

Cosmic Explosions

Fang Yuan

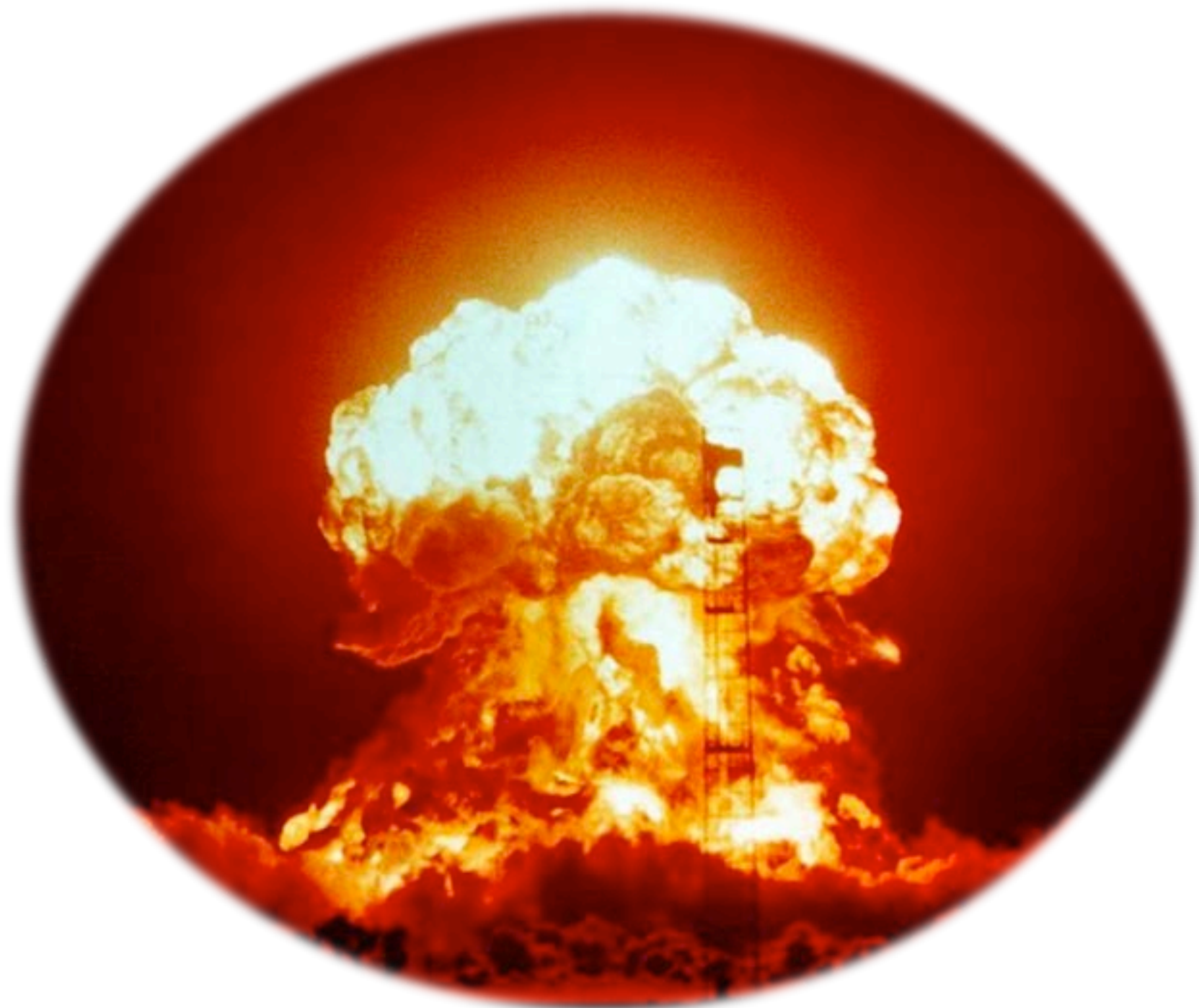


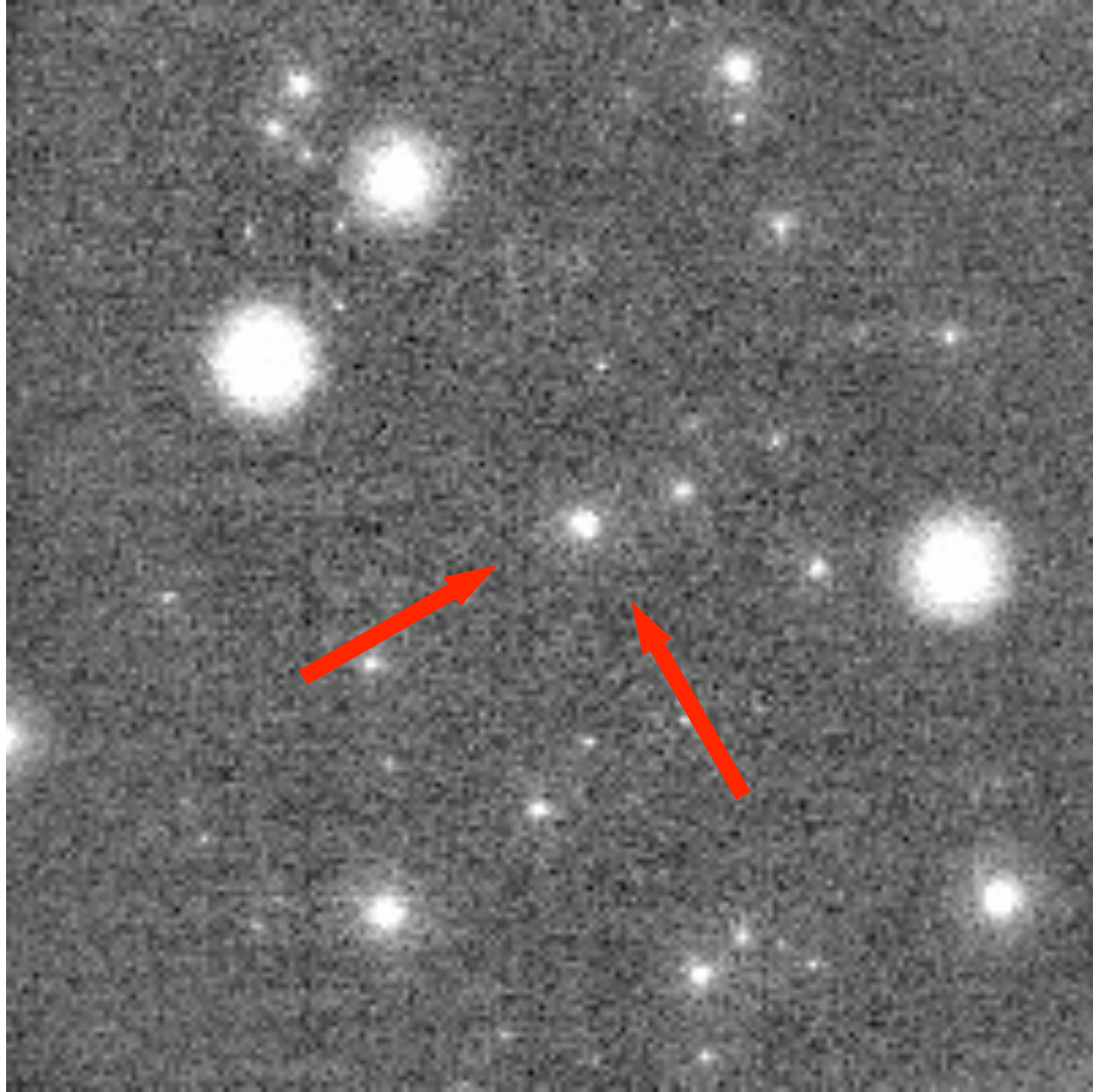
Australian
National
University



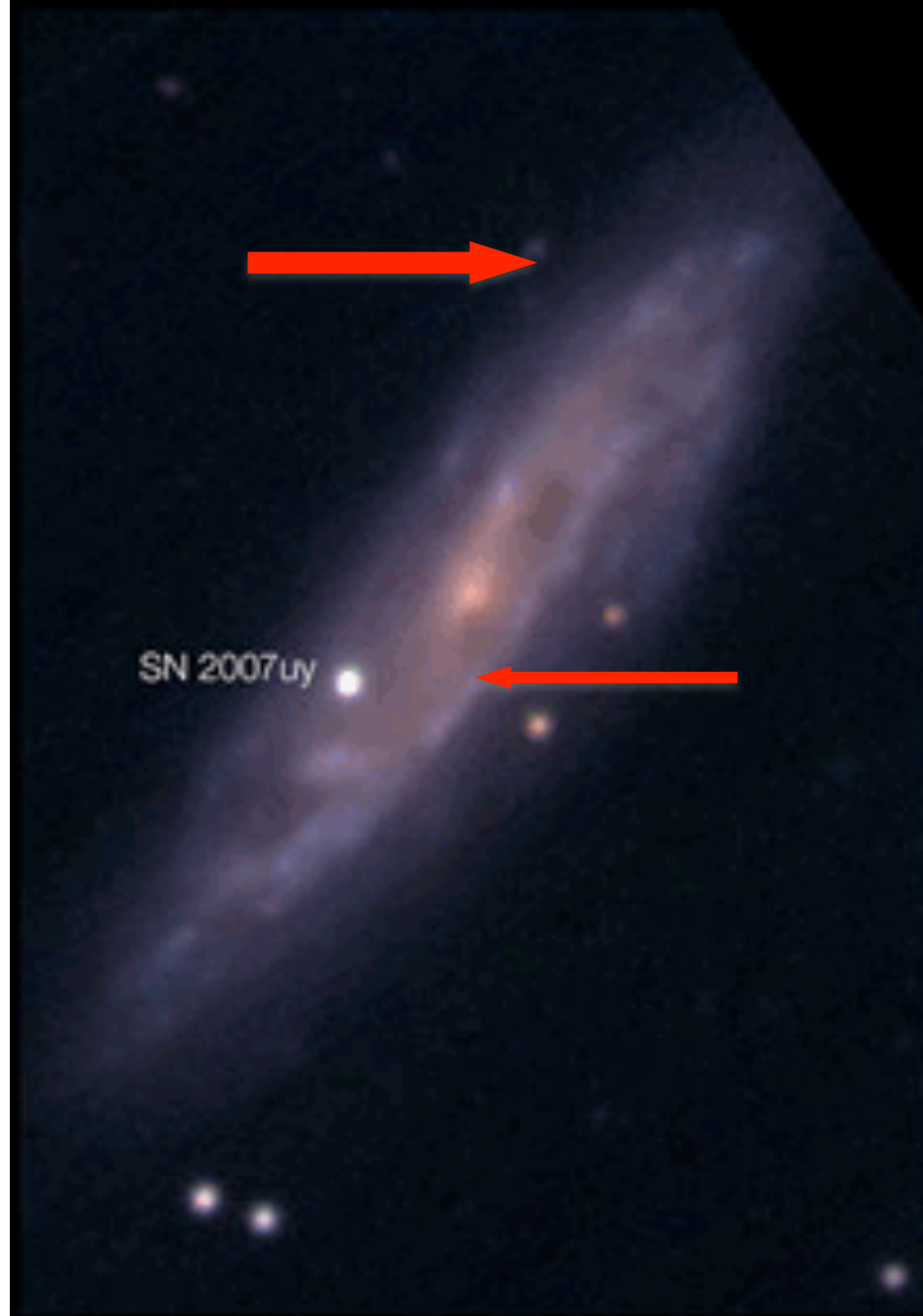
CAASTRO
ALL-SKY ASTROPHYSICS

What do we



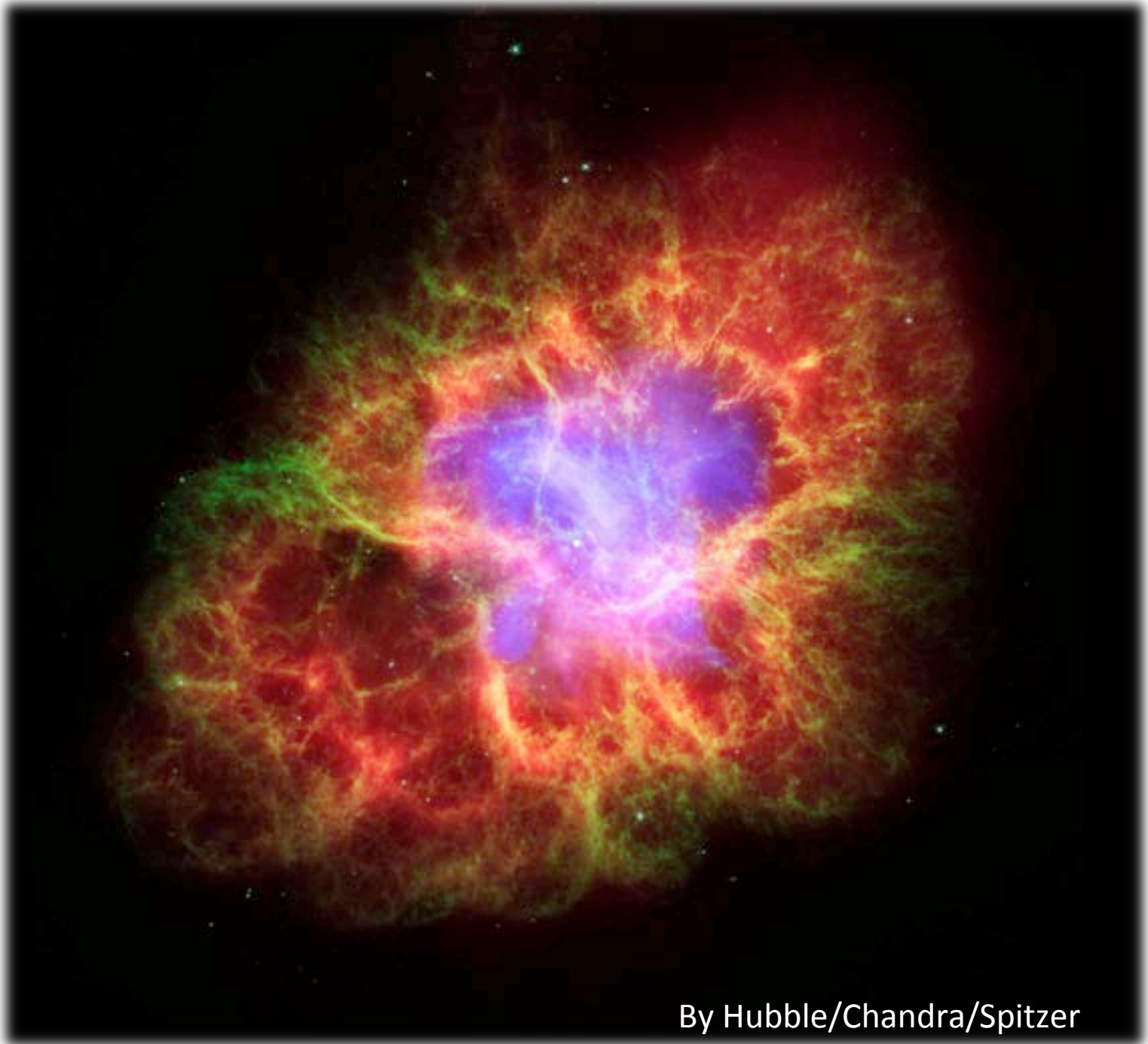


6 January 2008





Credit: **Davide De Martin**



By Hubble/Chandra/Spitzer

What are they?

Gamma-Ray Burst

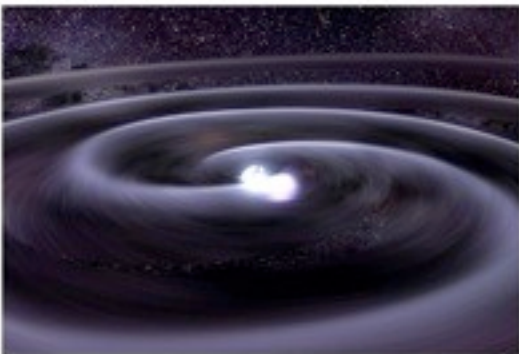


Supernova



Massive Star

Compact Merger



White Dwarf





A GRB in action (simulation)

http://www.nasa.gov/centers/goddard/mov/97789main_GRBstar2.mov

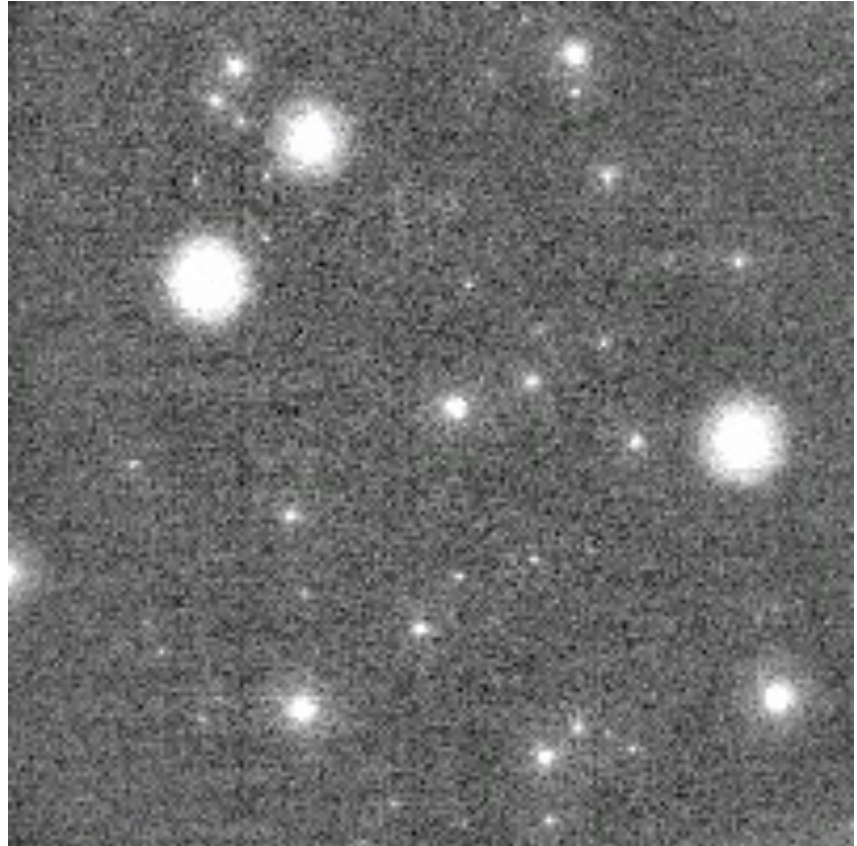


GRB 080319B

7.5 billion years ago

Visible by naked eye!

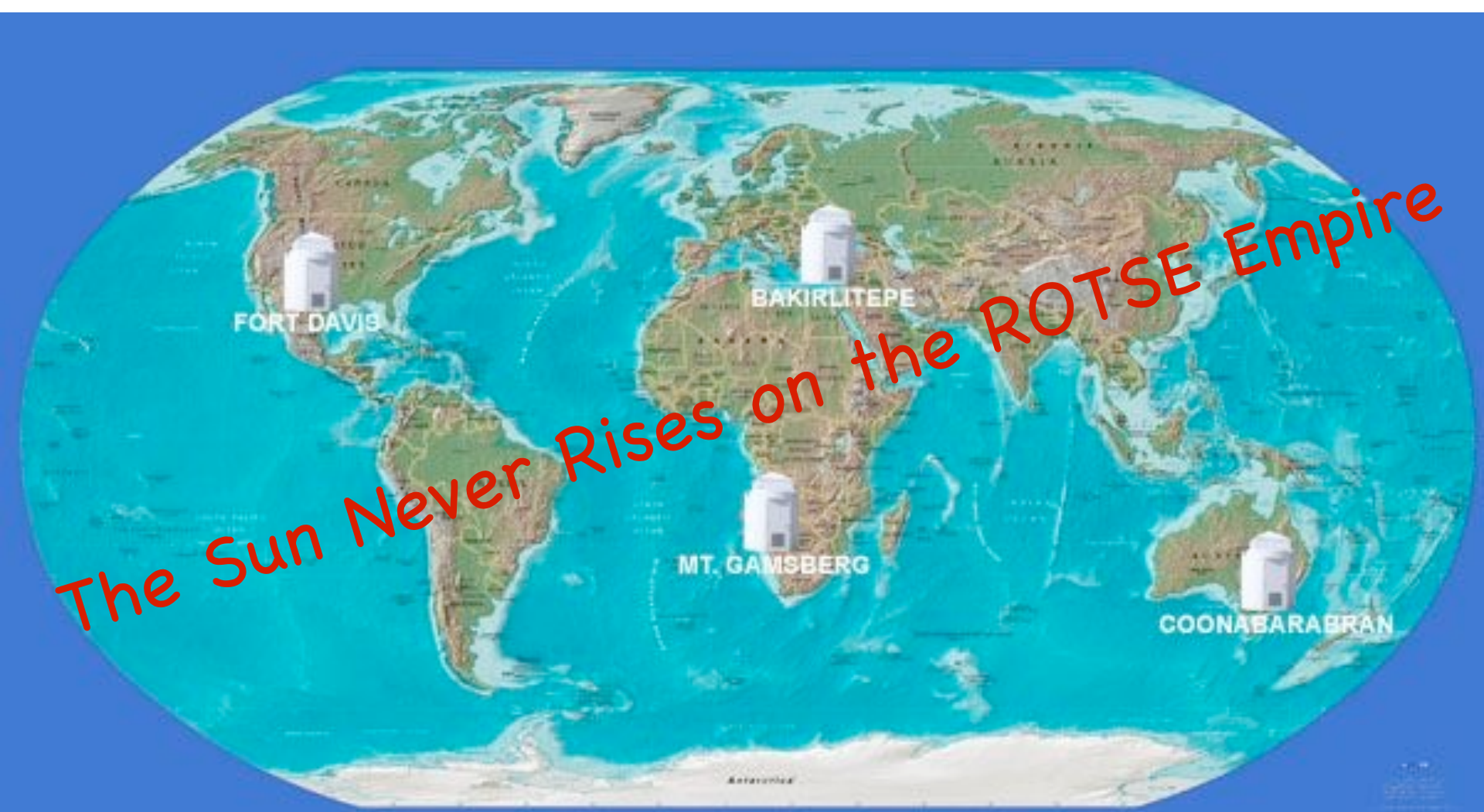
10^{17} brighter than our
sun



How do we

Robotic Optical Transient Search Experiment

ROTSE



The Sun Never Rises on the ROTSE Empire



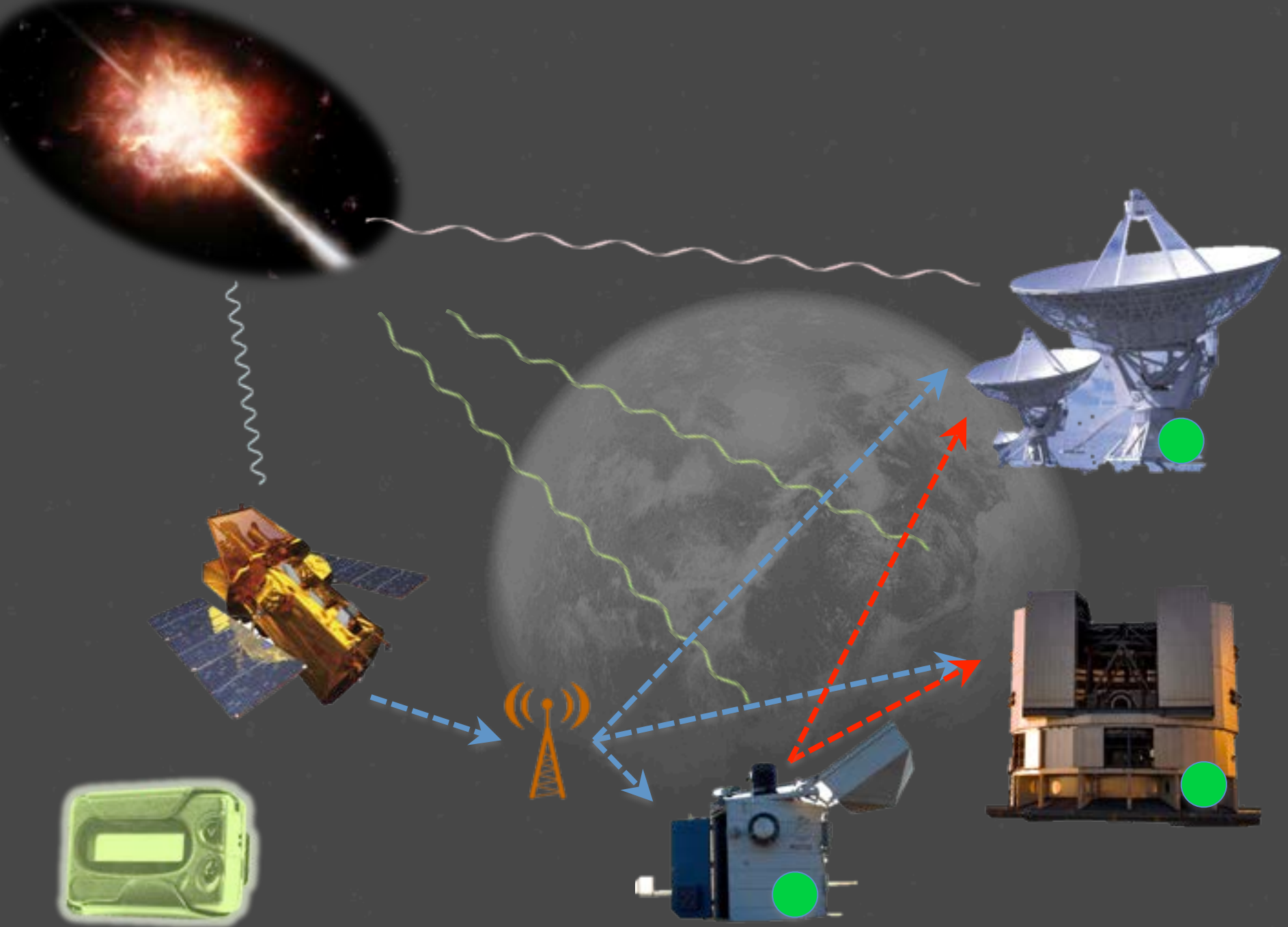
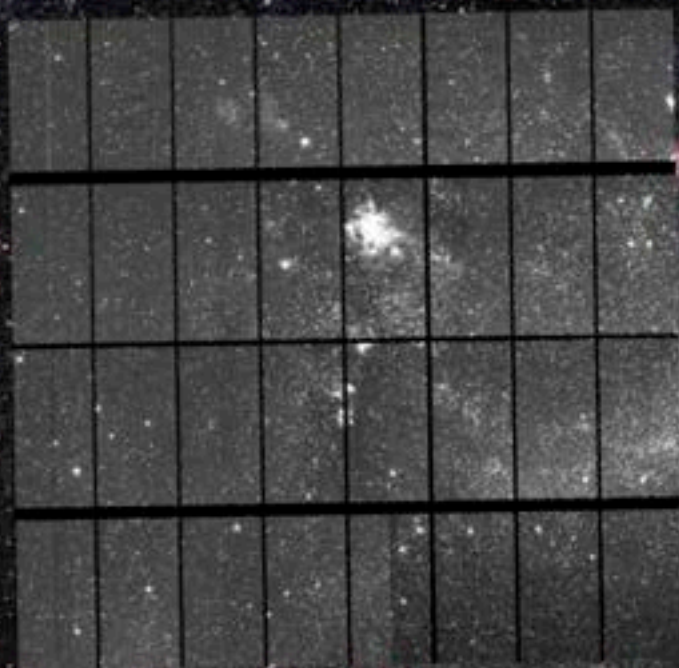


Image Credit: ESO/A. Roquette / NASA / Iztok Boncina/ESO / NRAO/AUI



SkyMapper @ SSO





Why do we

Extreme Physics



99.99 % speed of light

H																	He				
Li	Be															B	C	N	O	F	Ne
Na	Mg															Al	Si	P	S	Cl	Ar
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr				
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe				
Cs	Ba			Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn			
Fr	Ra																				
		La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu					
		Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr					

Big Bang

Supernovae

Large Stars

Small Stars

Cosmic Rays

Big Bang

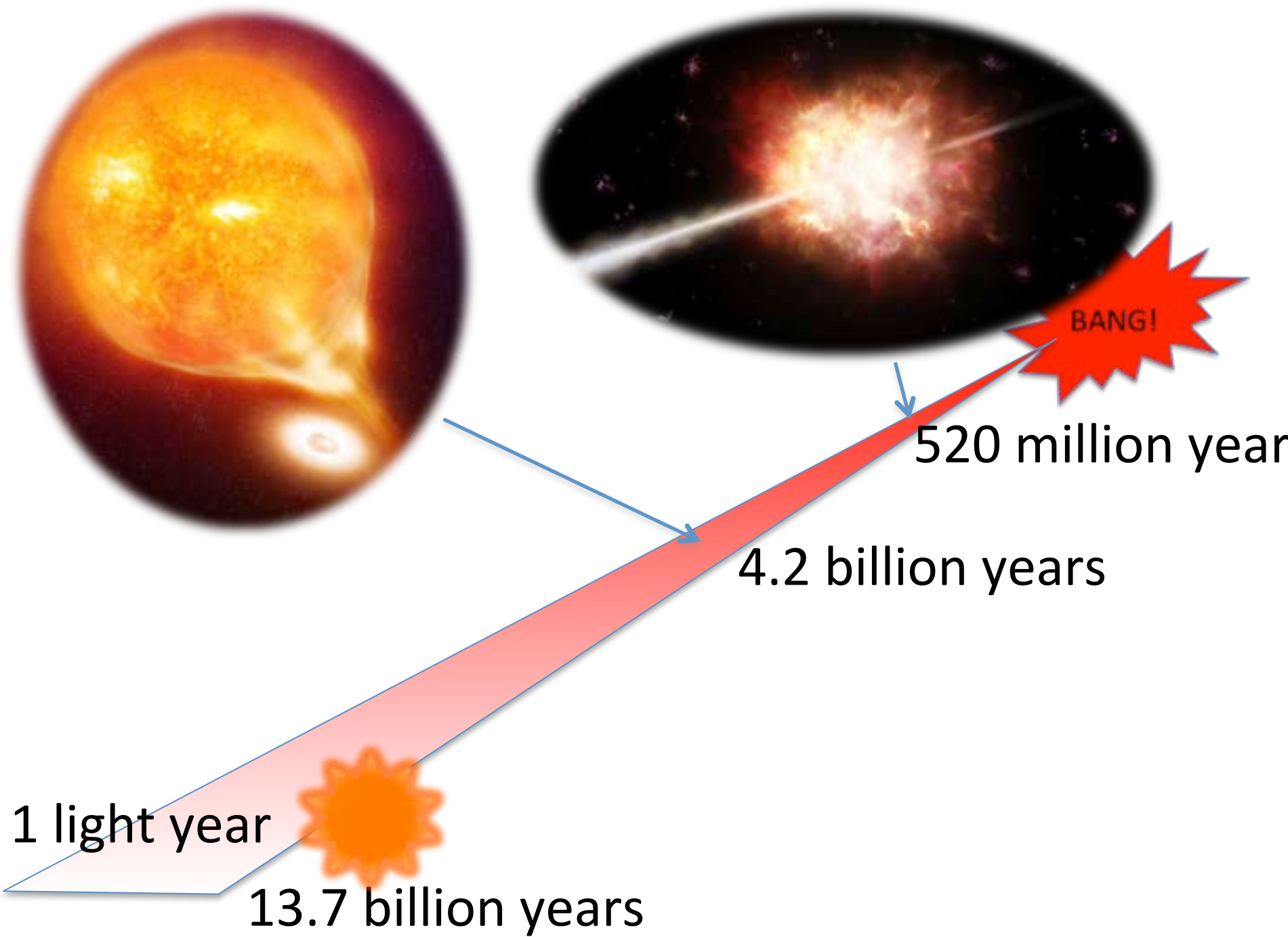
Supernovae

Large Stars

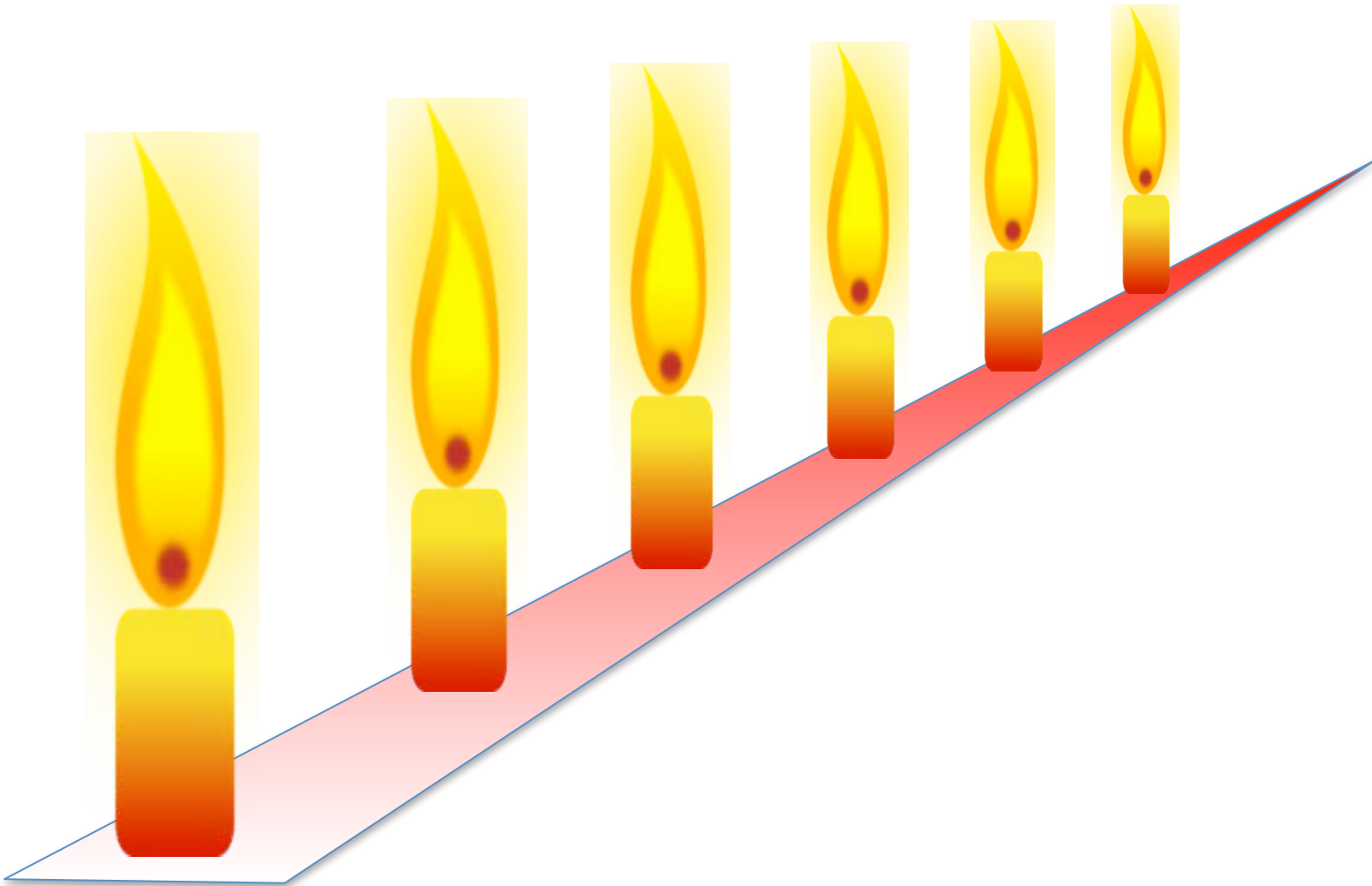
Small Stars

Cosmic Rays





Standard Candle





Cosmic Beacon

Big Questions

Better standard candles
(physics, evolution)

How do stars form and evolve?
(how do they explode?)

Where and when do they explode?)