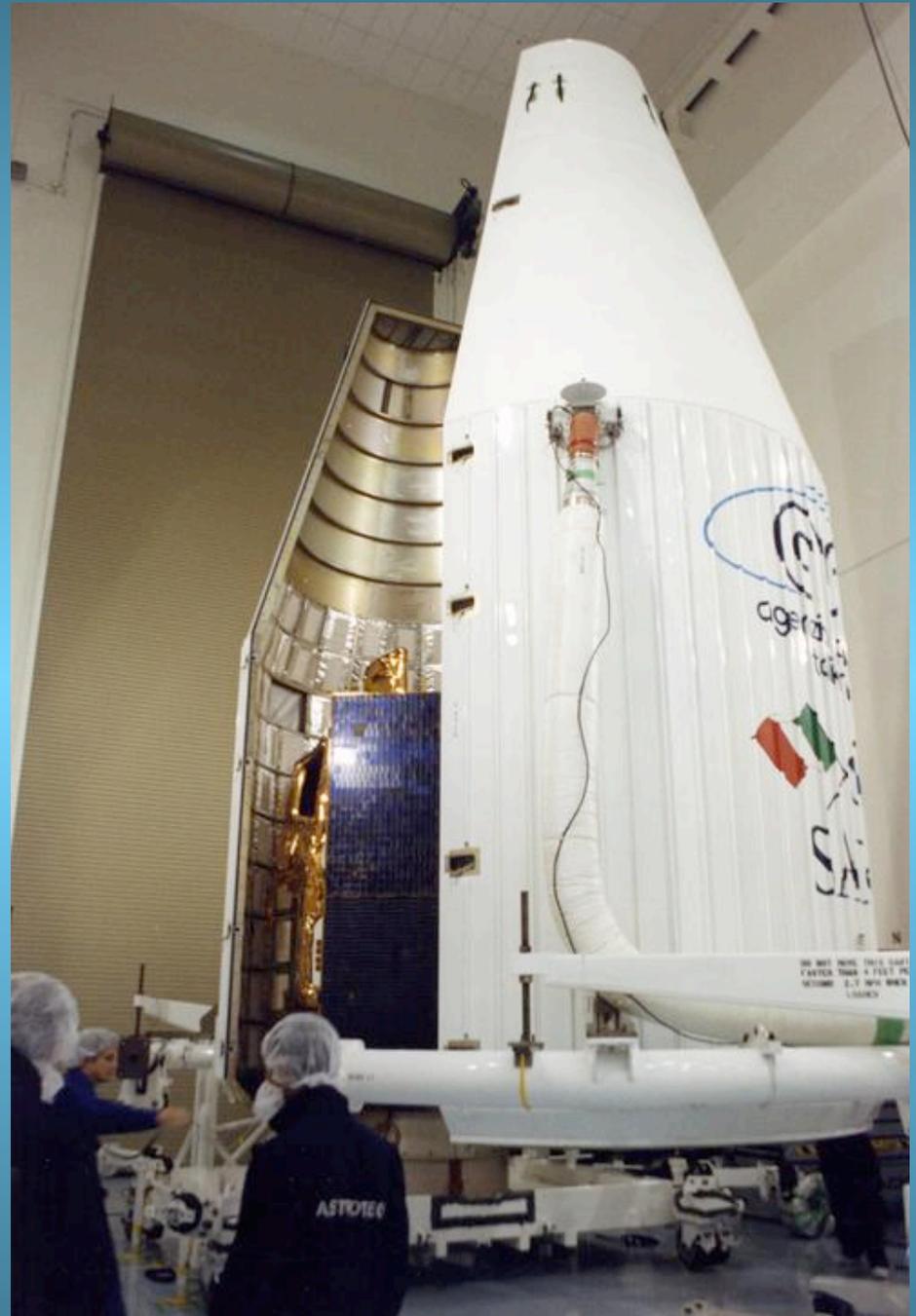
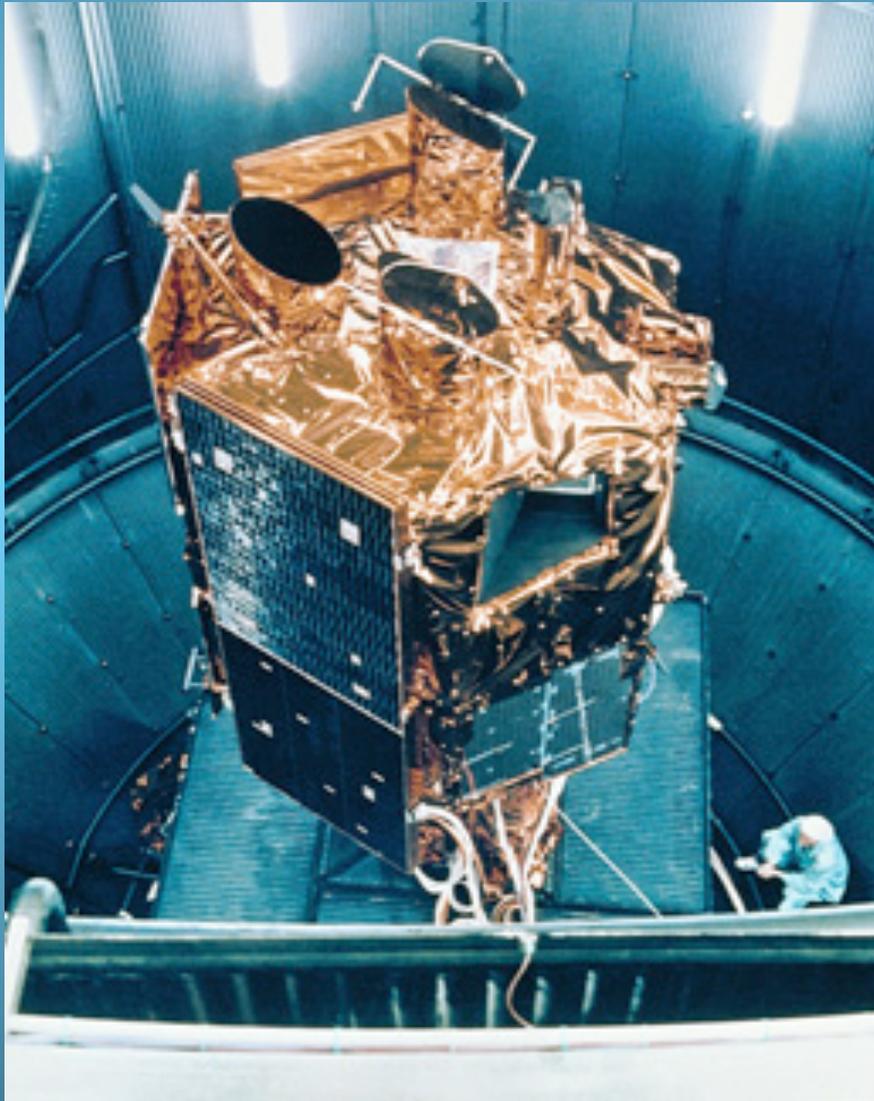
in grado di indentificare

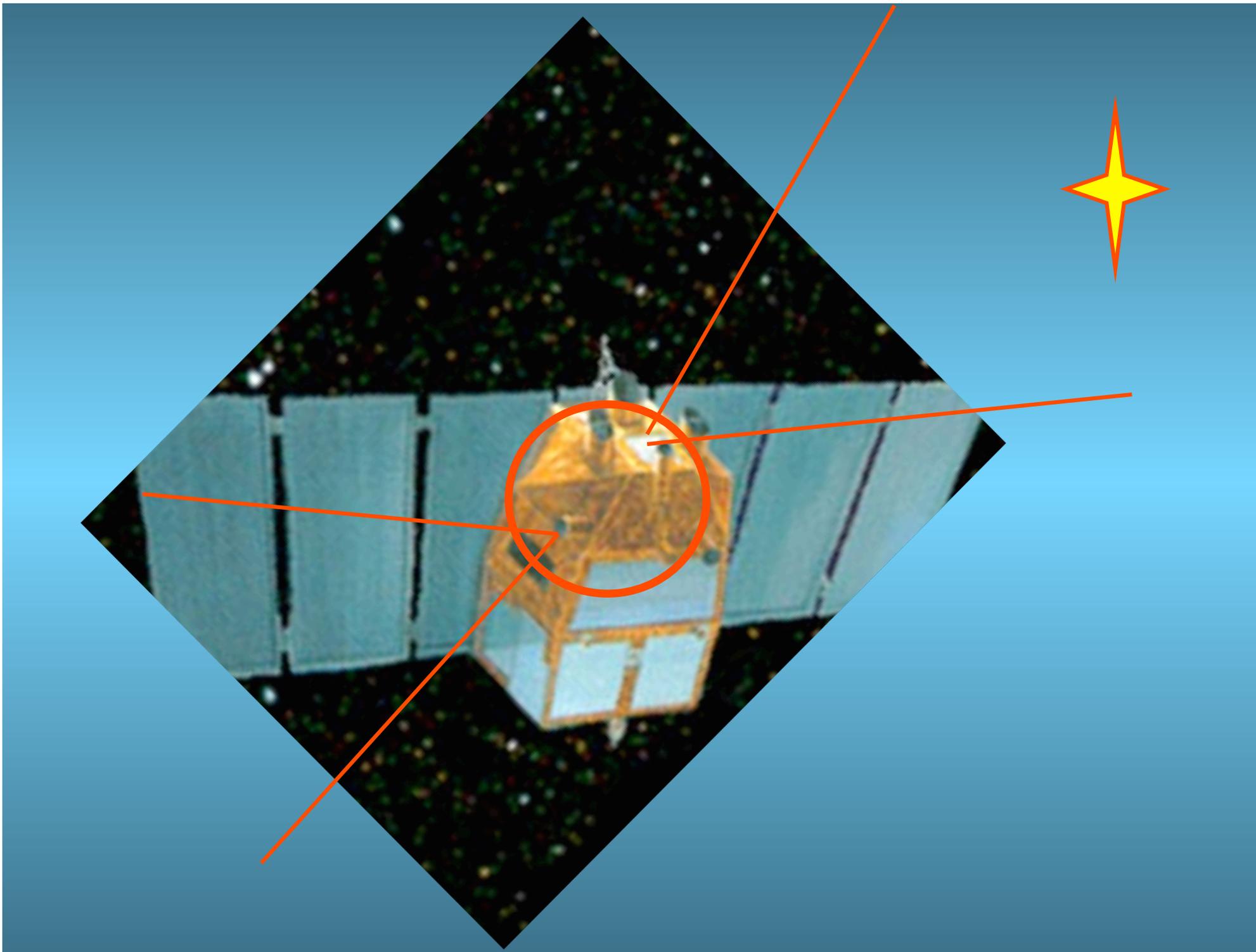
Ammassi di galassie ...

Residui di supernova ...

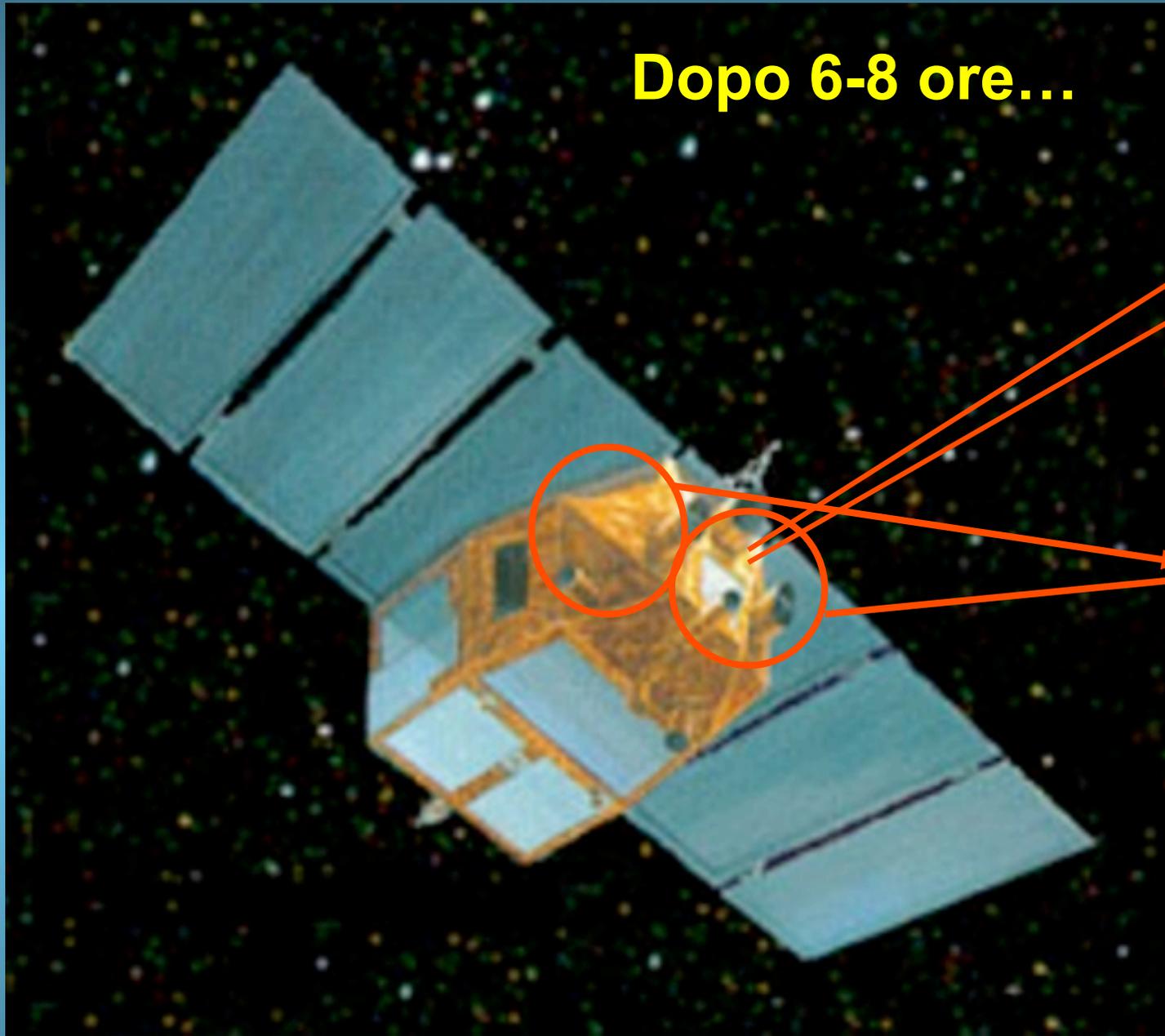
Galassie

BeppoSAX





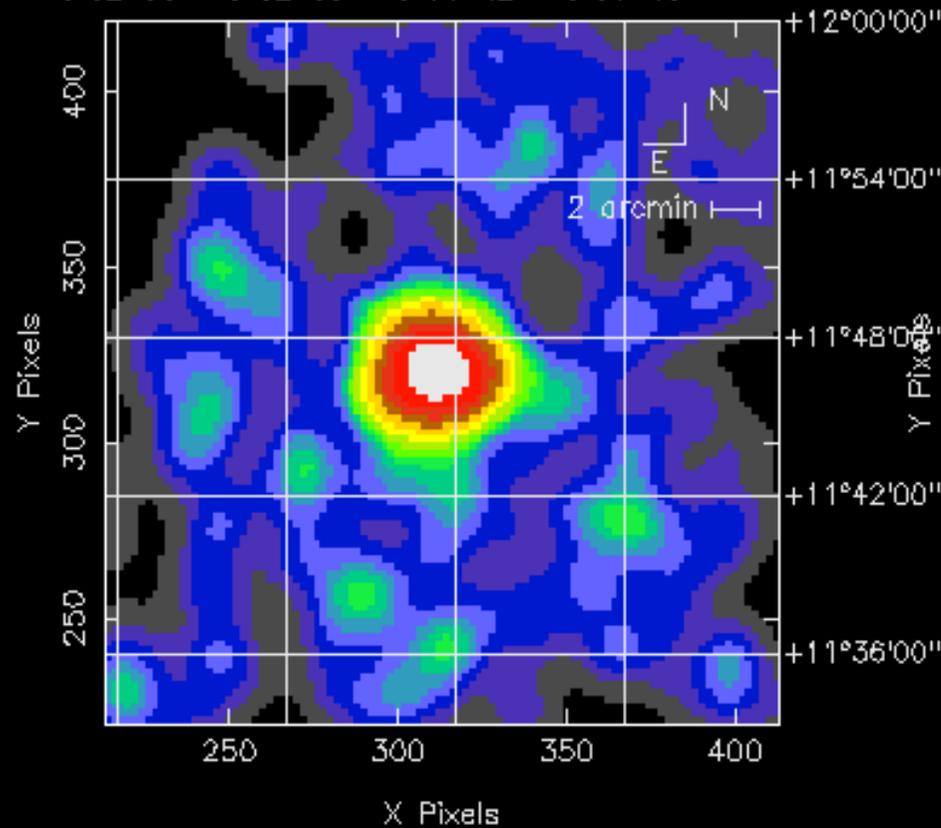
Dopo 6-8 ore...



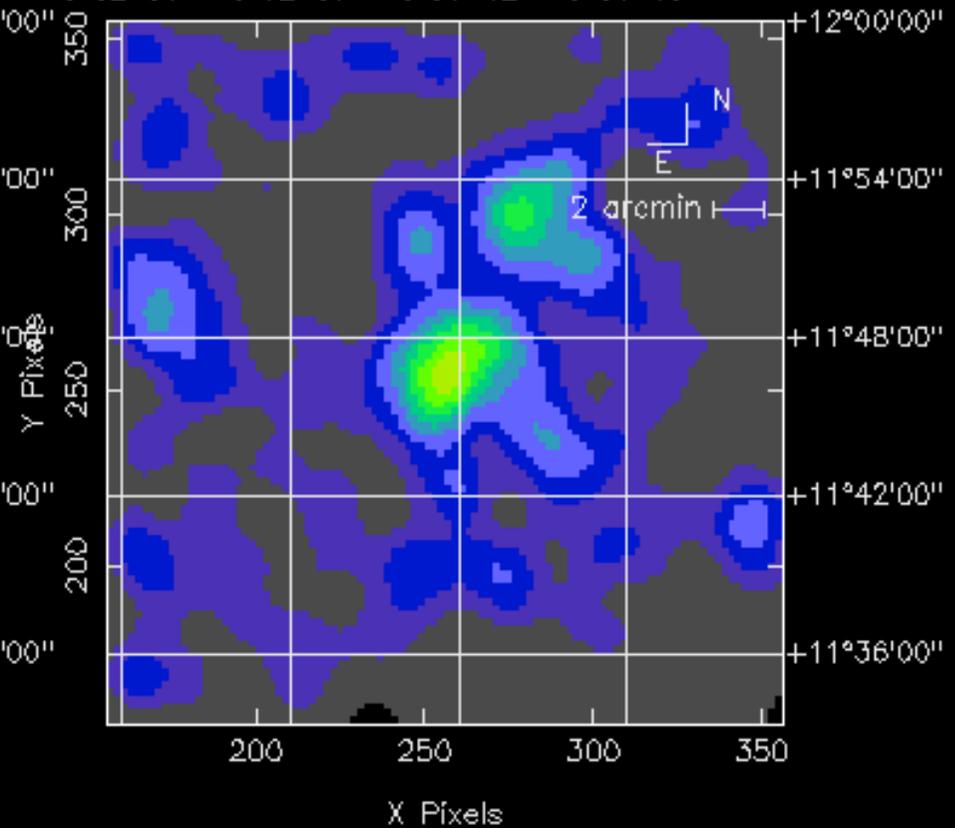
Telescopi X

AFTERGLOW !

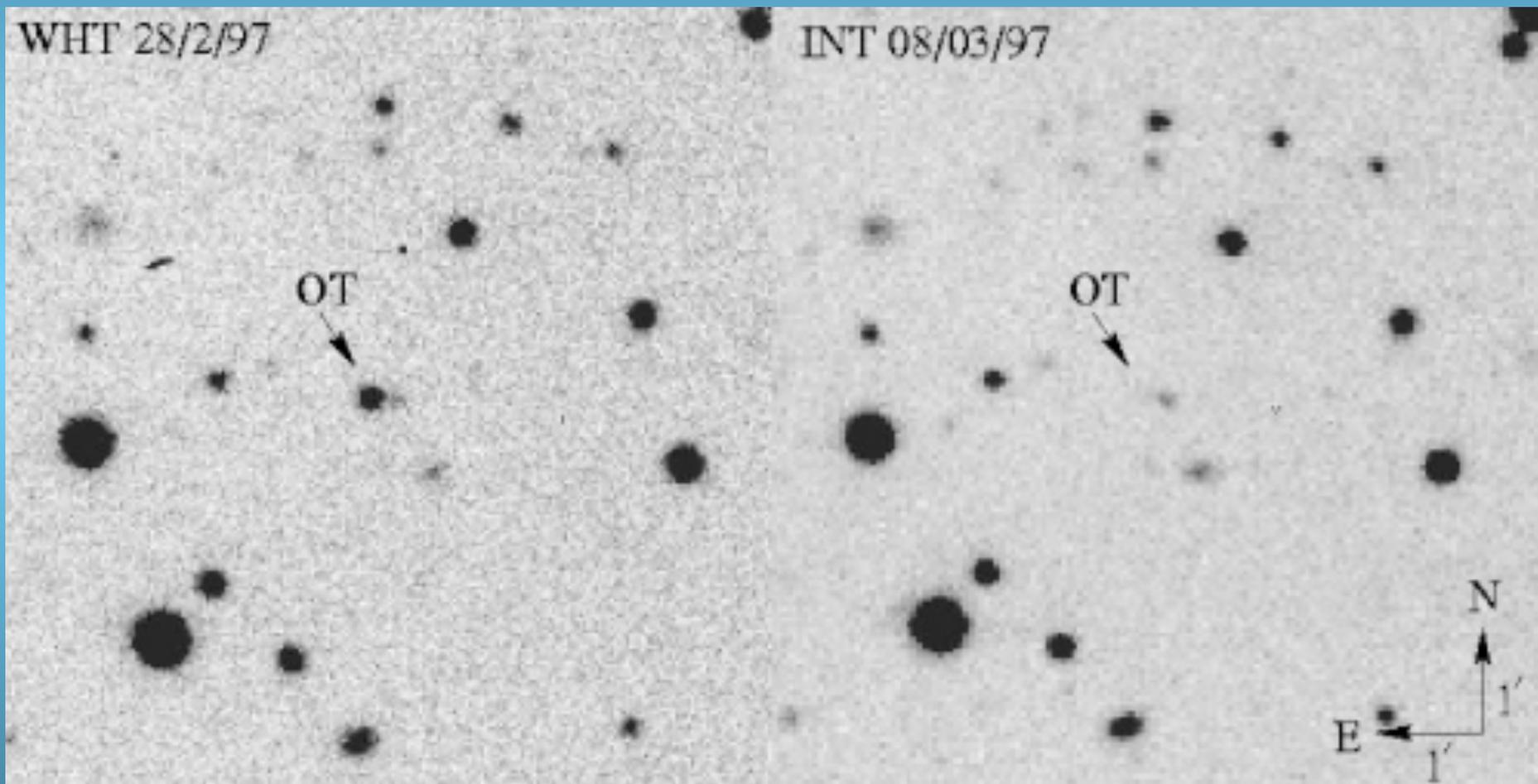
BeppoSAX observation of GRB970228 field
SAX MECS 1997 Feb 28 Exposure: 14334 s
5^h02^m36^s 5^h02^m09^s 5^h01^m42^s 5^h01^m15^s

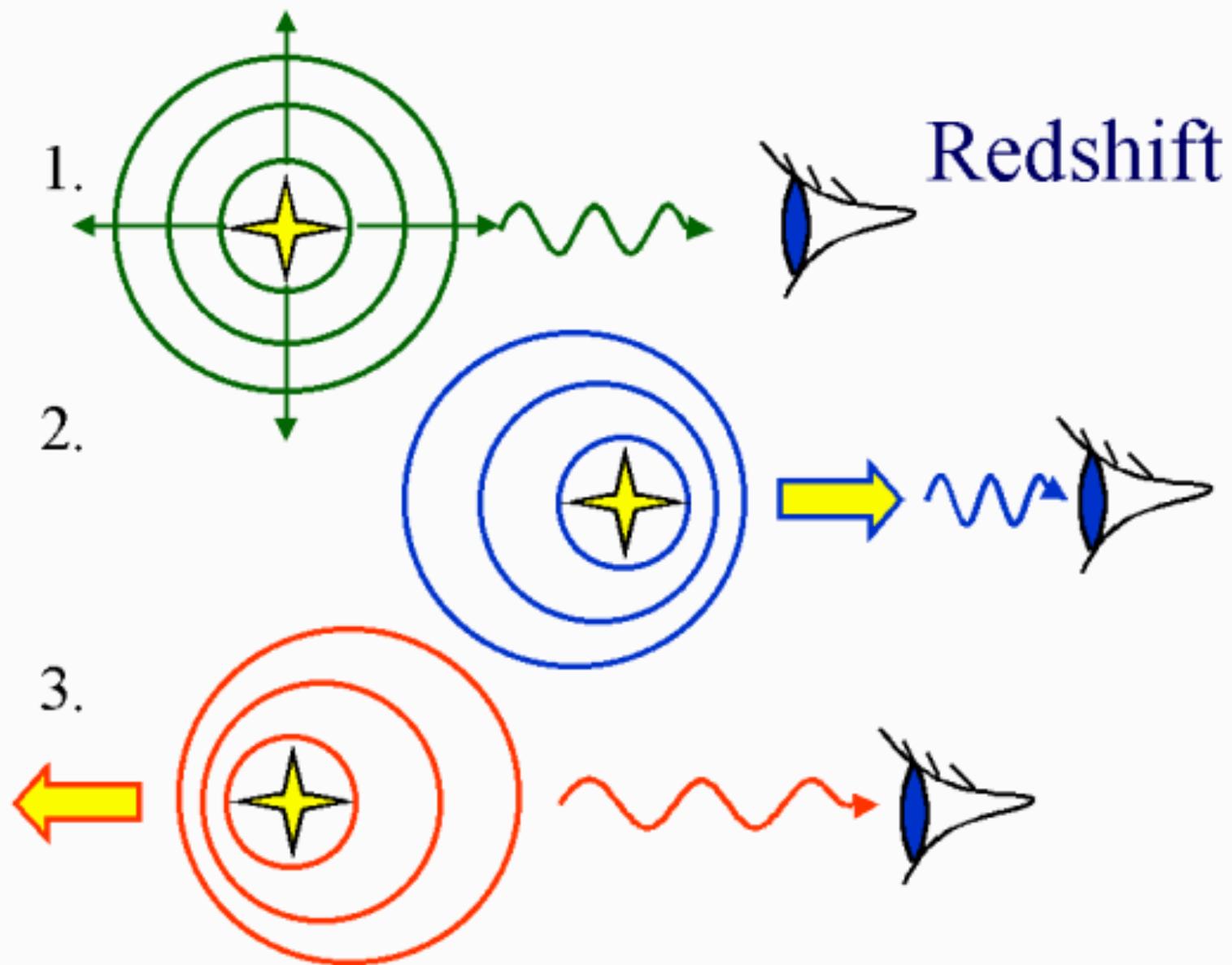


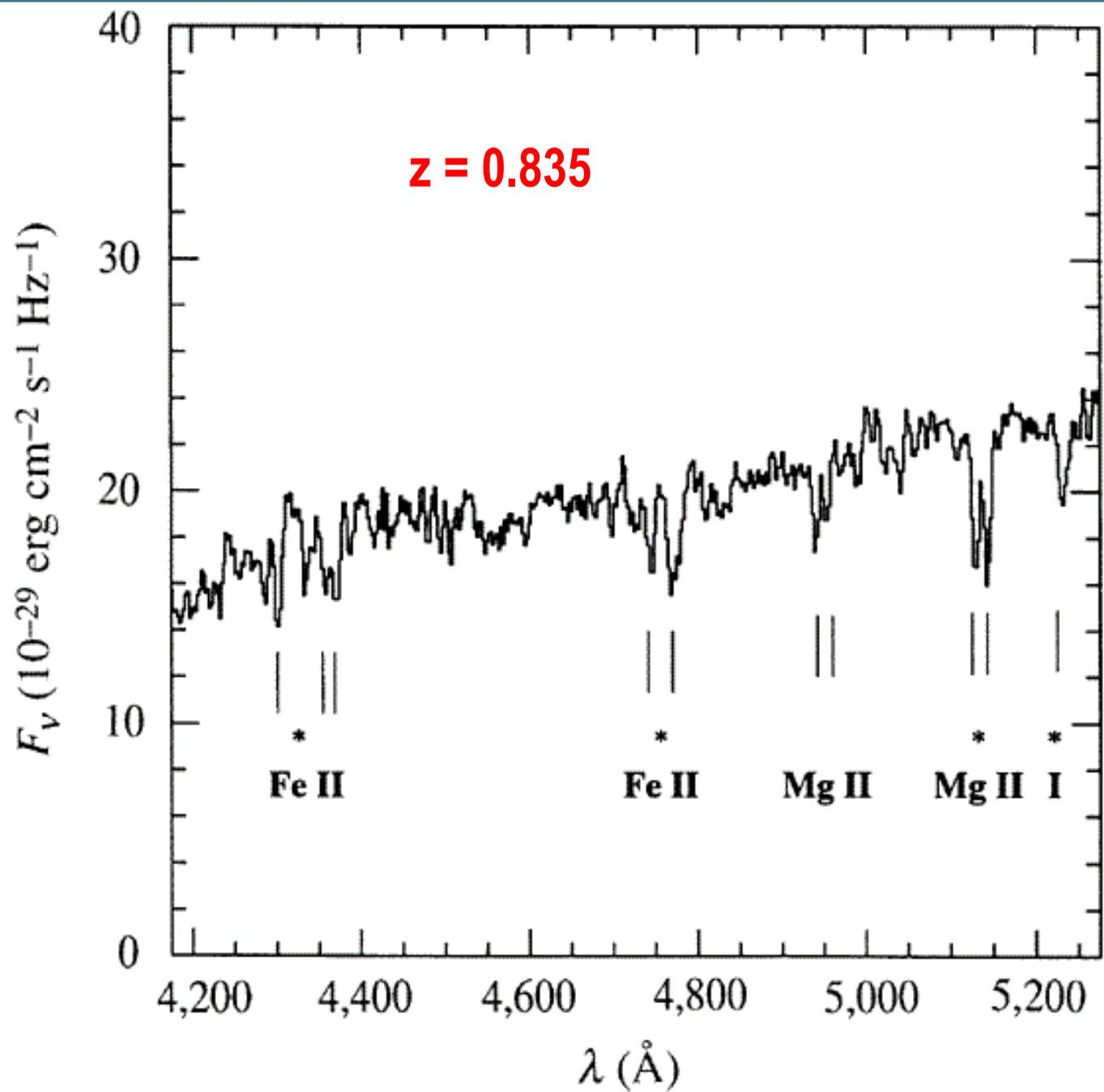
BeppoSAX observation of GRB970228 field
SAX MECS 1997 Mar 3 Exposure: 16272 s
5^h02^m36^s 5^h02^m09^s 5^h01^m42^s 5^h01^m15^s



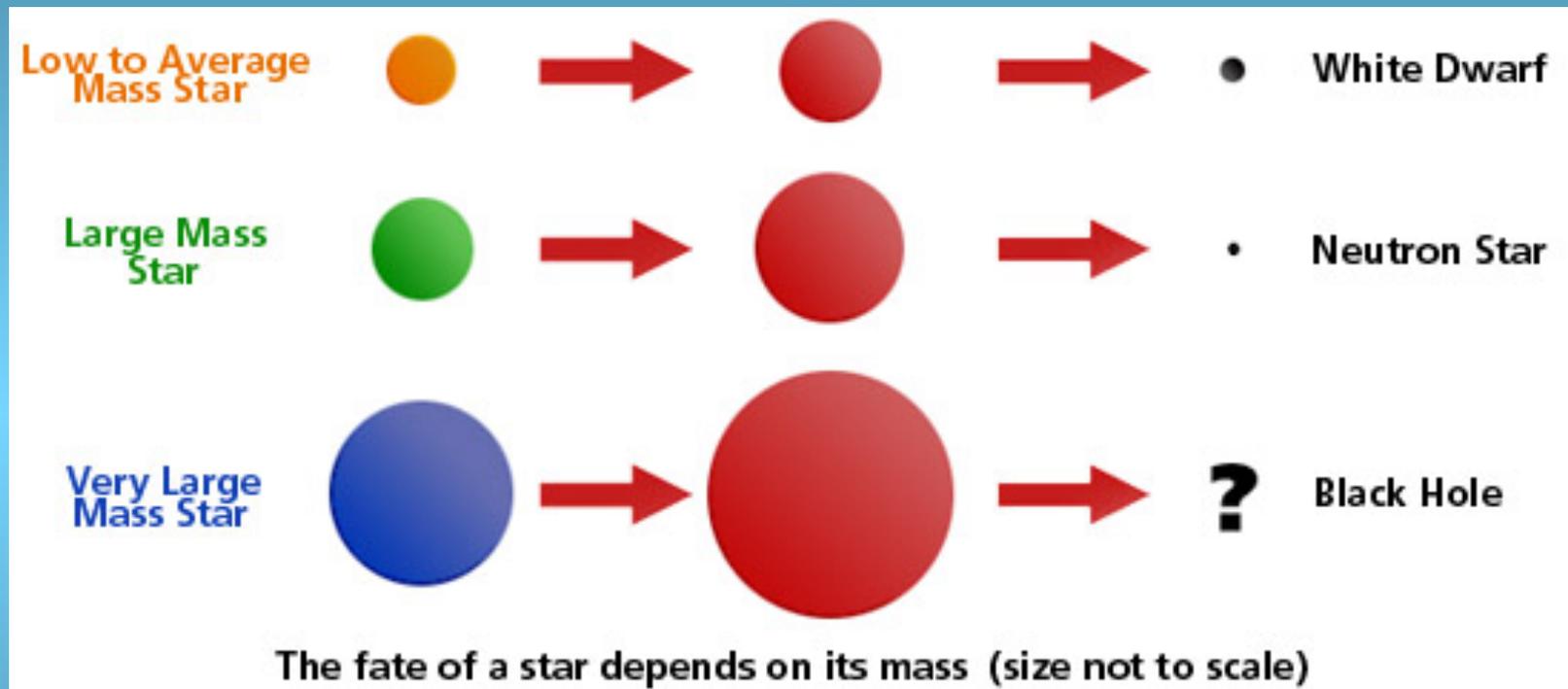
E da terra...







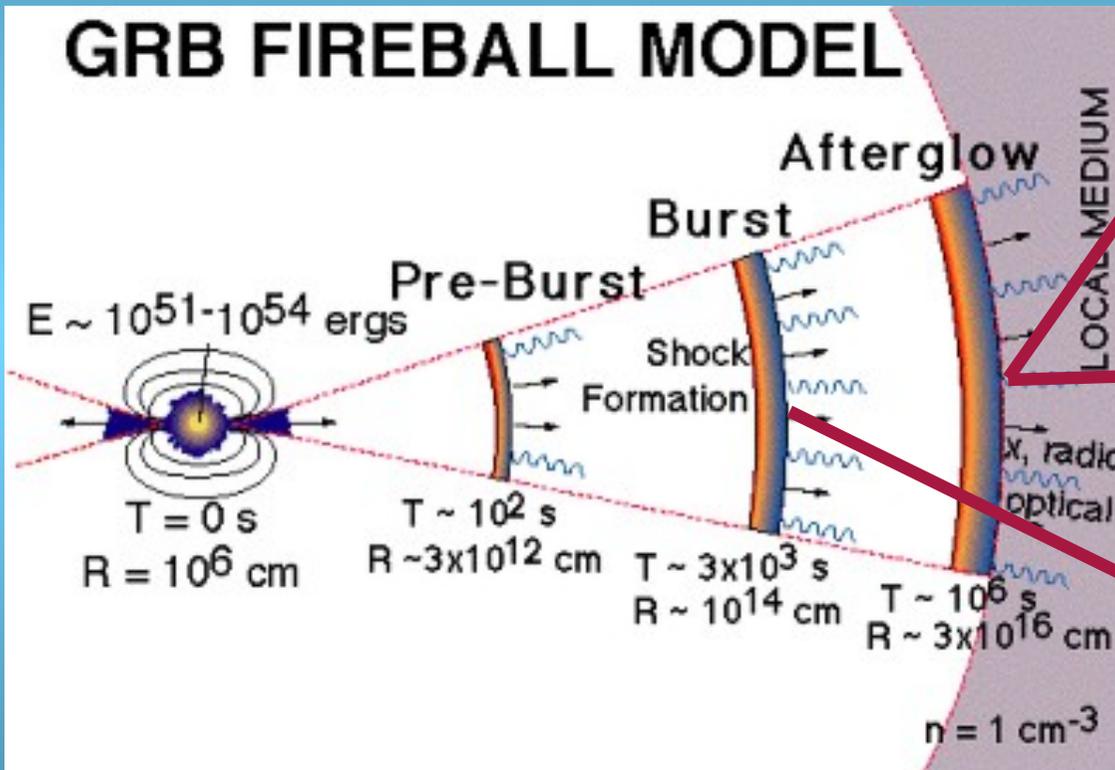
Un breve ripasso di evoluzione stellare...



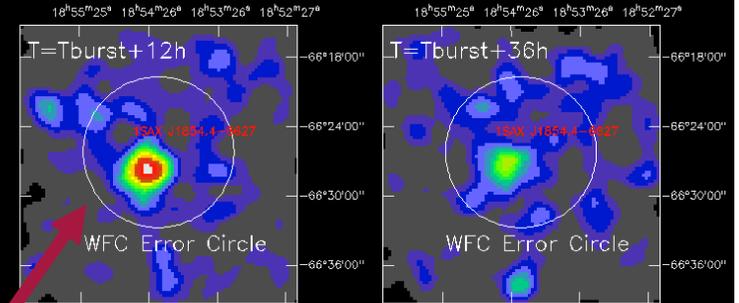
Essenzialmente, le stelle medio-piccole si spengono relativamente dolcemente, le stelle massicce esplodono!

Il modello a fireball

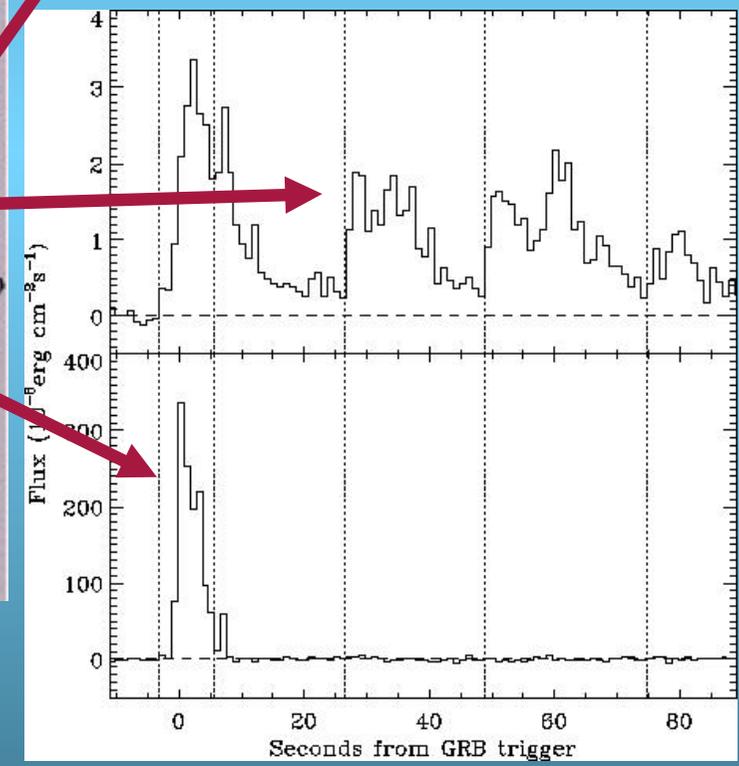
GRB FIREBALL MODEL



GRB 000214 X-ray afterglow (BeppoSAX MECS)

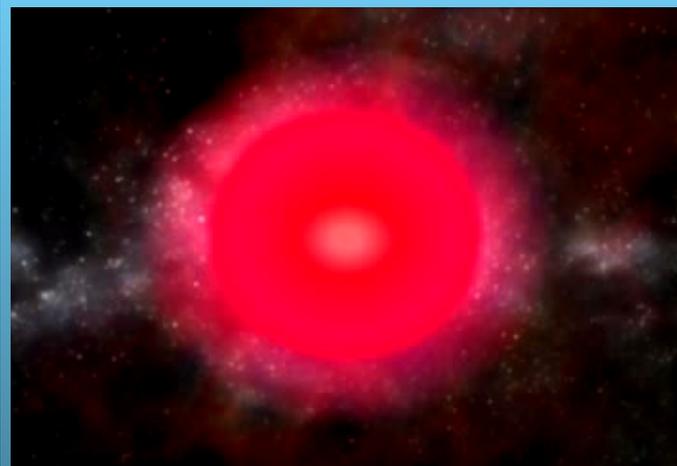


(Antonelli et al., 2000, Ap.J.Lett., in press)





I progenitori dei GRB



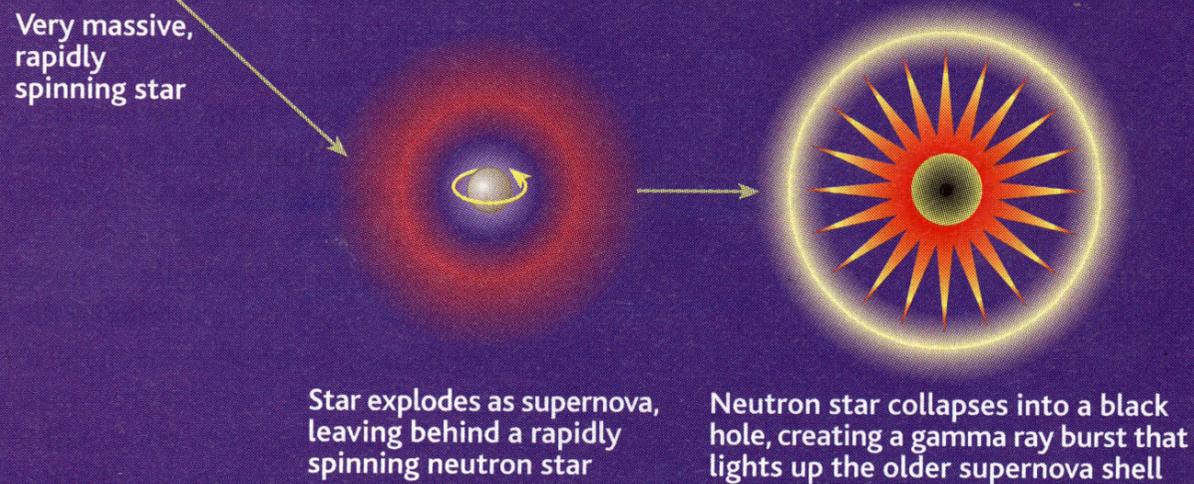
Merging neutron stars

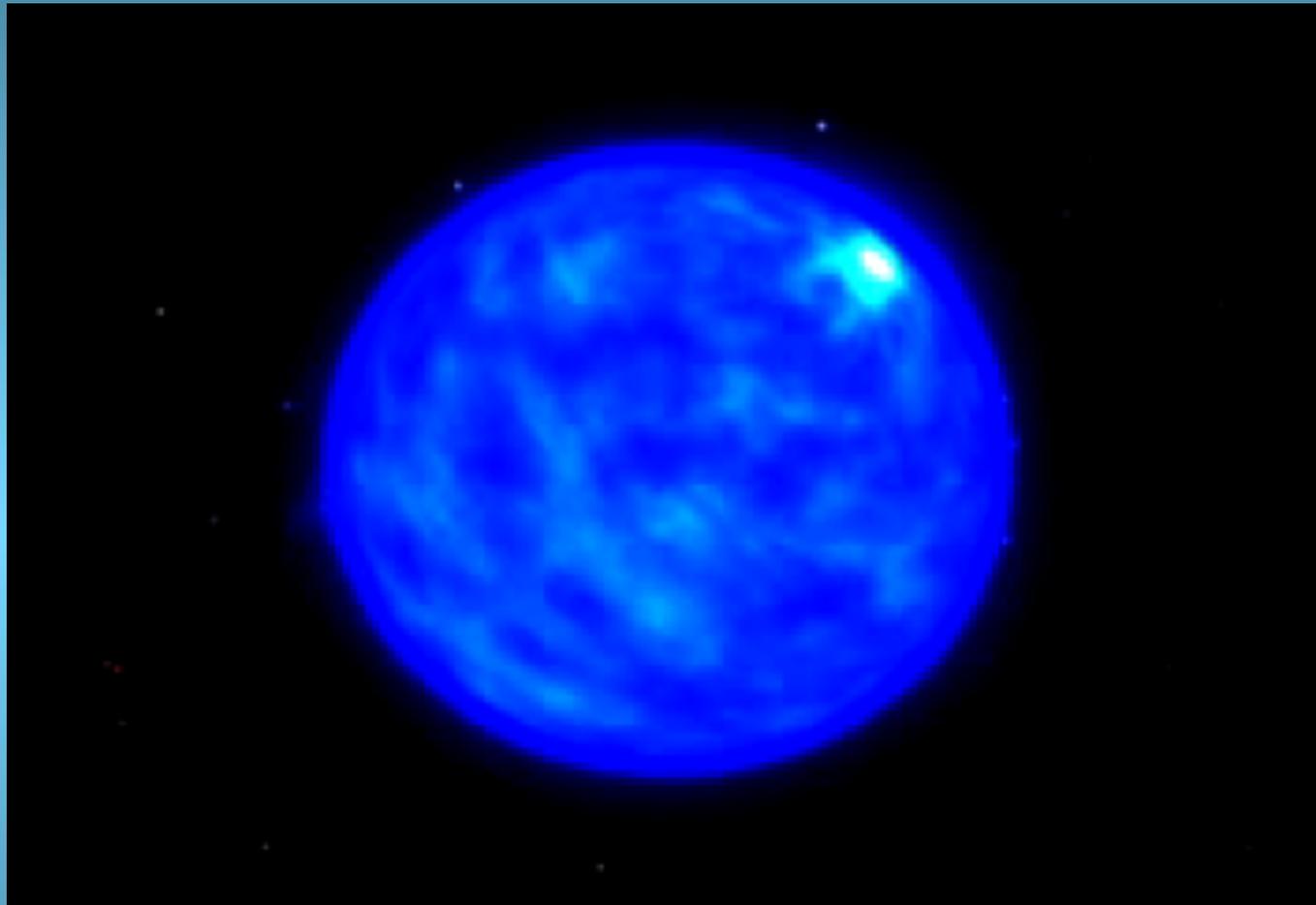


Classical hypernova model



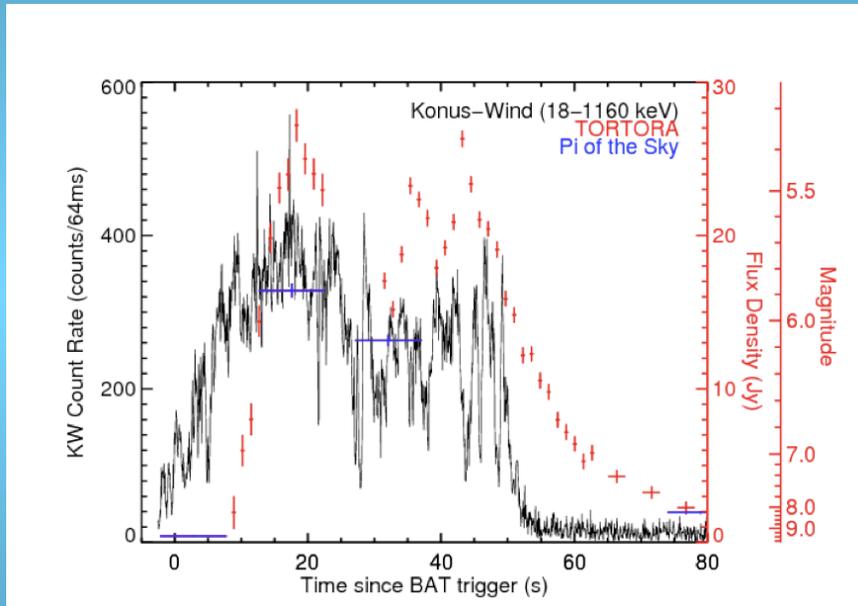
Supranova model of Vietri and Stella



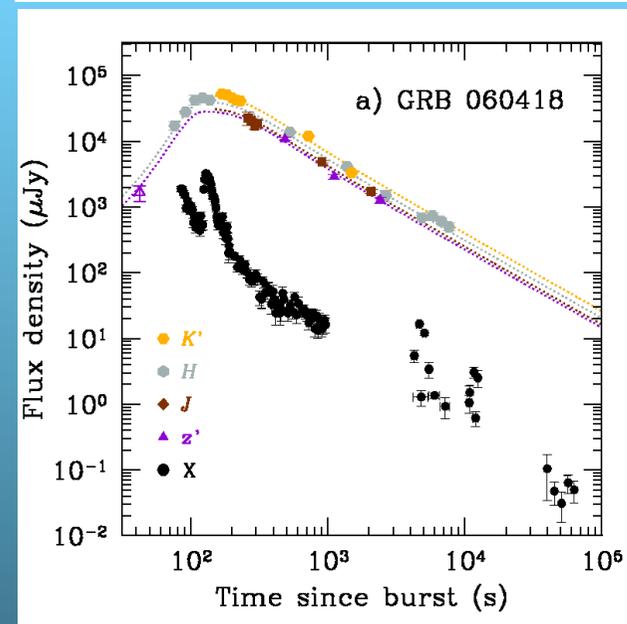
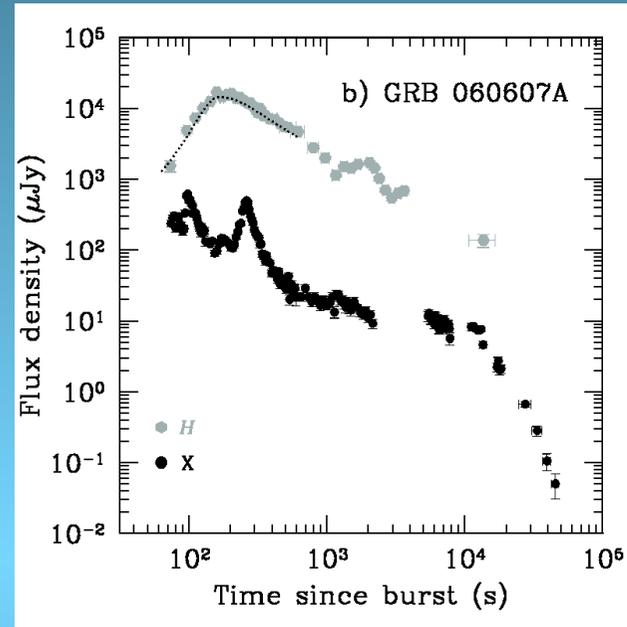


Una possibile descrizione di un GRB

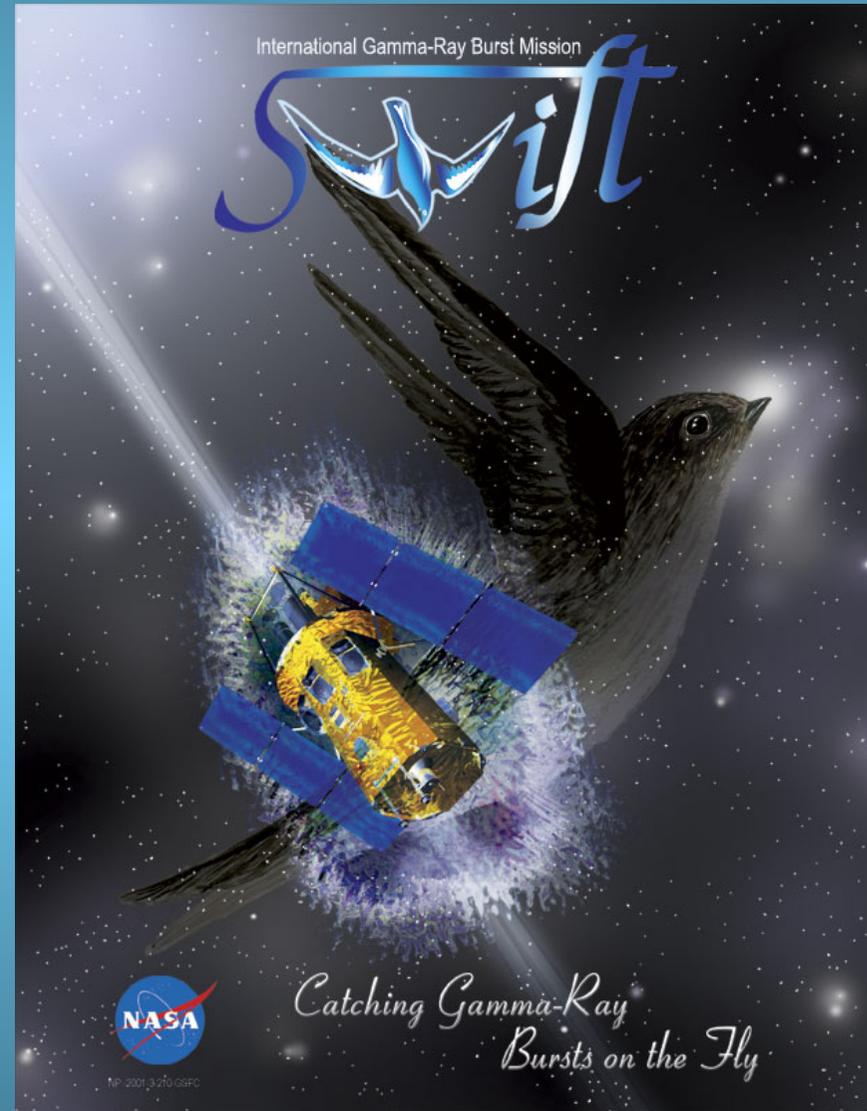
I GRB sono fenomeni rapidi...

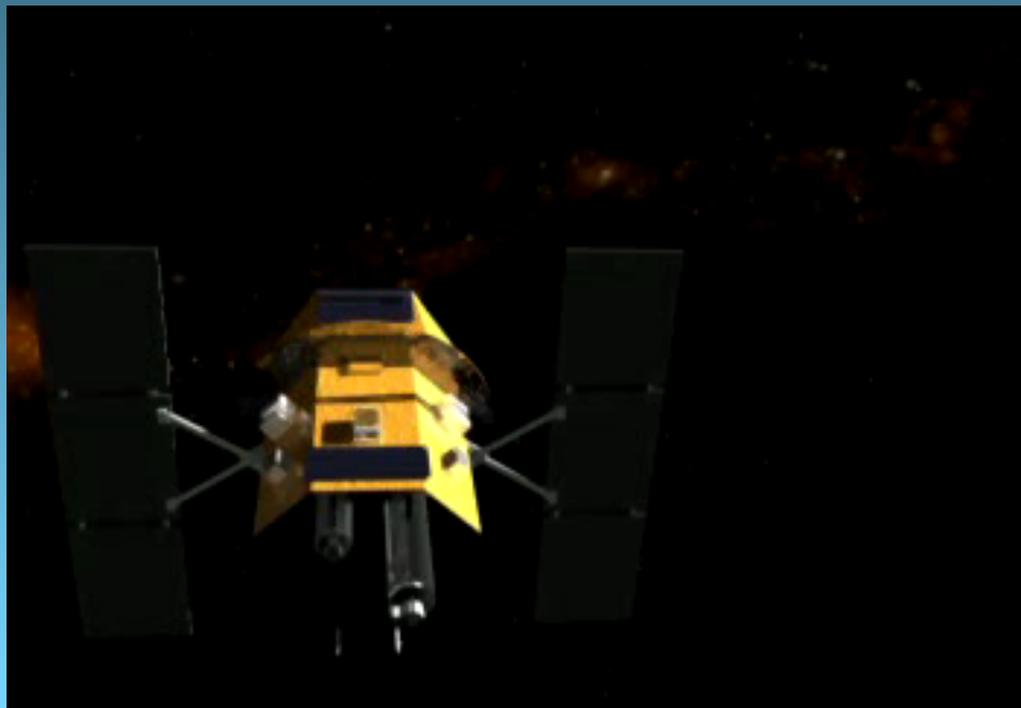


GRB080319B



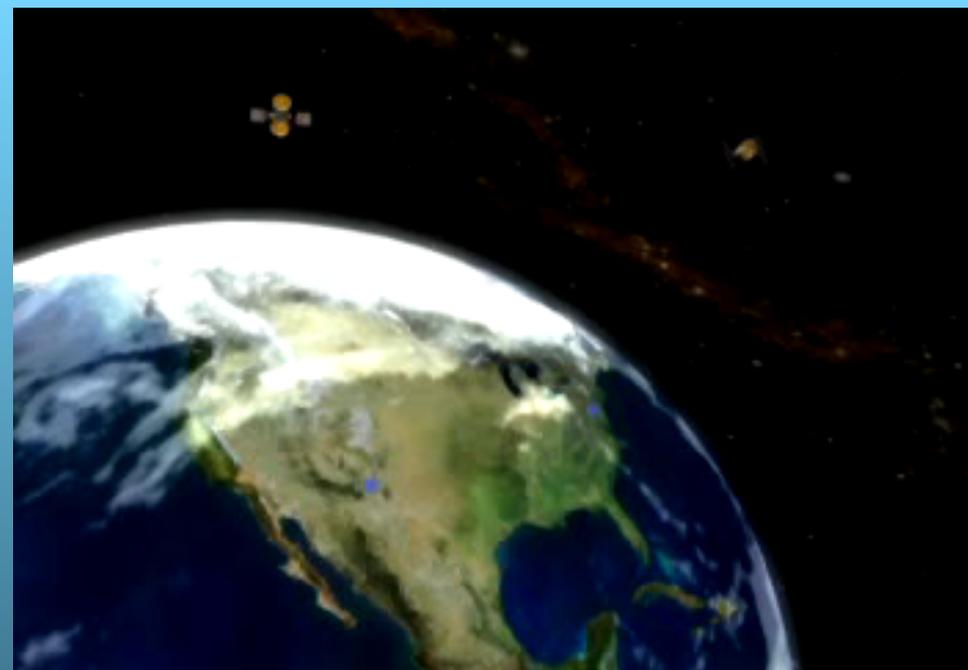
Swift





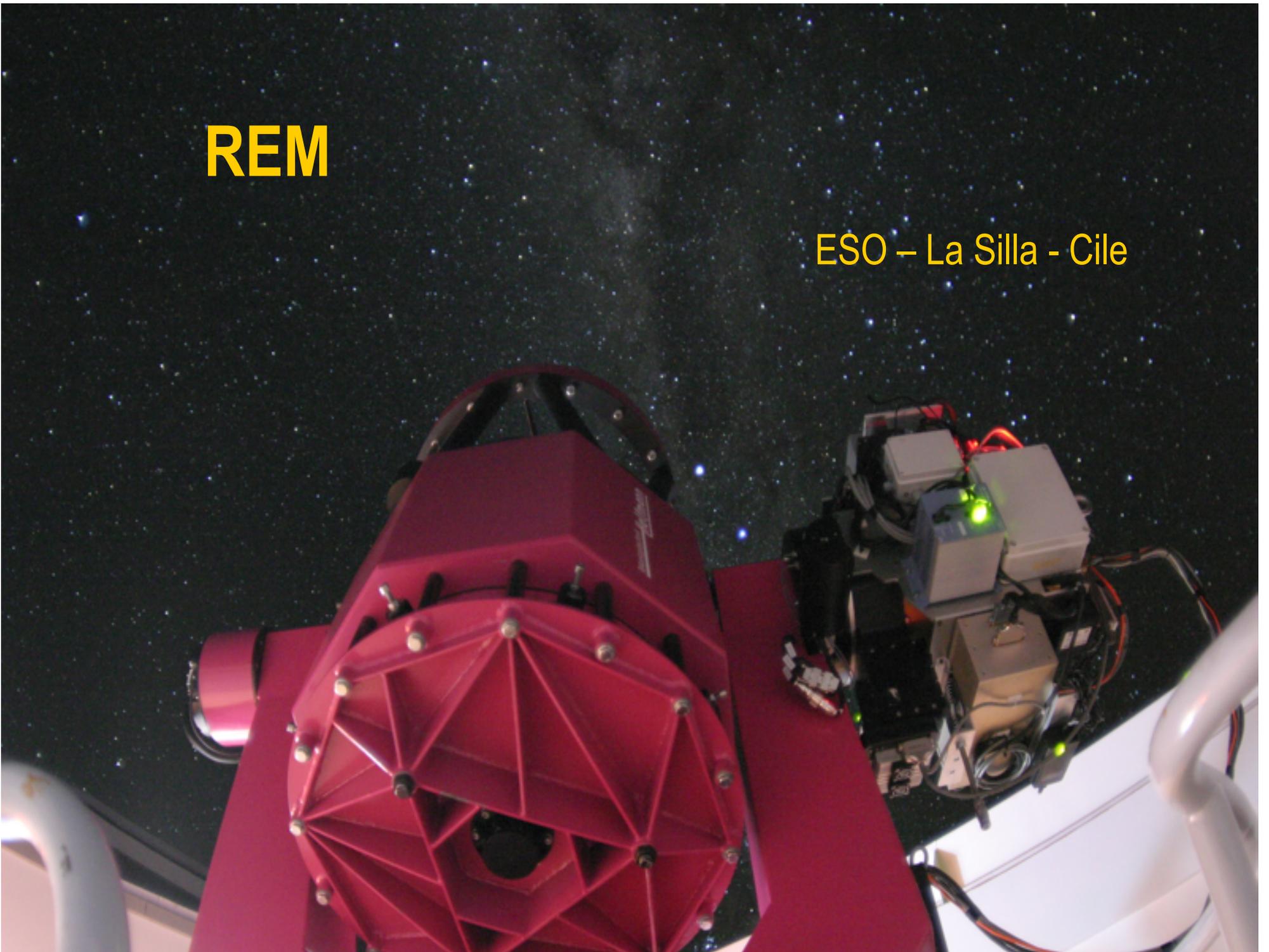
Cosa fa Swift?

E cosa fa fare...?



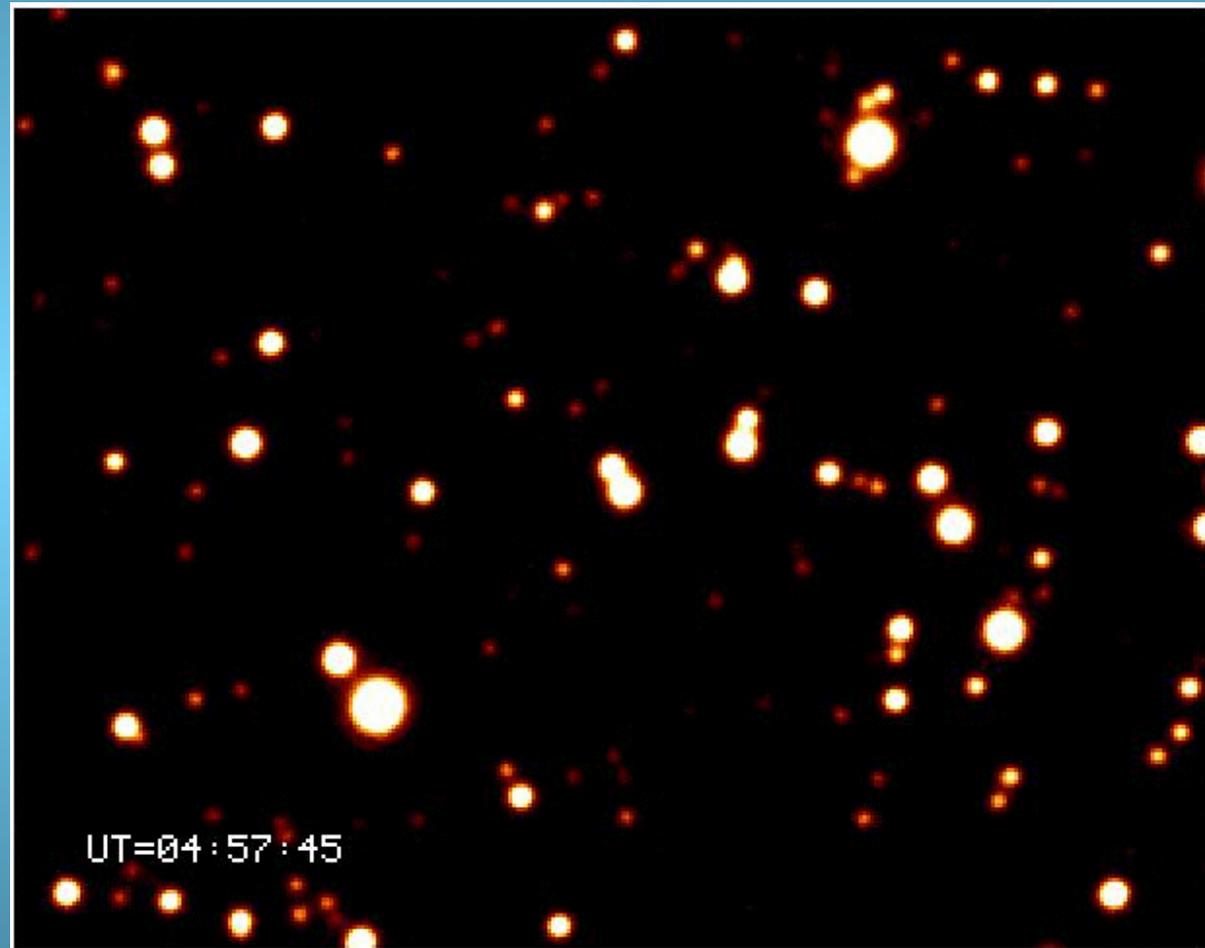
REM

ESO – La Silla - Chile

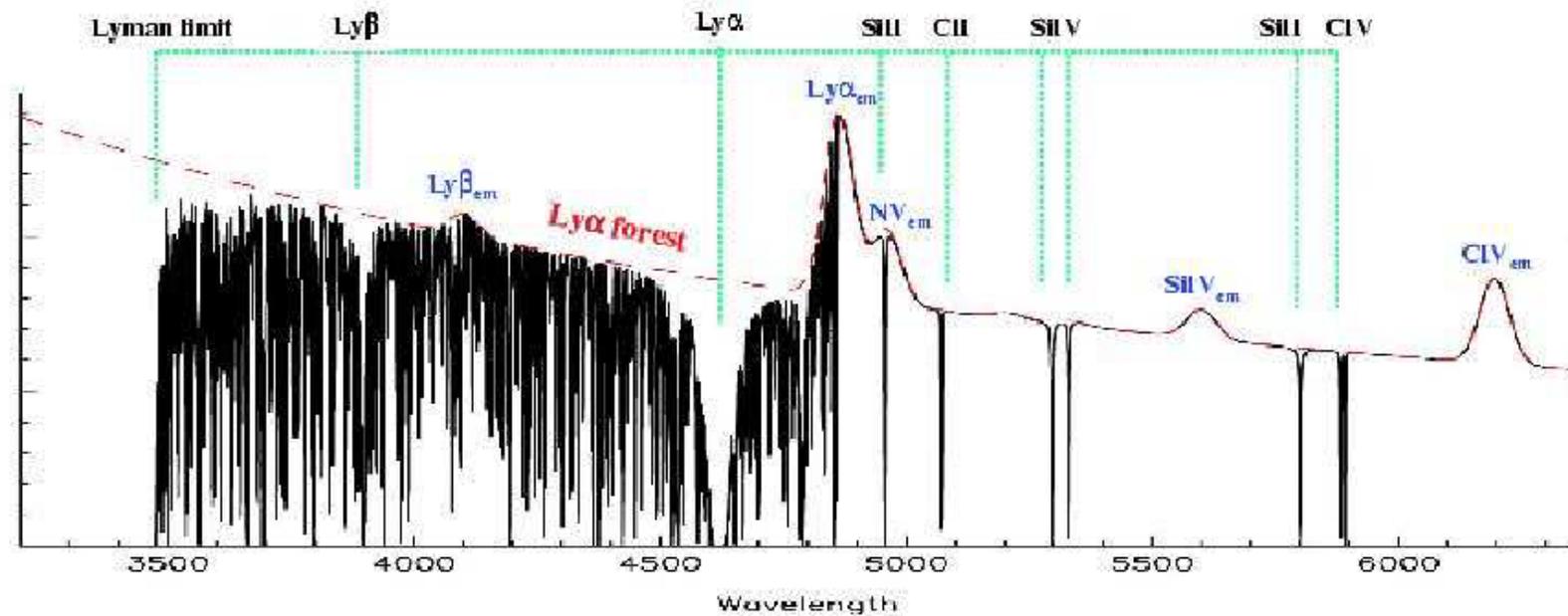
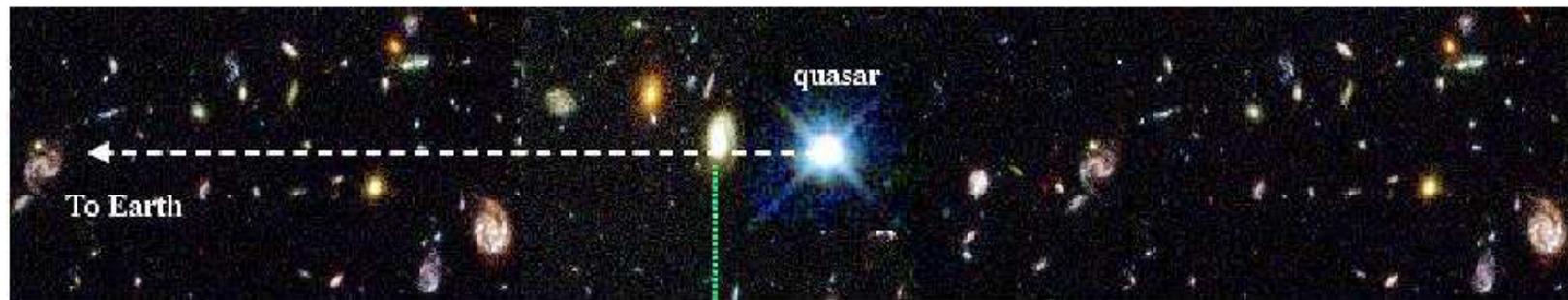


GRB 050721

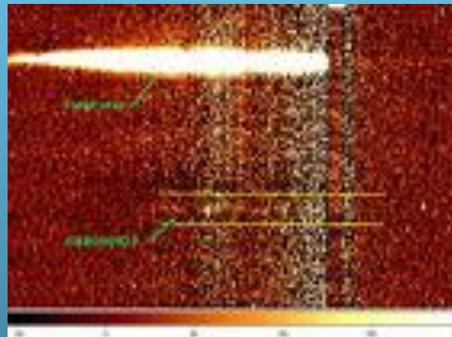
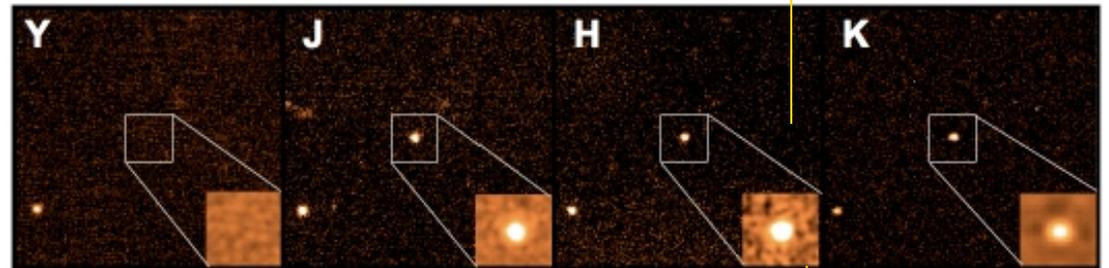
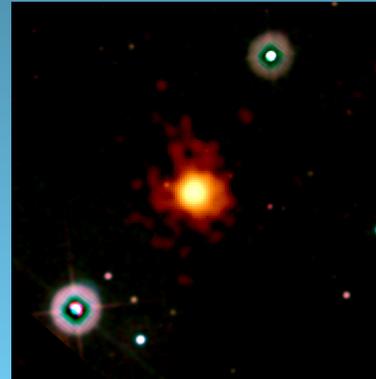
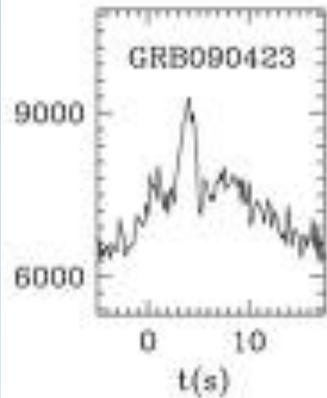
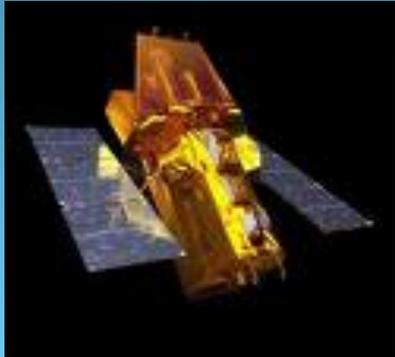
Filmato di D. Fugazza



GRB => una tomografia dell'Universo



GRB 090423



Telescopio
Nazionale
Galileo

Z ~ 8.2!

