SOLVING THE PUZZLE OF GRB AND SN CORRELATED EVENT BY PURE ELECTRON JET

arXiv:1605.00177

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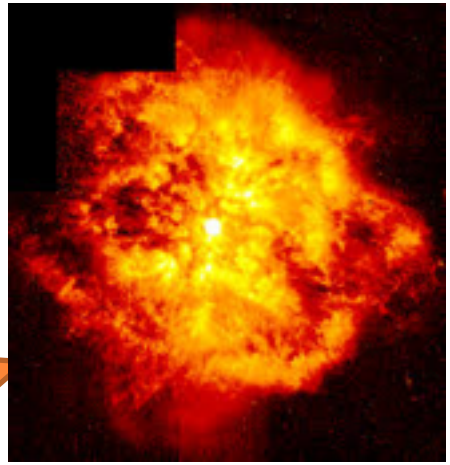
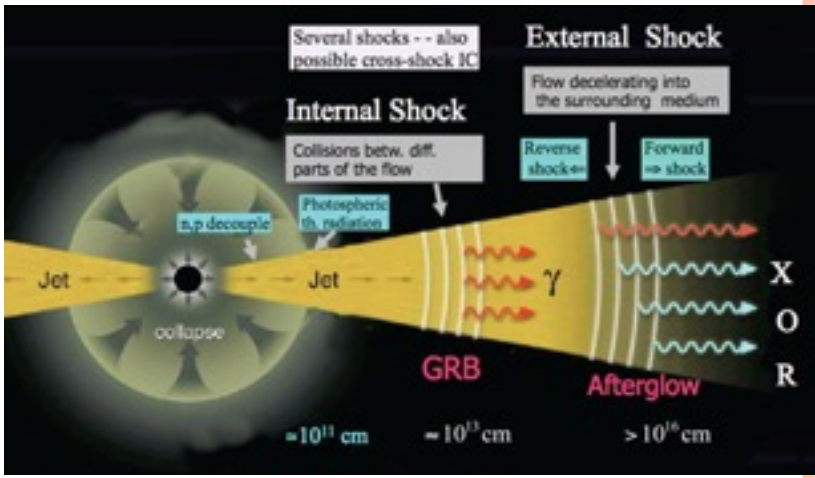
TECHNION, 24 AUGUST 2016

OLD FIREBALL 1980

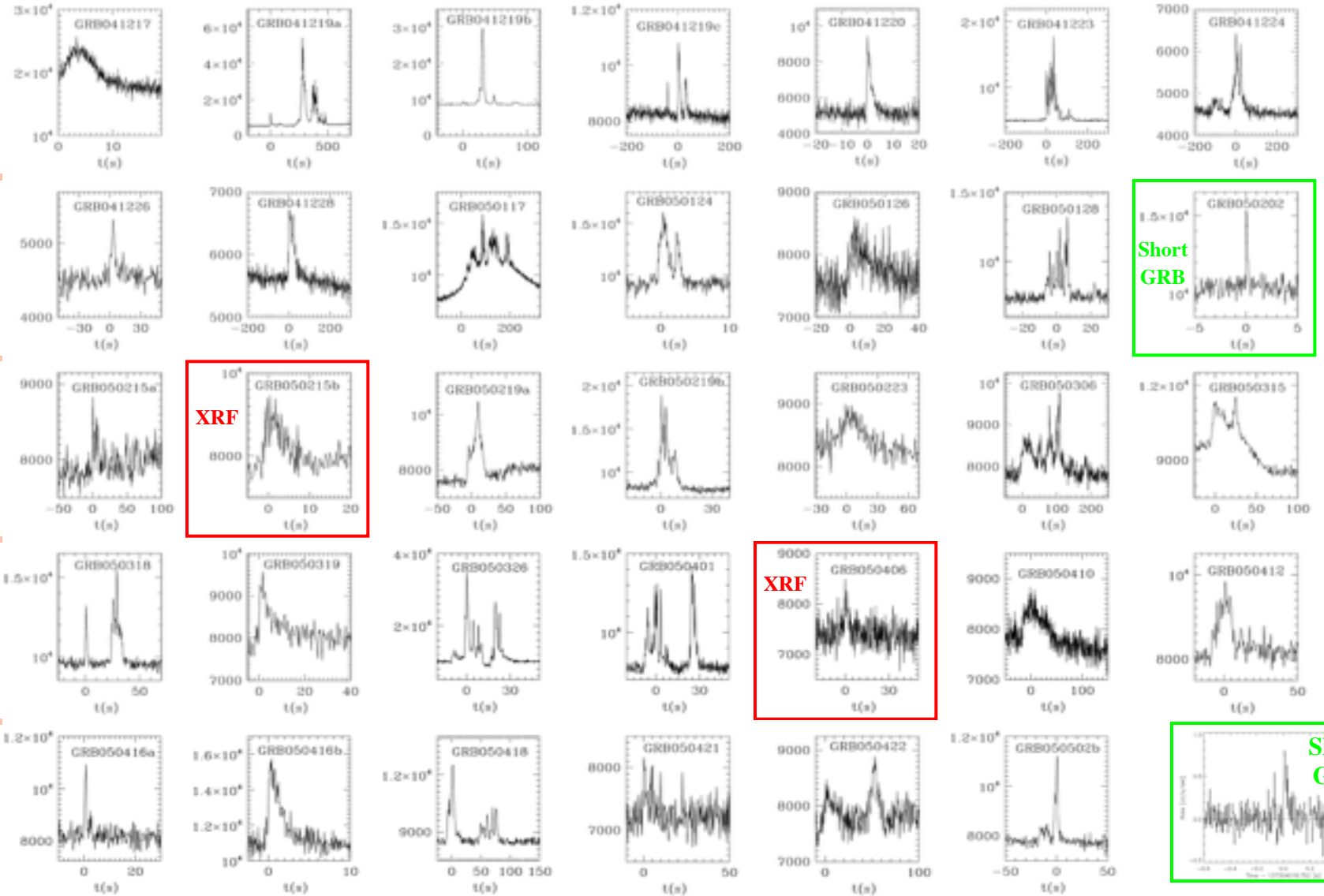


late FIREBALL 2000

New GRB-Jet..
(precessing)



More GRBs


GRB041217
GRB041219a
GRB041219b
GRB041219c
GRB041220
GRB041223
GRB041224
GRB041226
GRB041228
GRB050117
GRB050124
GRB050126
GRB050128
Short GRB
GRB050202
GRB050215a
XRF
GRB050215b
GRB050219a
GRB050219b
GRB050223
GRB050306
GRB050315
GRB050318
GRB050319
GRB050326
GRB050401
XRF
GRB050406
GRB050410
GRB050412
GRB050416a
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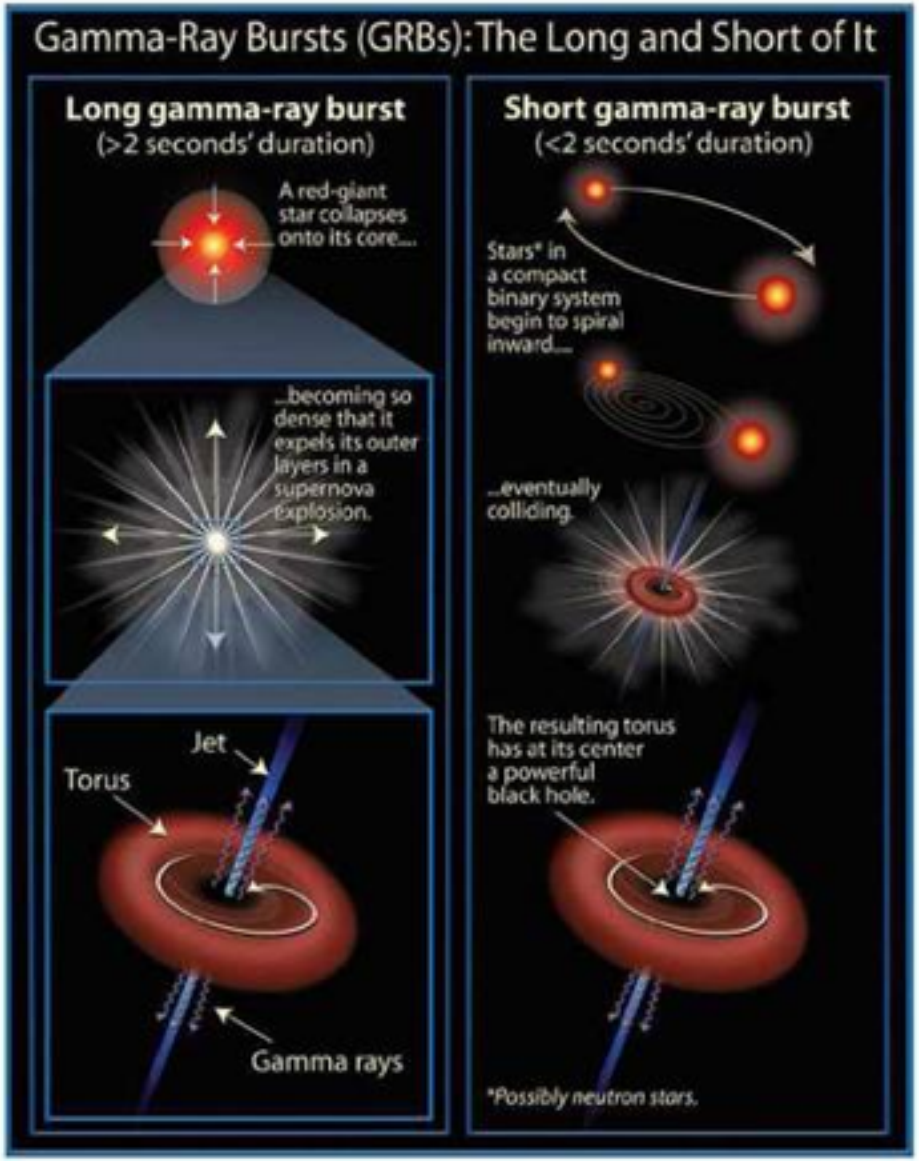
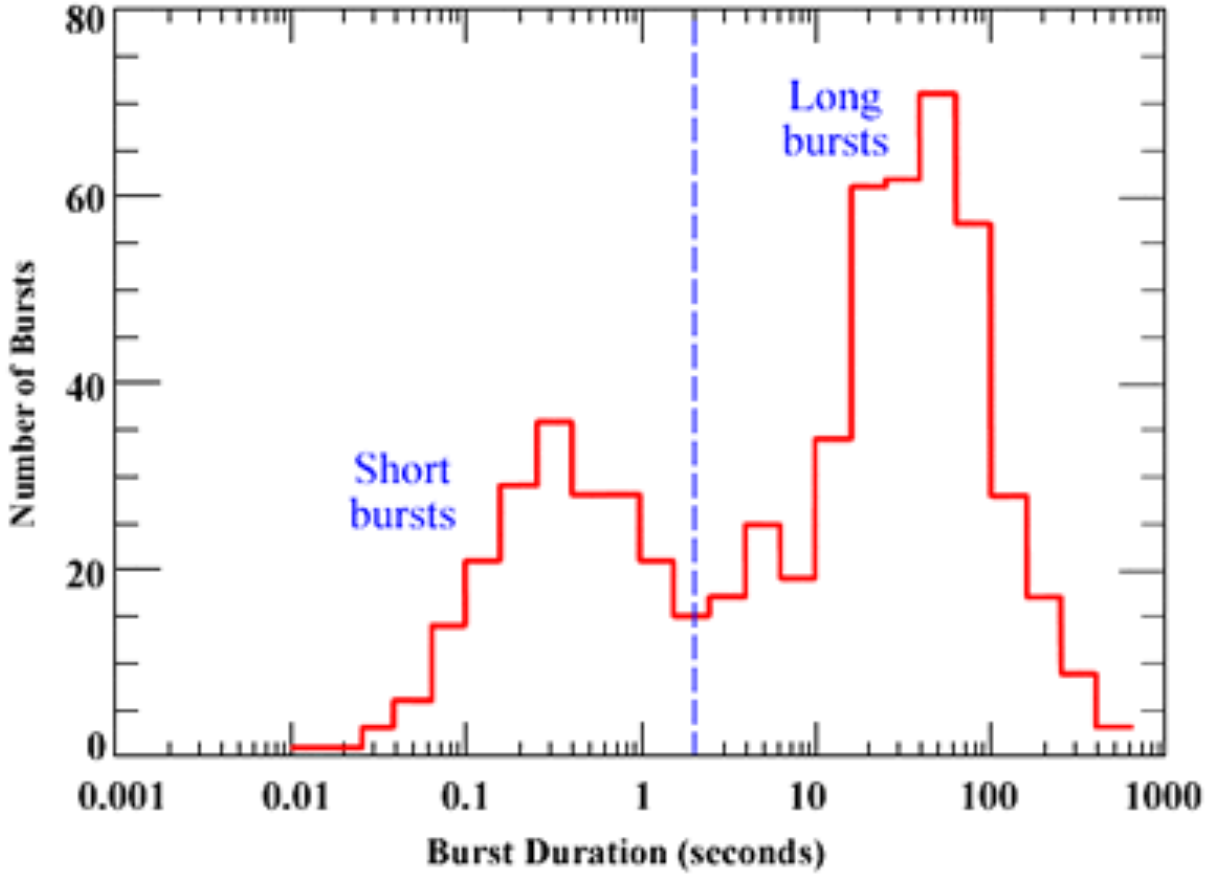
GRB050421
GRB050422
GRB050502b
Short GRB
t(s)


Gamma-Ray Bursts (GRBs): The Long and Short of It
Long gamma-ray burst
(>2 seconds' duration)
A red-giant star collapses onto its core....
...becoming so dense that it expels its outer layers in a supernova explosion.
Jet
Torus
Gamma rays
Short gamma-ray burst
(<2 seconds' duration)
Stars* in a compact binary system begin to spiral inward....
...eventually colliding.
The resulting torus has at its center a powerful black hole.
*Possibly neutron stars.

GRB…POPULATIONS

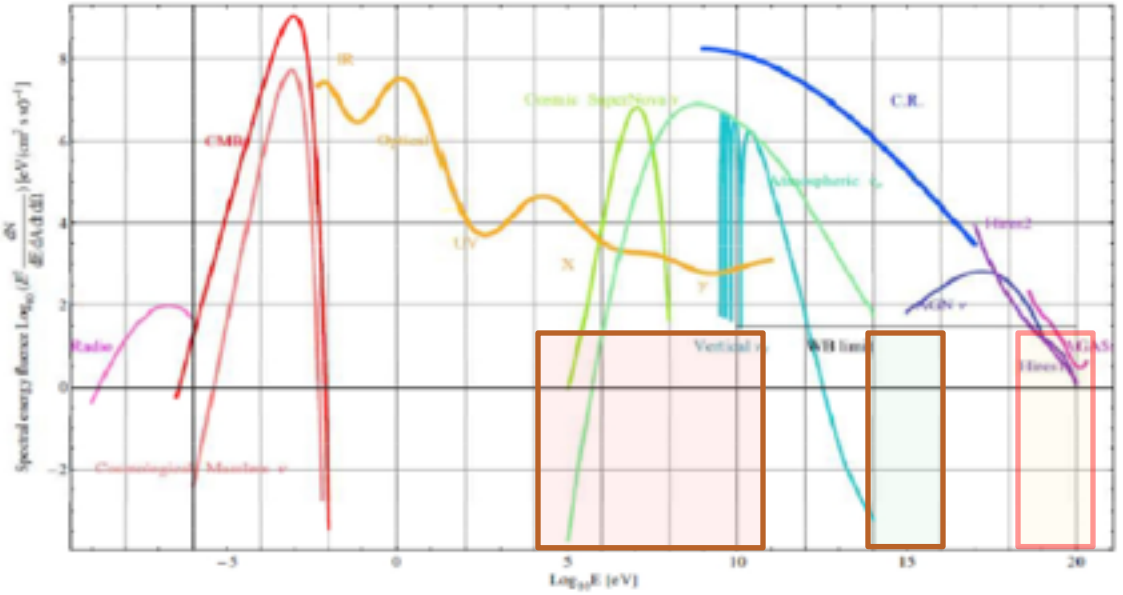


What is a GRB?

GRBs are flashes of X and gamma Rays
detected from random places in the Universe.

In few second, GRBs emit as much energy as
Our Sun will release in its entire 10 billions
Years lifetime

GRBs wide Power range $10^{45} ergs^{-1} \leftrightarrow 10^{54} ergs^{-1}$



To produce a Gamma (MeV) GRB you need a relativistic charge hitting a photon (real or virtual);

- A thermal bath in GRB will be opacque to itself
- (Over Eddington by dozen of order of magnitude)
- The relativistic charges, electron or proton are very different in their ability in gamma making:
- A) Their cross section is almost the square of the compton wavelenght , proportional to the inverse of the square masses: a ratio of nearly 4 million in favour of the electron..

Different Racckets (cross sections) to make a gamma photon ;
The electron and the proton ones

Photon

Electron

Proton

THE LAZY (HEAVY) PROTON VERSUS THE LIGHT FAST ELECTRON

B) A Lorentz boost factor of a thousand or more is energetically needed ; it is more costly for proton than for electron (proportional with their mass ratio)

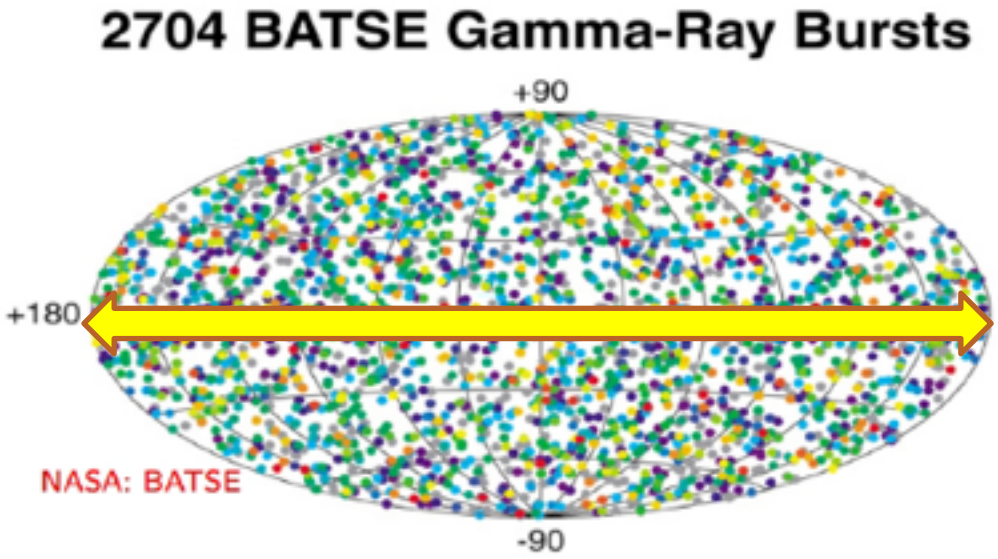
C) A total of nearly 8 billion times a more efficent gamma showering by electron! Therefore UHE Electron are the ideal gamma sources

However most model imagine first an HADRONIC JET whose secondaries are pions and later final electrons pairs and neutrinos will appear

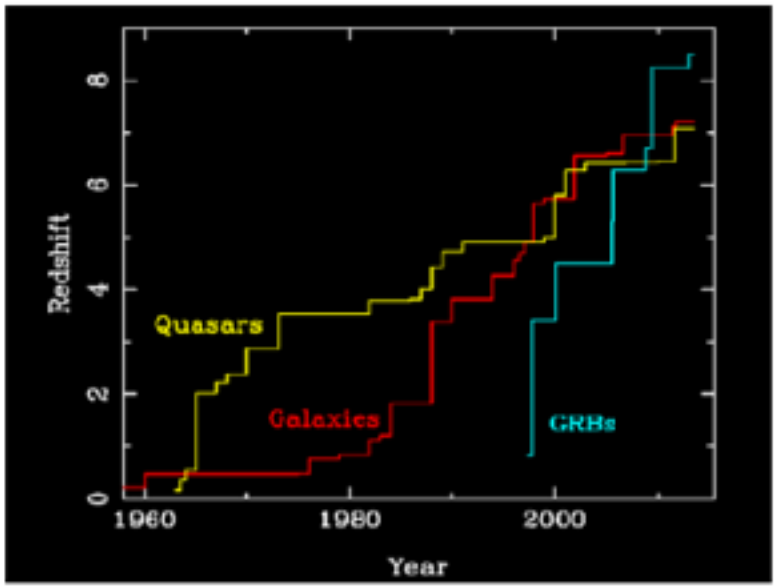
- GRB must be source of neutrino GRB whose correlation might have been already found
- This is not the case: No GRB- ICECUBE connection has been found
- NOT ICECUBE event vesus GAMMA CONNECTION
- This imply either neutrino much earlier or simply they are not born at all

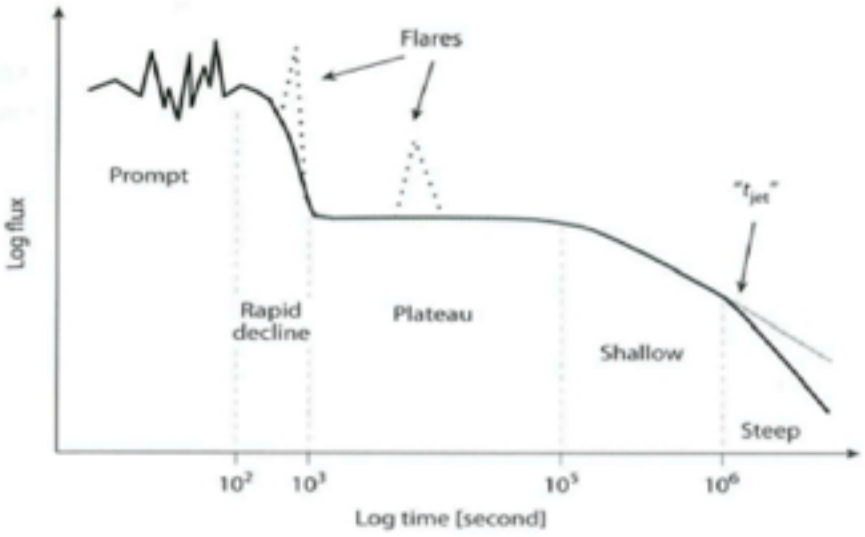
Remind on GRBS nature

Where they are in the sky?

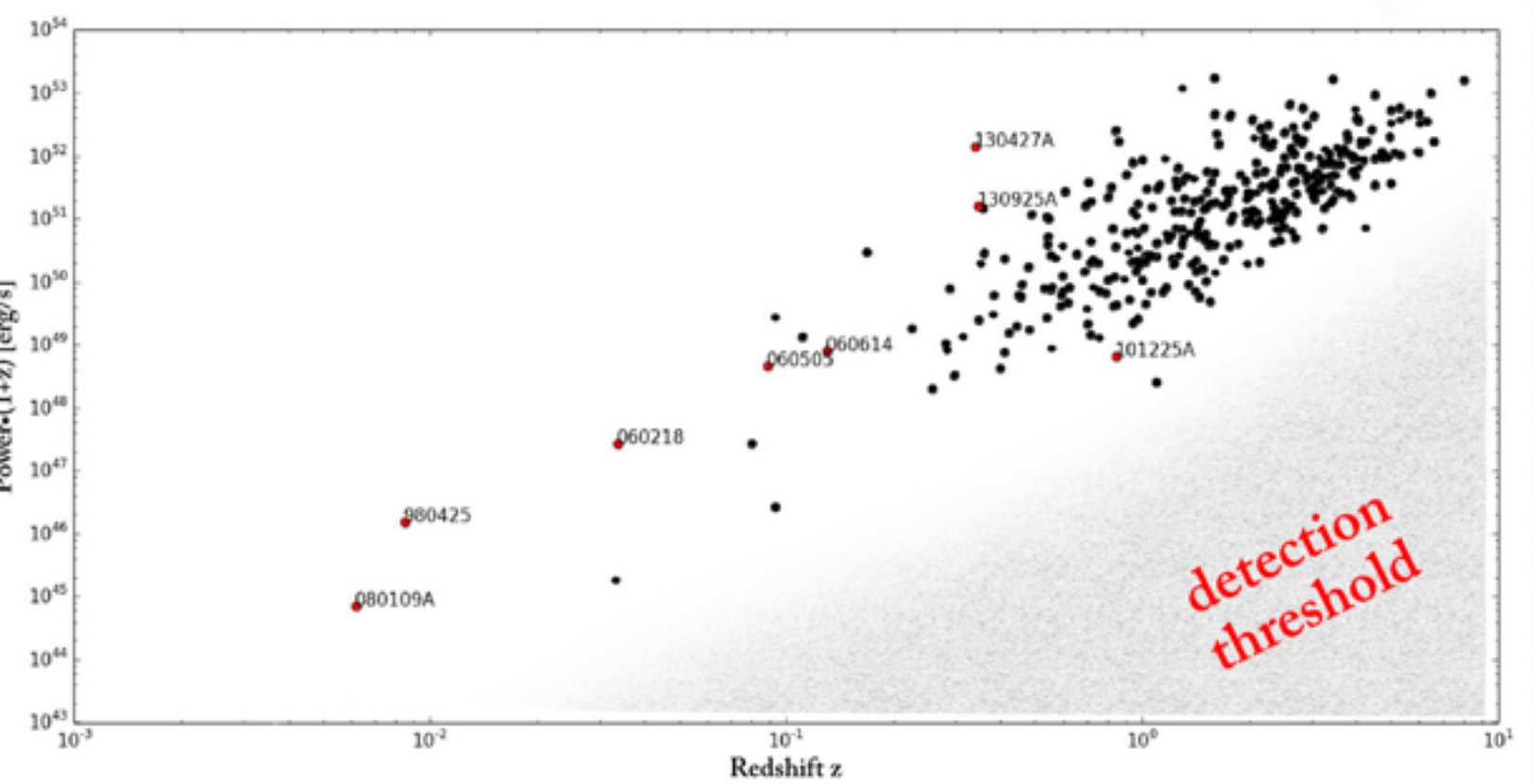


SGR





Peak GRB isotropic Luminosity with redshift: ARE WE IN THE CENTER?



omplete sample of GRBs with known redshift plotted against their relativistic invariant peak power (evaluated in a standard smic model, assuming isotropic radiation) shows many orders of magnitude increment with its redshift. The rarest soft GRBs, ones, have to be very abundant also at far redshift, but they are hidden by their weak detection threshold; the far away GRB the largest volumes and in richest sample, where the most rarely aligned γ jet might be pointing to us emerging as the

How do we explained the diagram?

- The beam jet angle is modulated by the energy:
- The angle is inverse to the electron Lorentz factor
- The harder are the sharper and their jet

is more thin and more rare to be observed

The jet solid angle should be as the the inverse of luminosity extreme ratio..

One over hundred milions sr.

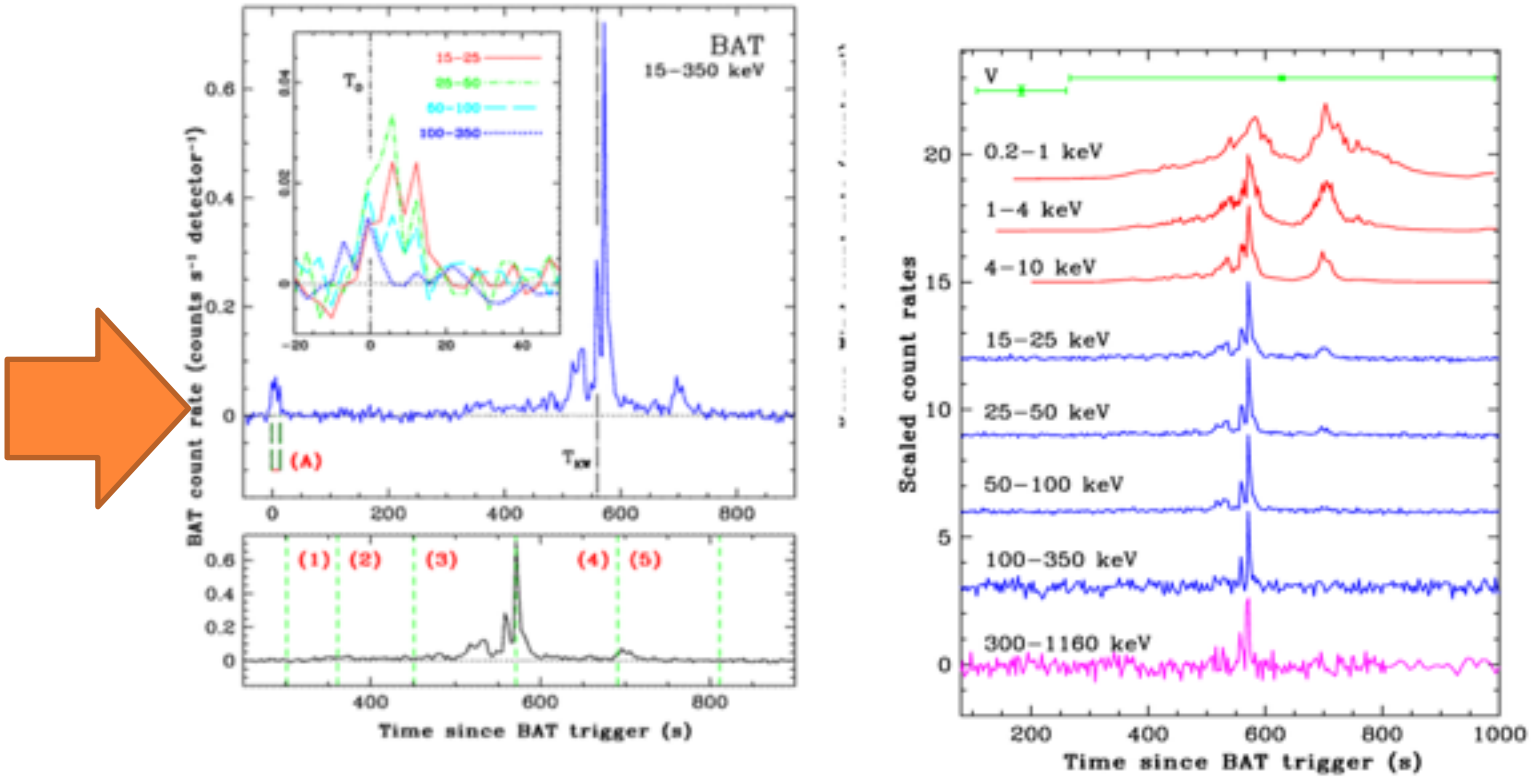
The jet should be persistent and thin

The softer are born in the same jet external cones leading to softer photons and more probable observation; the hardest GeVs are the most rare

The MeVs are abundant, The X-ray afterglow is extremely abundant and persistent! Not yet observed at cosmic distances because energy thresholds

KILLING FIREBALL: WHY 15% OF GRBS SHOW AN X RAY PRECURSOR?
PRECESSING EXPLAIN WHY..

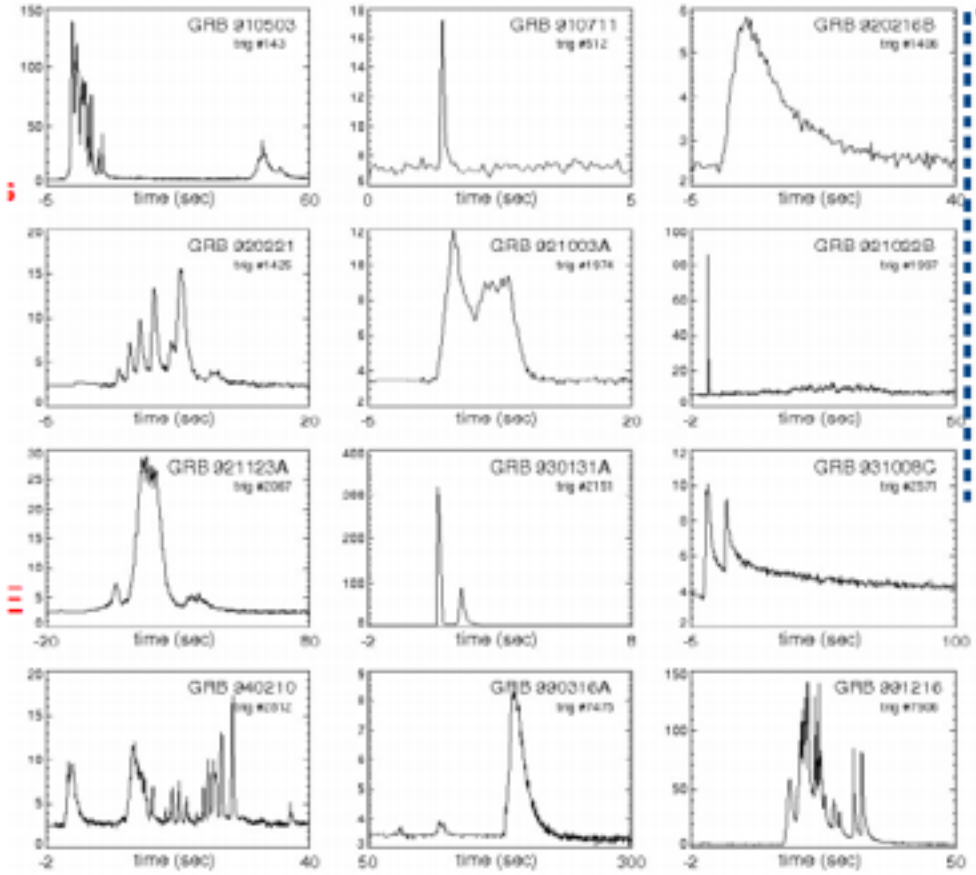
A famous teaching precursor just ten minutes GRB 060124



D.Fargion-1-
and Down and Hadron-Lepton
Jets

BRIEF SUMMARY: GRB ---> OVER BILLION TIME EDDINGTON LUMINOSITY
AN EXTREME VARIABILITY IN TIME AND OUTPUT: GEOMETRY BEAM VARIABILITY CAN!

Light curves



The shapes and time-scale can be very different.

Time-scales can vary from 1 ms to 100 s

MOREOVER during X-AFTERGLOW And along rarest GeV peaks GRB holds Up to DAYS or months!

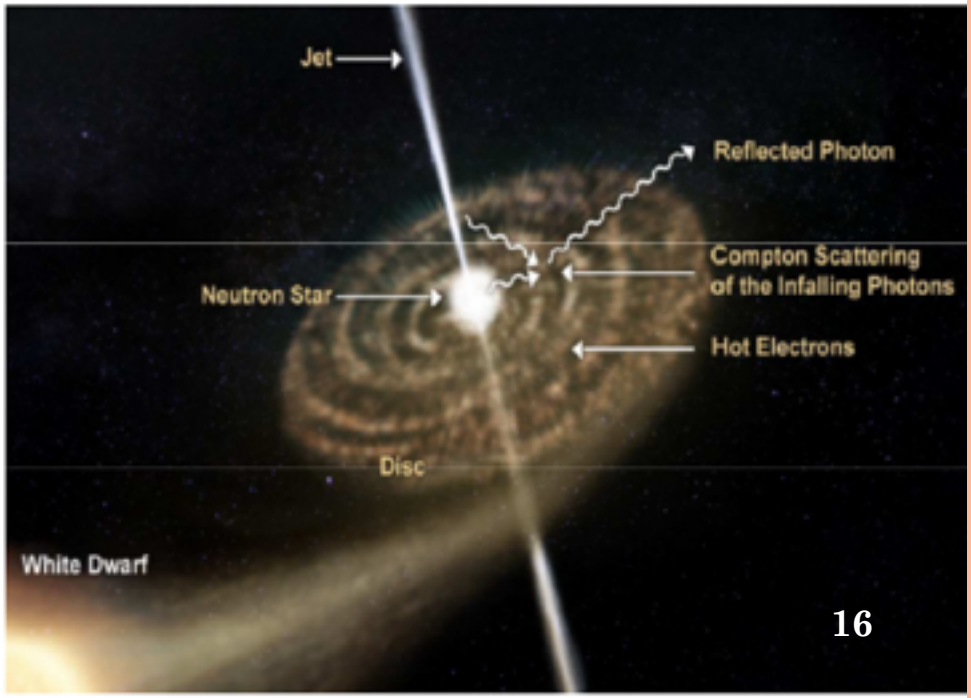
Precessing gamma jet model

We imagine the GRB and SGR nature as the early and the late stages of jets fuelled by a SN event first and then by an asymmetric accretion disk or by a companion star (white dwarf,WD, or neutron star, NS)

The GJs are born by Inverse Compton Scattering of thermal photons (optical, infrared...) onto (power law) electron jets (from GeV energies and above) produced by pulsar or black holes.

A nutation due to the asymmetric inertial momentum may lead to aperiodic behaviour of GRB signals.

SGRs are GRBs seen at the periphery of the hard energy GJ beam core!!



Simplest view

Beaming Selection and SN-GRB-Jets Evolution 5

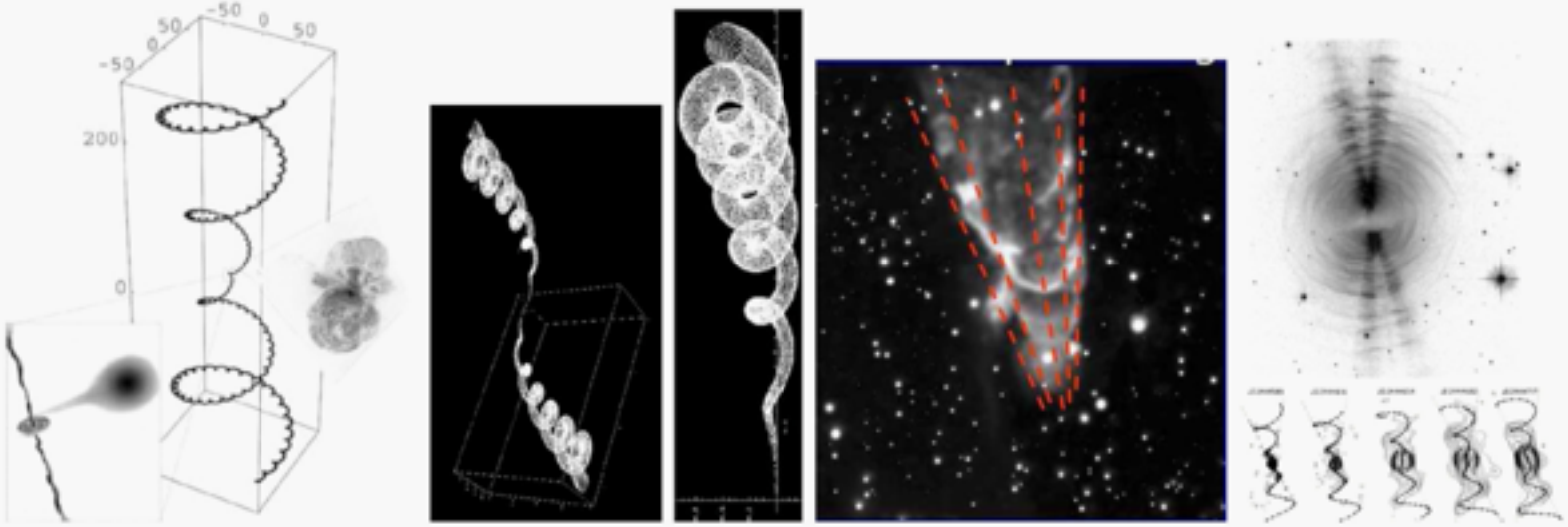
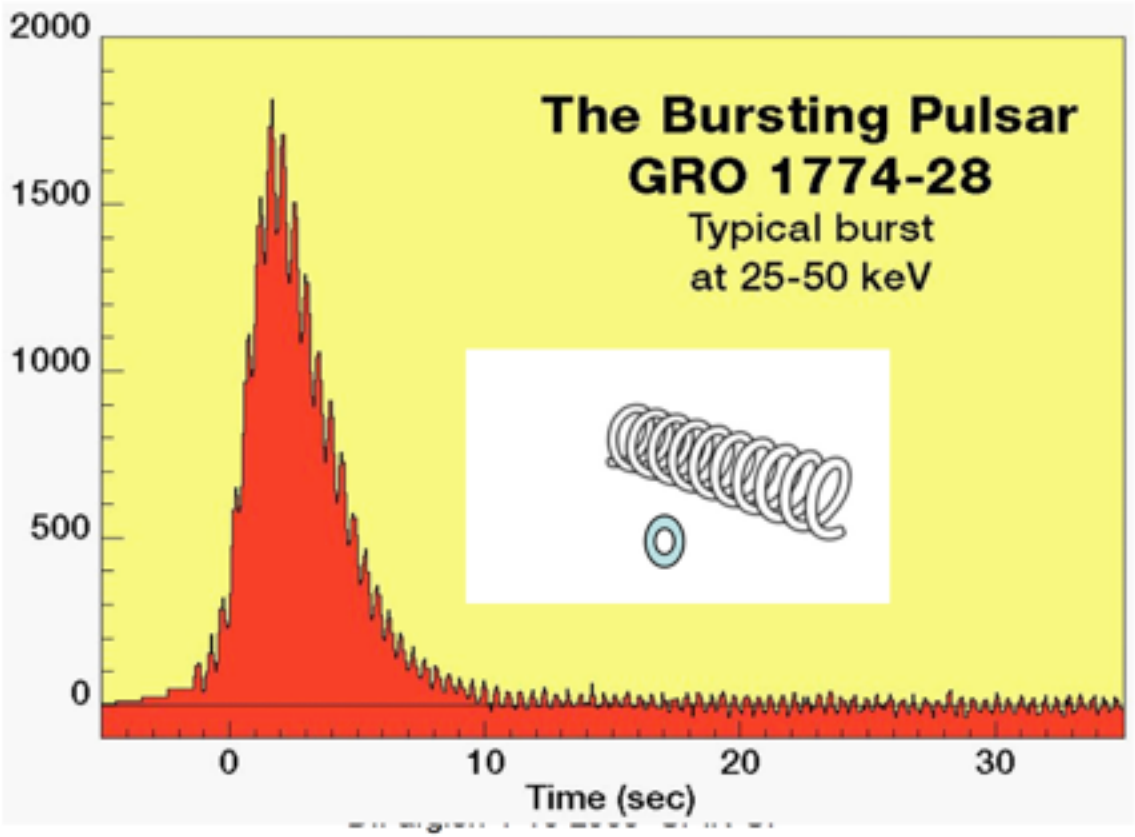


Figure 4. From the left to the right: A possible *3D* structure view of the precessing jet obtained with a precessing and spinning, gamma jet; at its center the "explosive" SN-like source for a GRB (or a steady binary system, like Eta-Carina, for a SGRs) where an accretion disc around a compact object, powers a thin collimated precessing

The Simplest case of precessing Blazing Jet in the Bursting Pulsar GRO 1774-28.

A pedagogical Link to SGRs Jets



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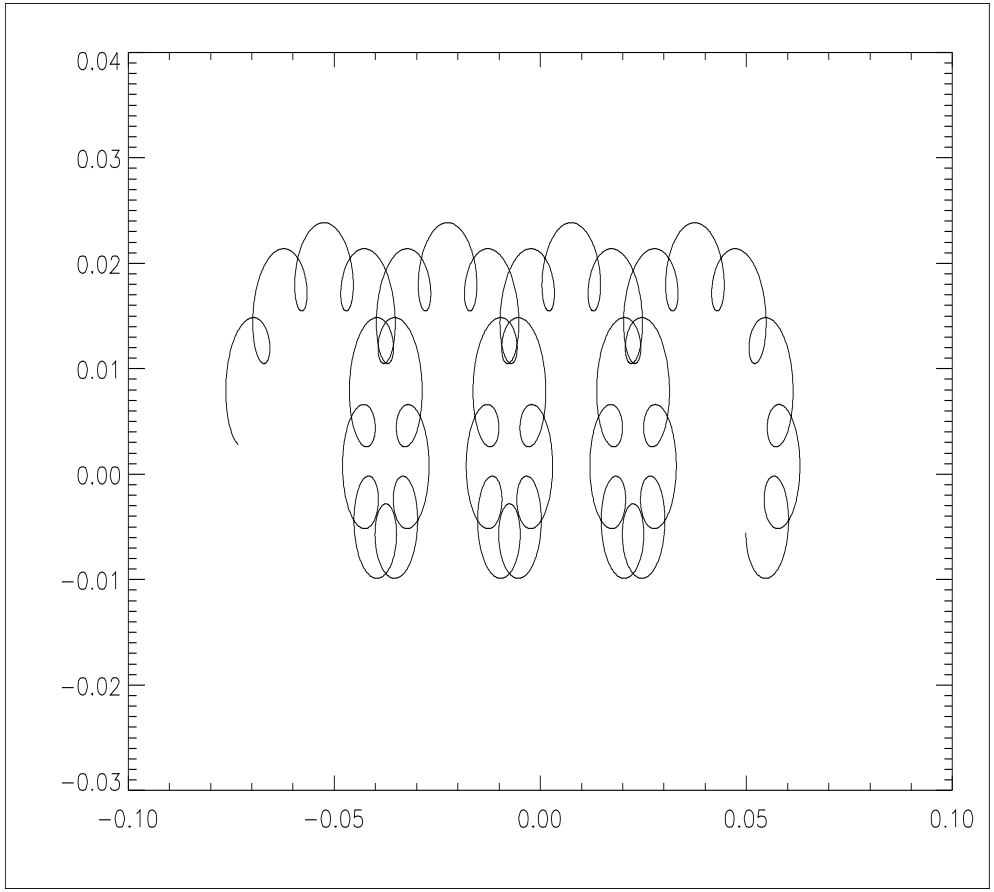
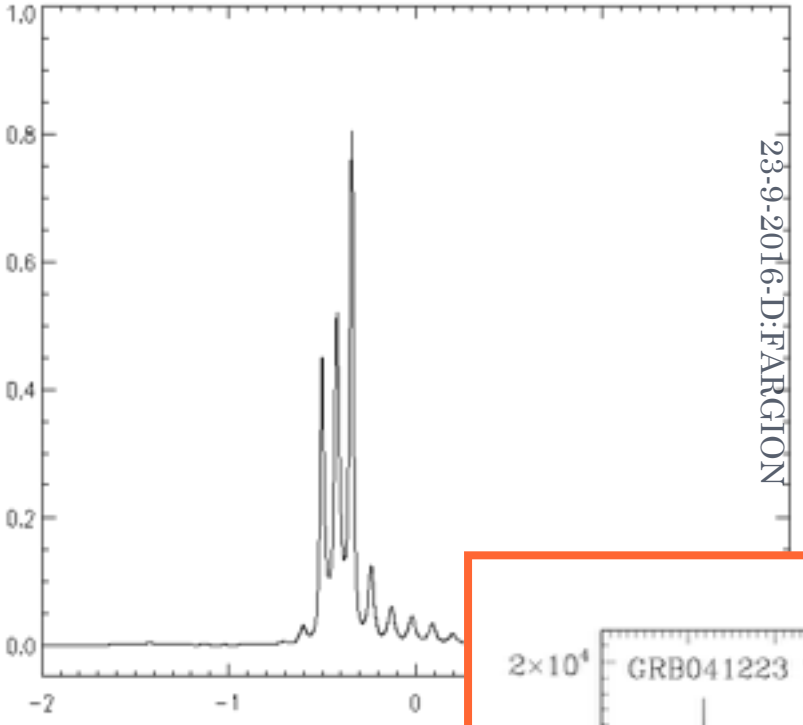
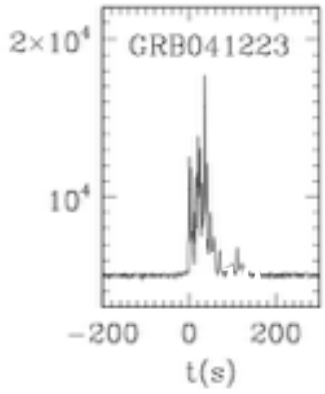
and Down and Hadron-Lepton

Jets

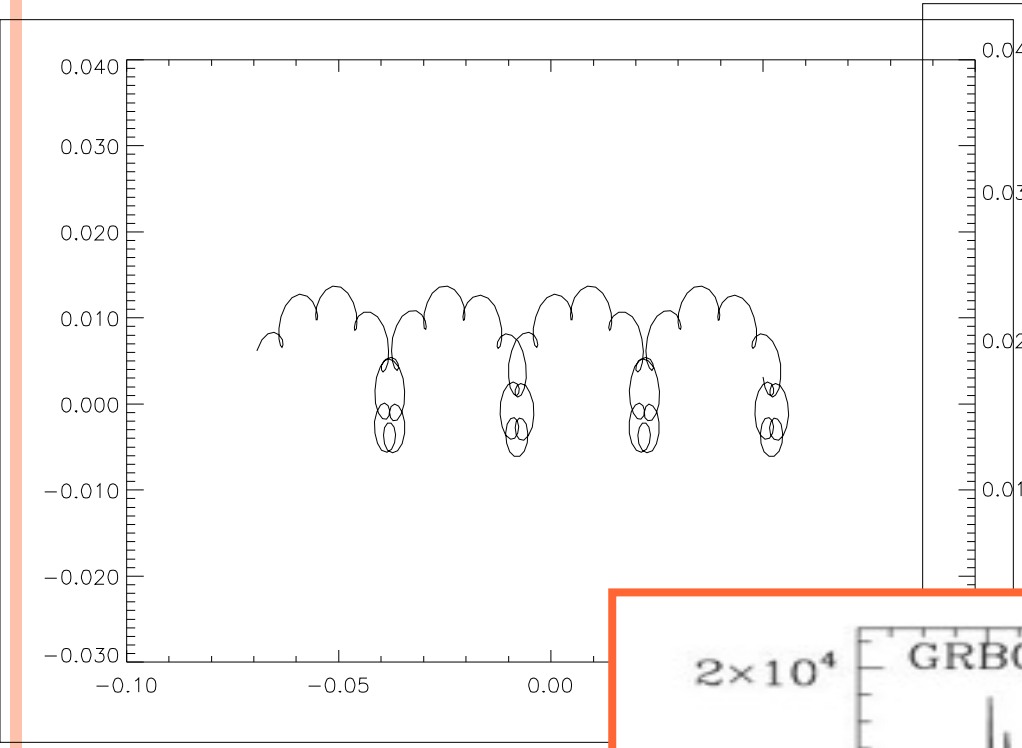
The blazing precessing Gamma jet

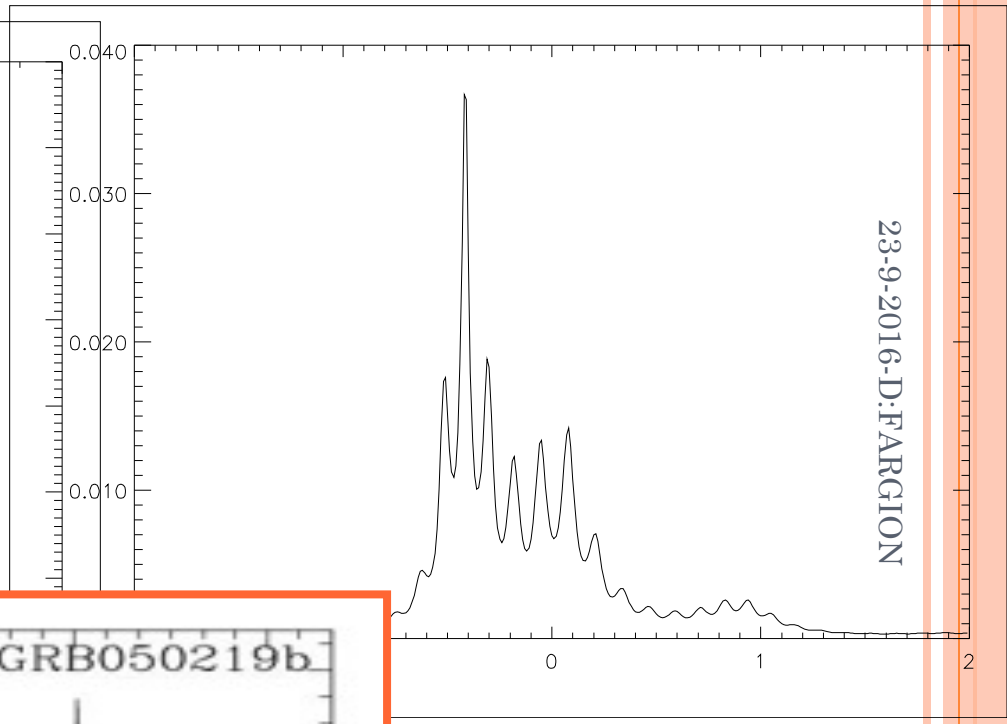


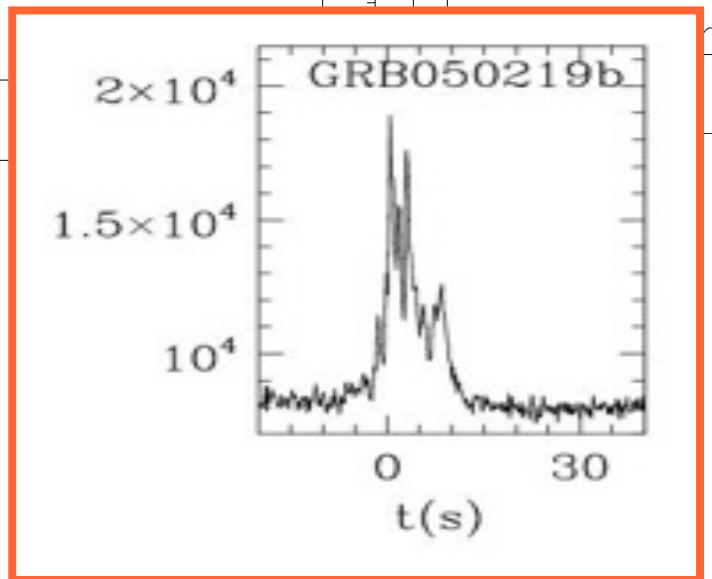




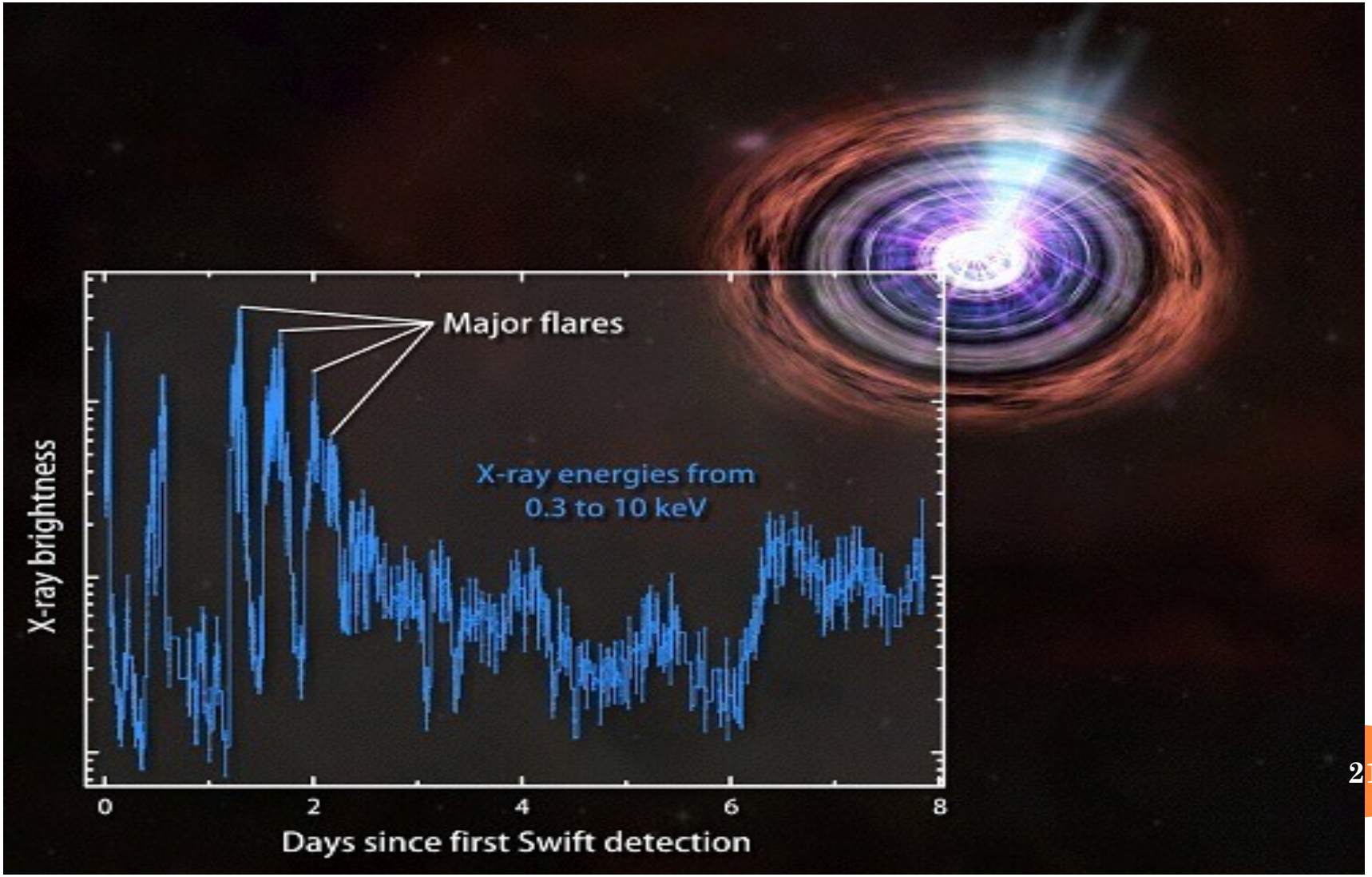
DIFFERENT GEOMETRY..DIFFERENT GAMMA SPECTRA





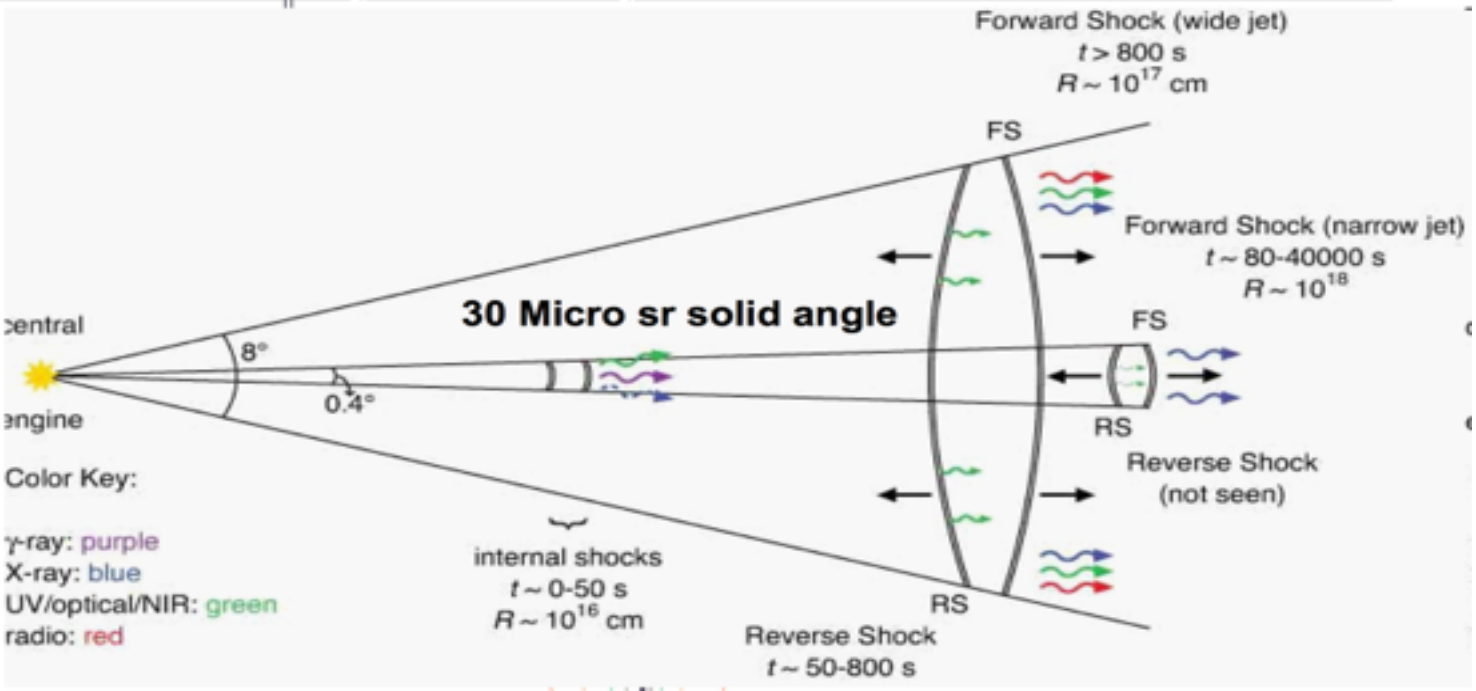


GRB 110328A


Major flares
X-ray energies from
0.3 to 10 keV
X-ray brightness
0
2
4
6
8
Days since first Swift detection

Need for thinner and thinner jet: polarization

Jet by Inverse Compton Scattering
(GeVs electron pairs over I.R.)
or better by UHE Synchrotron Radiation



D.Fargion-1-10-2009- SPIN-UP and Down and Hadron-Lepton

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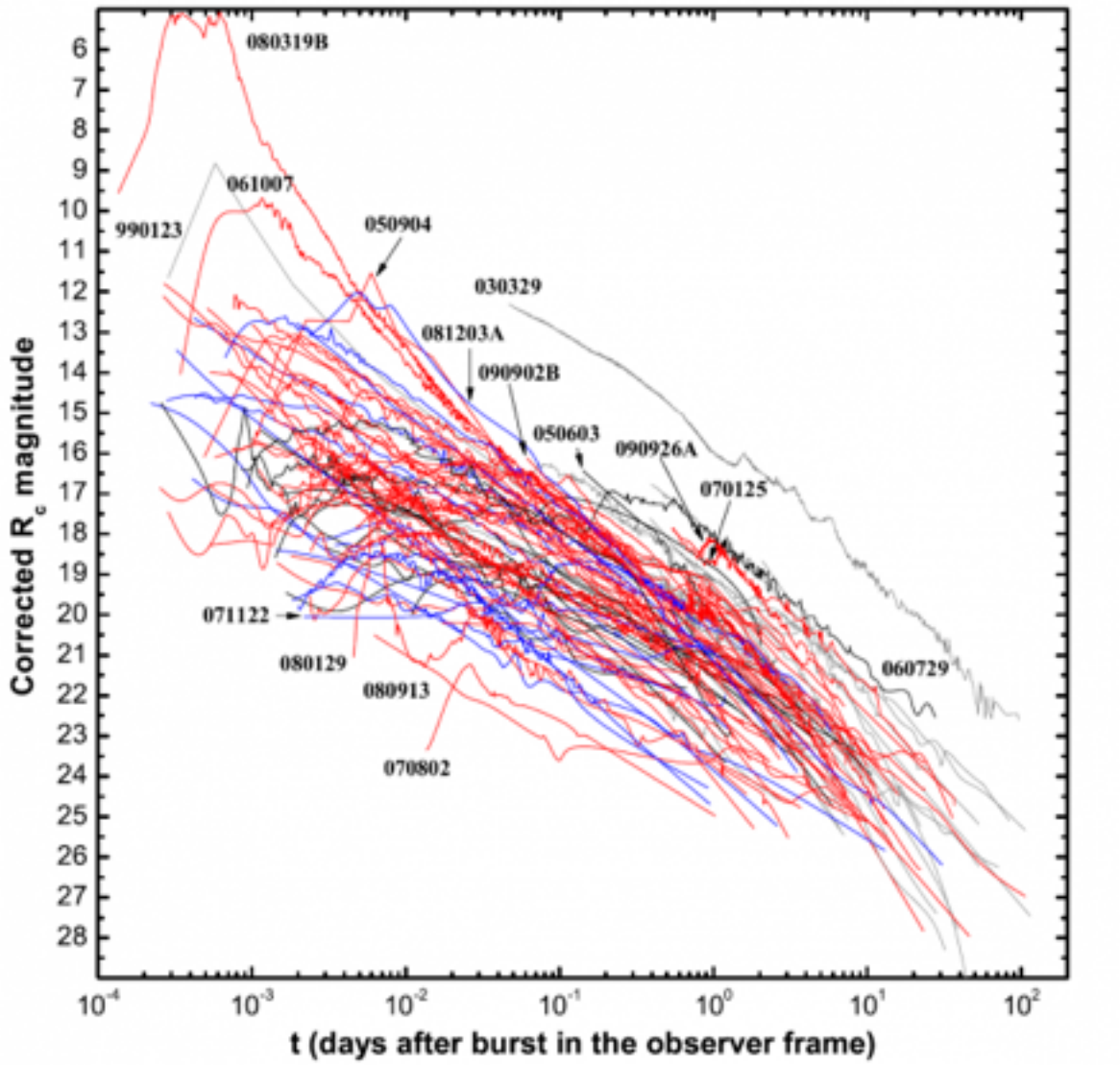
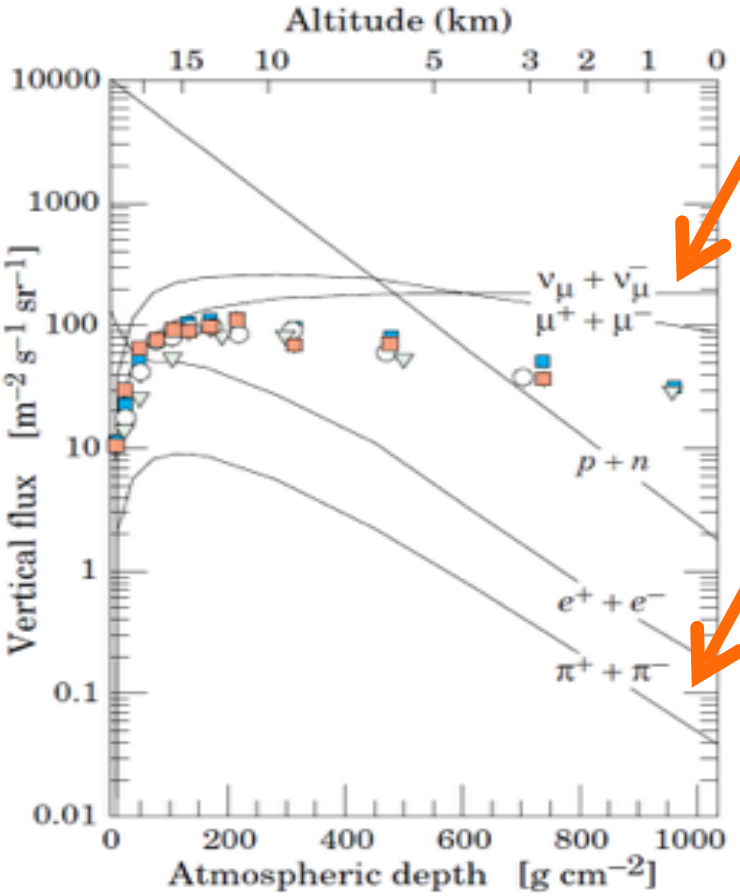
Averaged luminosity decay (power law-not exponential one) lifetime:PERSISTENT- NOT EXPLOSIVE one shoot GRB. Decay in an inverse time power, modulated by jet beaming



BUT : GAMMA ARE MUCH LESS

WHY NEUTRINO SHOULD BE MORE THAN GAMMA?



IF WE GO 1 KM depth
The UNIQUE E:M:
TRACES (later electron pairs and gamma)
Are the MUONS:
At 1 KM ..one of a million
Of original PROTON and:

ONE of a THOUSAND
Of secondary neutrino.

BELOW 12 KM
The MUONS
(FUTURE el. and gamma)
are a just a very TINY
FRACTION OF THE
TEV parent NEUTRINOS:

At 30 GeV
ONE muon (= > gamma)
every MILLION
NEUTRINO

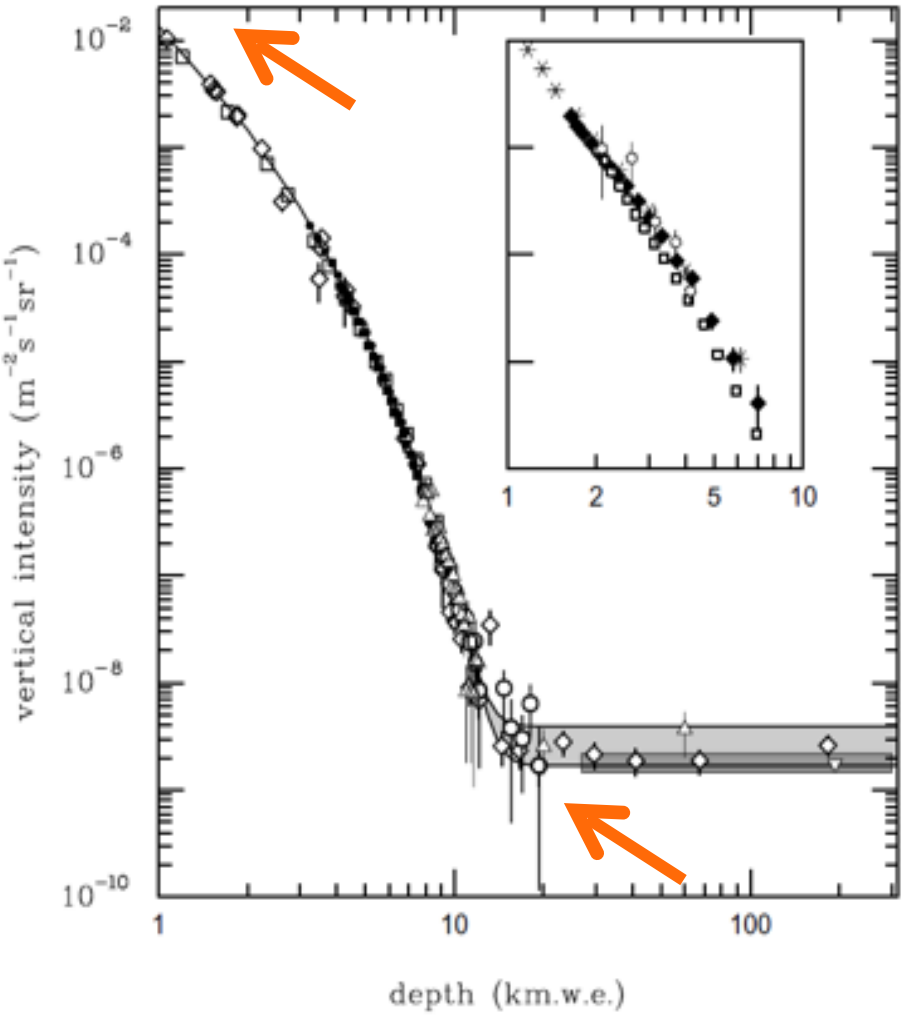
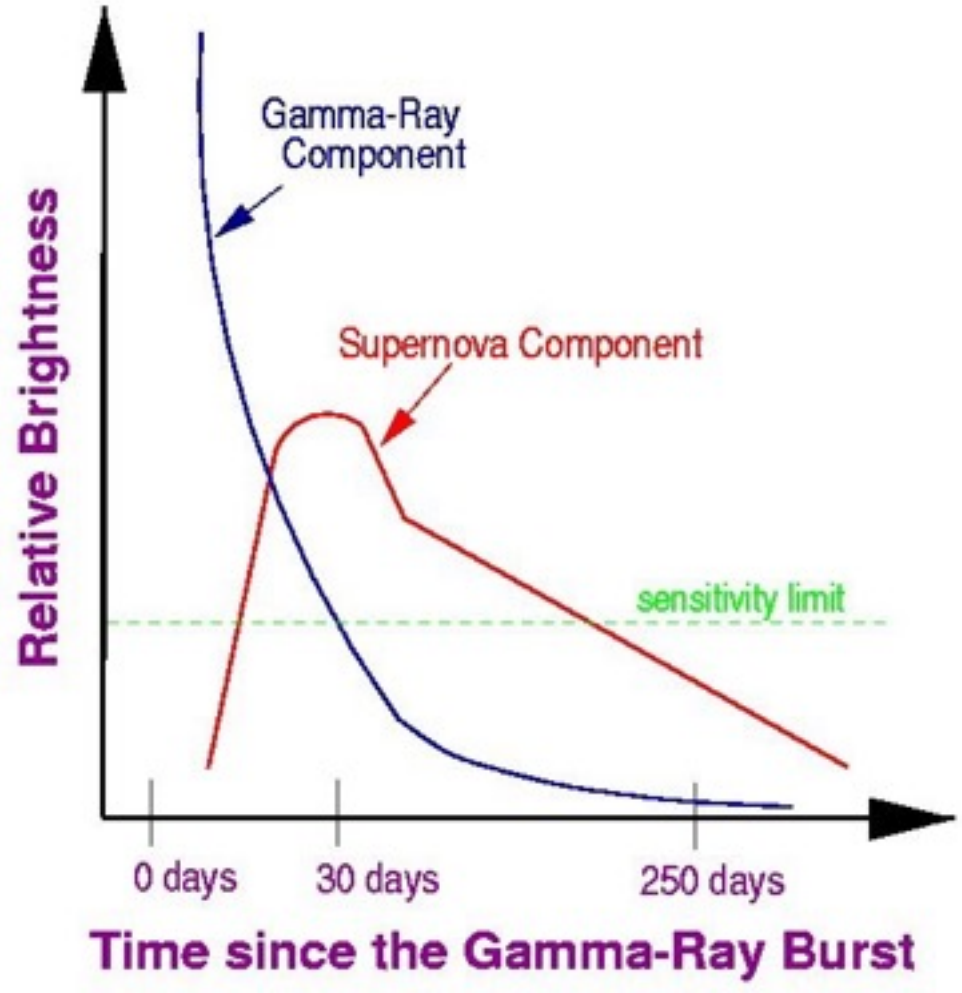


Figure 24.6: Vertical muon intensity vs depth (1 km.w.e. = 10^5 g cm^{-2}of standard rock). The experimental data are from: ◊: the compilations of Crouch [58], □: Baksan [63], ○: LVD [64], •: MACRO [65], ■: Frejus [66], and △: SNO [67]. The shaded area at large depths represents neutrino-induced muons of energy above 2 GeV. The upper line is for horizontal neutrino-induced muons, the lower one for vertically upward muons. Darker shading shows the muon flux measured by the SuperKamiokande experiment. The inset shows the vertical intensity curve for water and ice published in Refs. [59–62].

BUT: HADRON JET NEED A HUGE RATIO NEUTRINO OVER GAMMA FLUENCY

- THIS IS NOT OBSERVED: GRB AND probable ICECUBE FLUENCY are COMPARABLE!!

MOREOVER A DIFFERENT HUGE PUZZLE:
THERE ARE FEW **SN-GRB EVENTS NEARLY SAME PLACE AND TIME**
HOW DID IT OCCUR?



WE NEED A NEW ELECTRONIC JET MODEL WITH RARE EXPLOSIONS

- IT MUST BE COLLIMATED (JET OVERCOME EDDINGTON BOUND)

- IT MUST BE SUDDEN and POWERFULL
- (NO NEAR WIDE DIFFUSED STAR HALO)

- IT MUST SPIN AND PRECESS… interacting

- BECAUSE OF ELECTRONS WILL BE NO NEUTRINO

IT MUST SOLVE THE PUZZLE OF GRB SUPERNOVA EVENTS

- **arXiv:1605.00177**
- **Solving the missing GRB neutrino and GRB-SN puzzles**
- Daniele Fargion, Pietro Oliva
- Every GRB model where the progenitor is assumed to be a highly **relativistic hadronic jet** whose pions, muons and electron pair secondaries are feeding the gamma jets engine, necessarily (except for very fine-tuned cases) leads to a high average neutrino over photon radiant exposure (radiance), a ratio well above unity, though the present observed average IceCube neutrino radiance is at most comparable to the gamma in the GRB one.
- **Therefore no hadronic GRB, fireball or hadronic thin precessing jet, escaping exploding star in tunneled or penetrarting beam, can fit the actual observations.**
- **A new model is shown here, based on a purely electronic progenitor jet, fed by neutrons (and relics) stripped from a neutron star (NS) by tidal forces of a black hole or NS companion, showering into a gamma jet.**
- Such thin precessing spinning jets explain unsolved puzzles such as the existence of the X-ray precursor in many GRBs. The present pure electron jet model, disentangling gamma and (absent) neutrinos, explains naturally why there is no gamma GRB correlates with any simultaneous TeV IceCube astrophysical neutrinos.
- **Rare unstable NS companion stages while feeding the jet may lead to an explosion simulating a SN event. Recent IceCube-160731A highest energy muon neutrino event with absent X-gamma traces confirms the present model expectations.**

ELECTRON JET NEED A VACUUM LIKE SPACE FOR THE ELECTRON BEAM JET TO BE BUILT AND REMAIN COLLIMATED: NS+ BH SYSTEMS

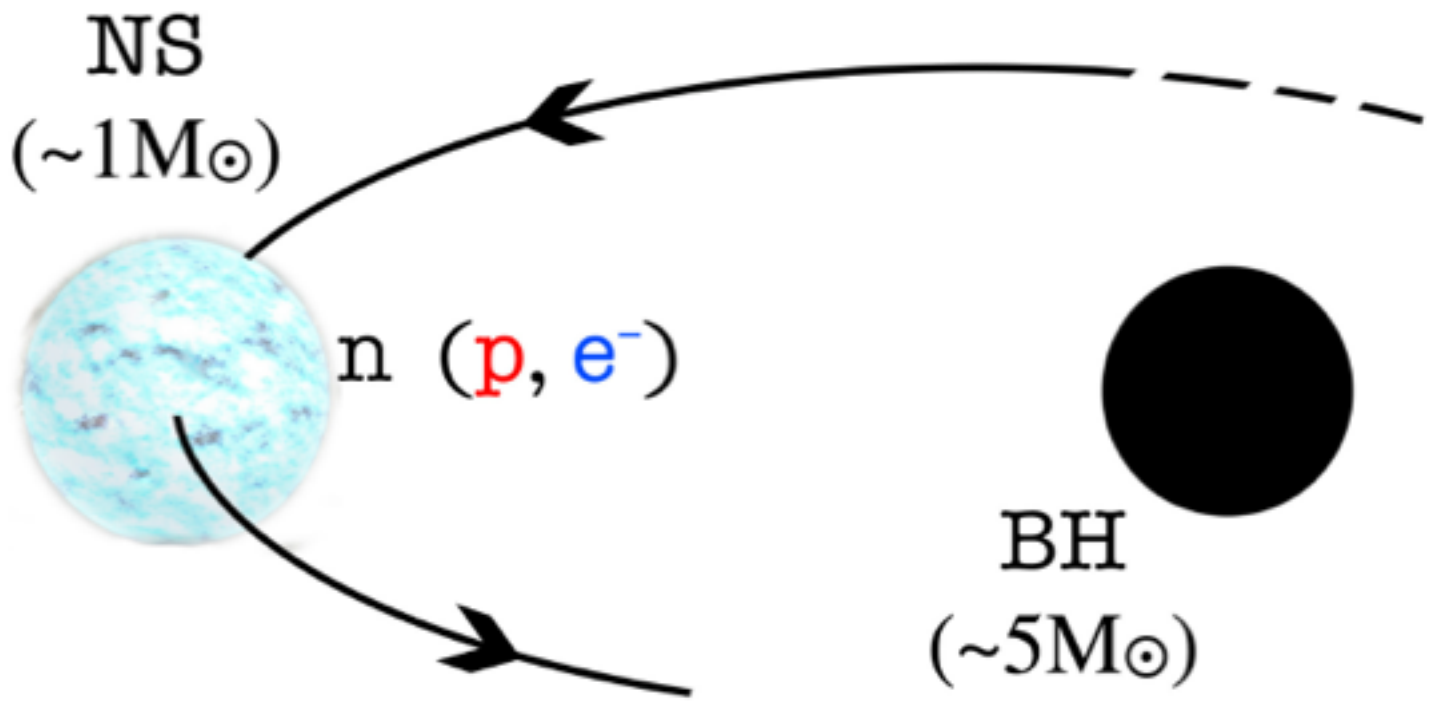
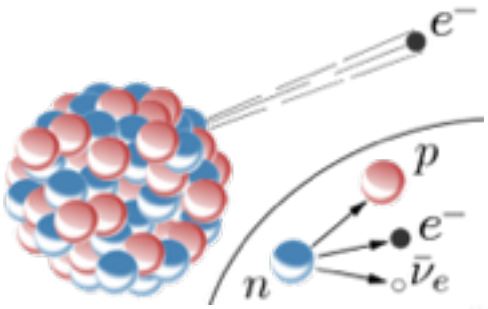
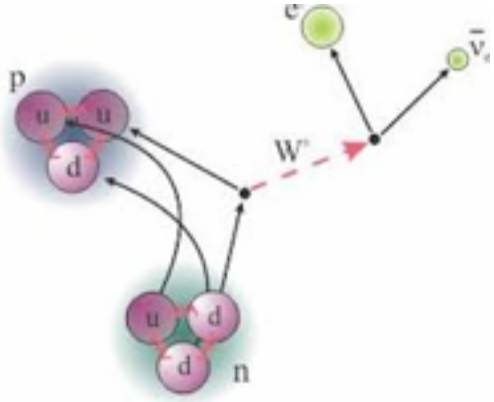
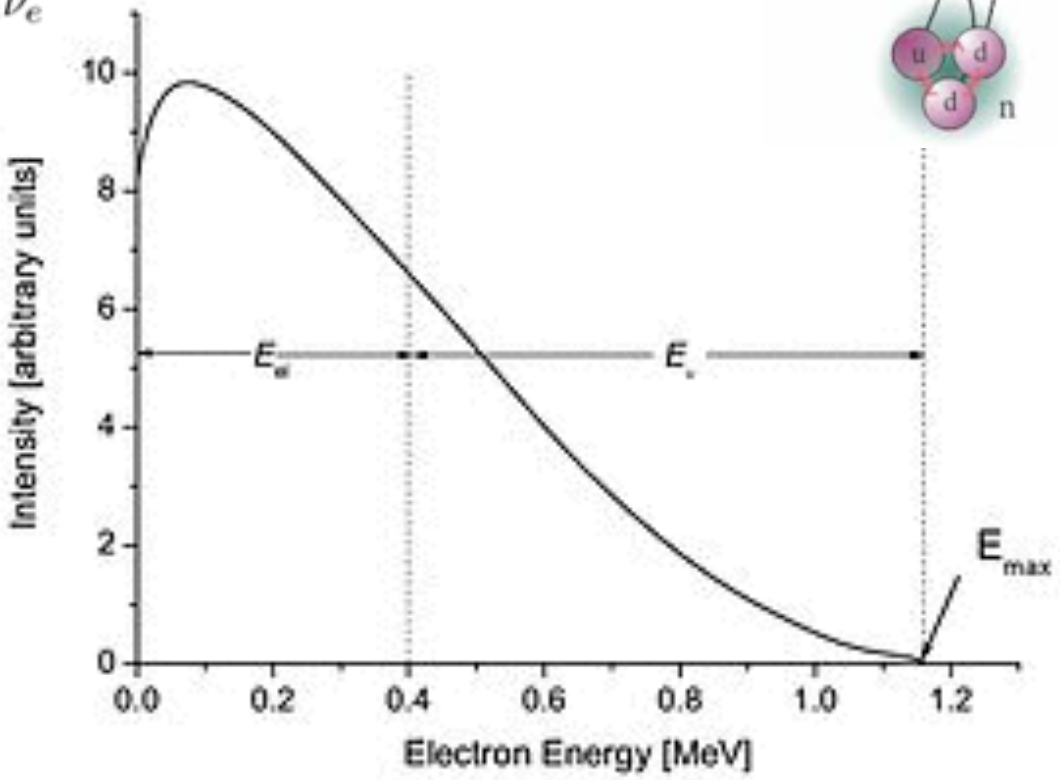


Fig. 2 *top*: Neutron star (NS) orbiting in an elliptical eccentric trajectory, skimming a black hole (BH) companion object;

Beta Decay in a three view:
The proton is at rest, neutrino is isotropic, relativistic electron almost, too..







Tidal strip tease of neutrons and their decay in flight: Low energy neutrino unobservable (if not galactic)

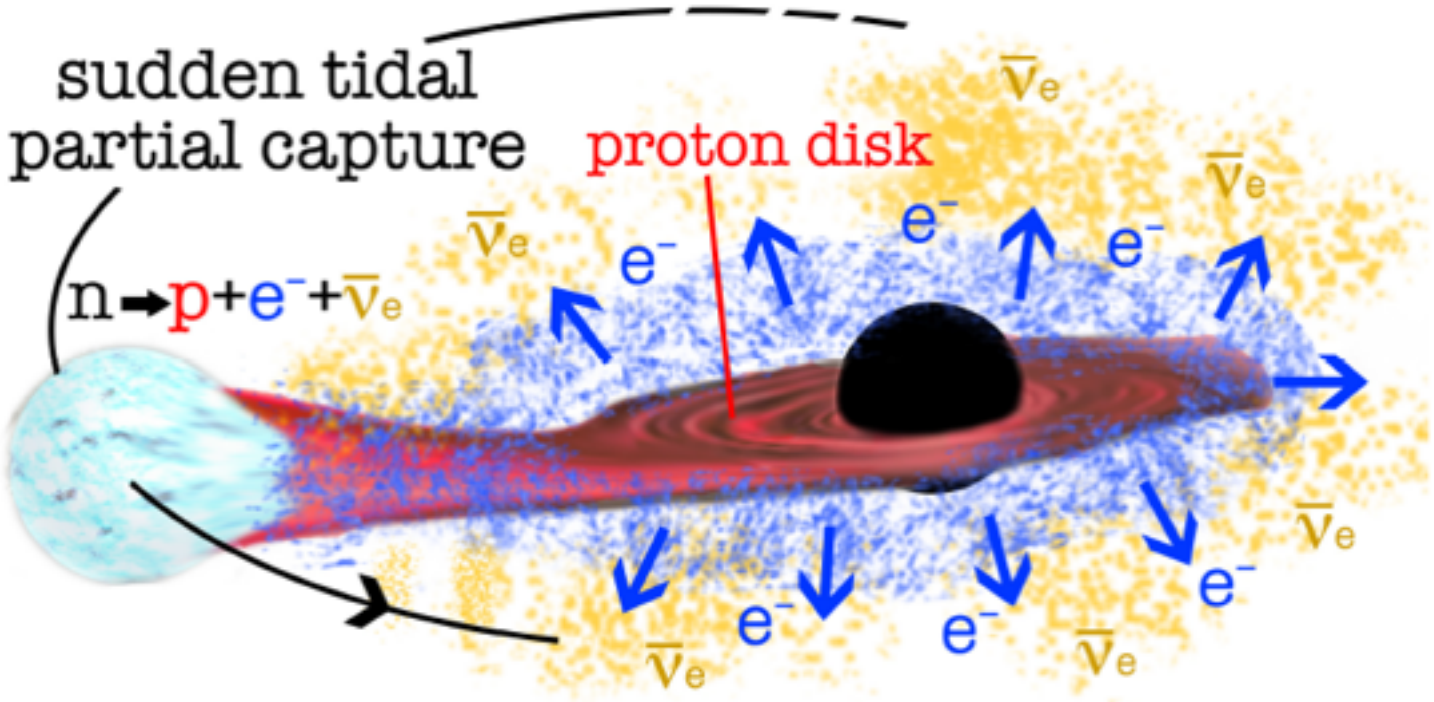


Fig. 2 *top*: Neutron star (NS) orbiting in an elliptical eccentric trajectory, skimming a black hole (BH) companion object; *bottom*: NS suffering a tidal force able to strip neutron dense matter along an accretion disk. The neutron in free fall start to decay leading to a nearly (unmoved) proton tails, a free spherical evaporating ~ MeV beta decay $\bar{\nu}_e$ and an almost similar cloud of ~ MeV electrons.

Building a net charged (proton) accreating disk-ring

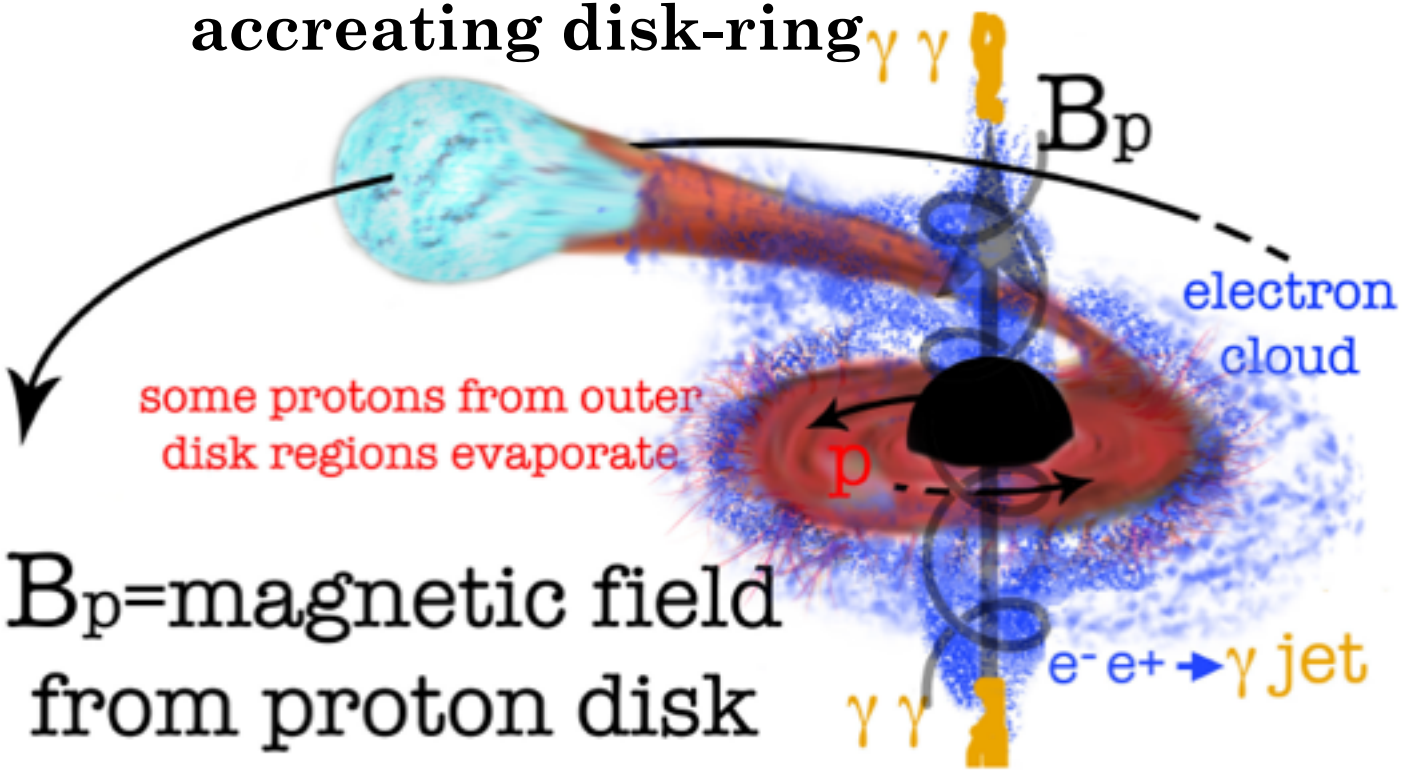
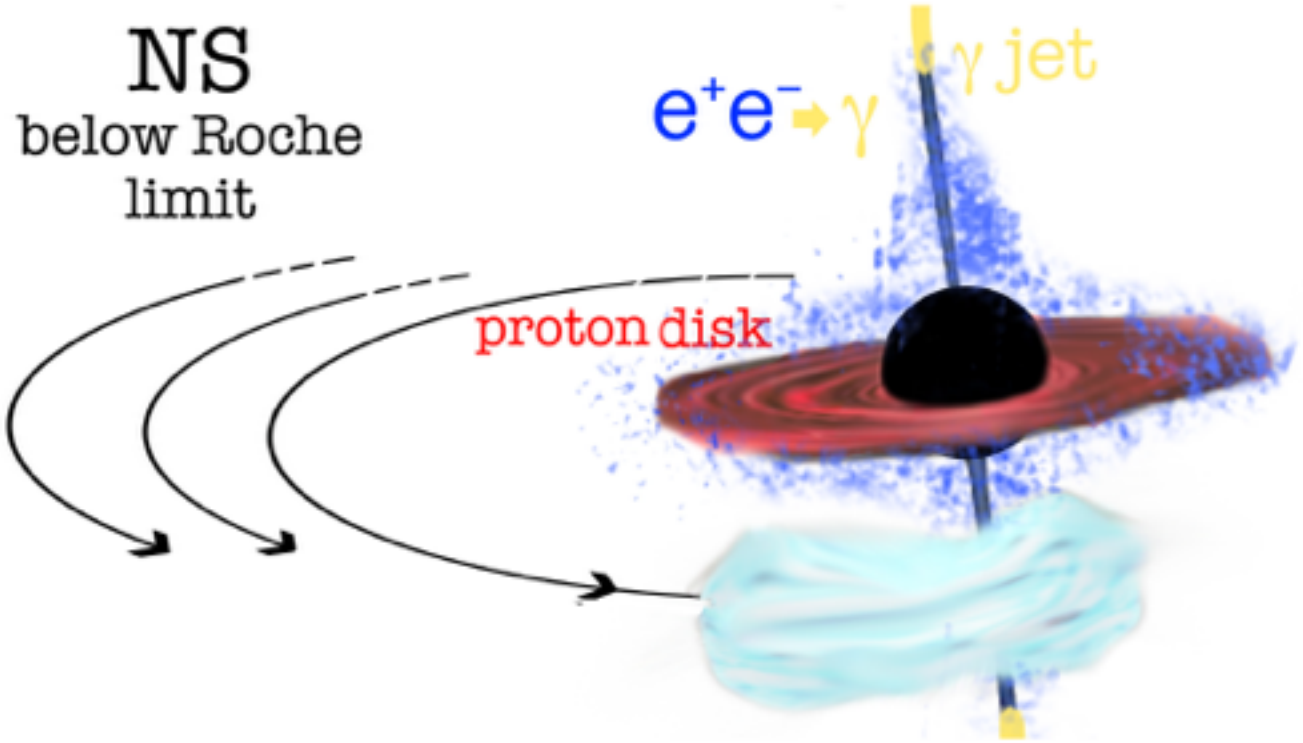
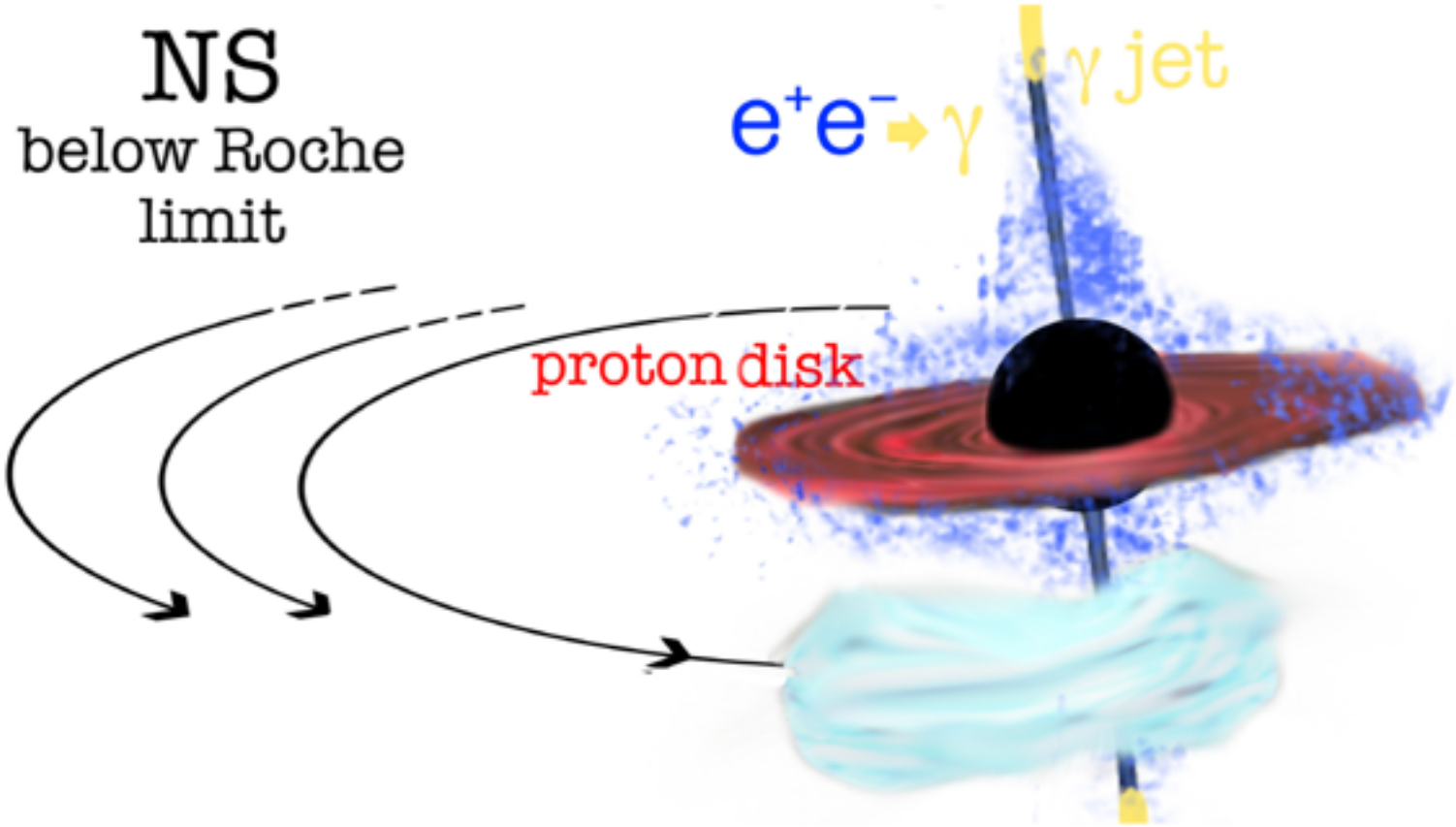


Fig. 3 Protons follow their ring trajectory while in β-decay forming a net charged current and a huge aligned magnetic field $\mathbf{B}_p$. The evaporating electrons are easily captured and aligned along $\mathbf{B}_p$; their crowding at the North and the South Poles create a huge electrostatic gradient that makes a powerful linear active accelerator: an electronic jet arises and ejects electrons and/or electron pairs by bremsstrahlung as well as photons (by inverse Compton scattering

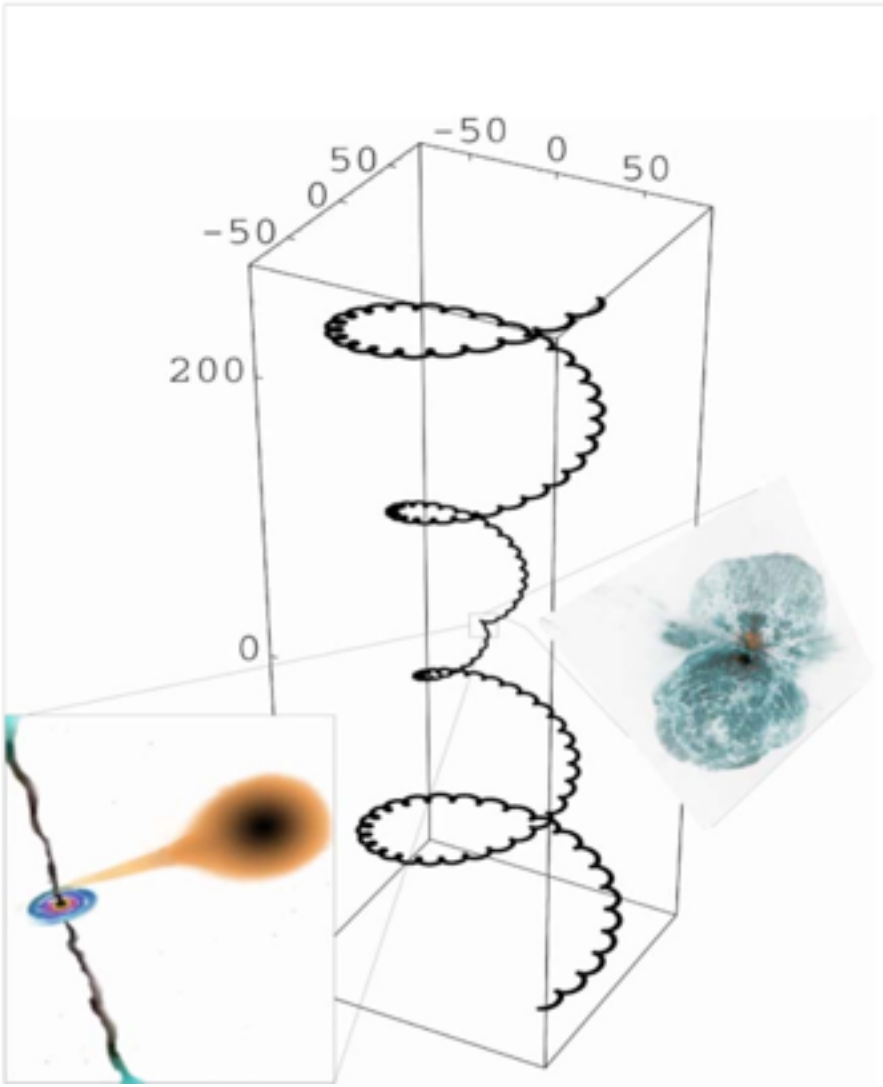
THE TIDAL EVOLUTIONS TAILS STRIP TEASE



The shrinkage of the electron beamed by magnetic lines and inhomogeneity: Powering UHE electron jets and pairs production leading to a gamma jet



Analogy of the precessing jet stage: FROM GRB to nearby

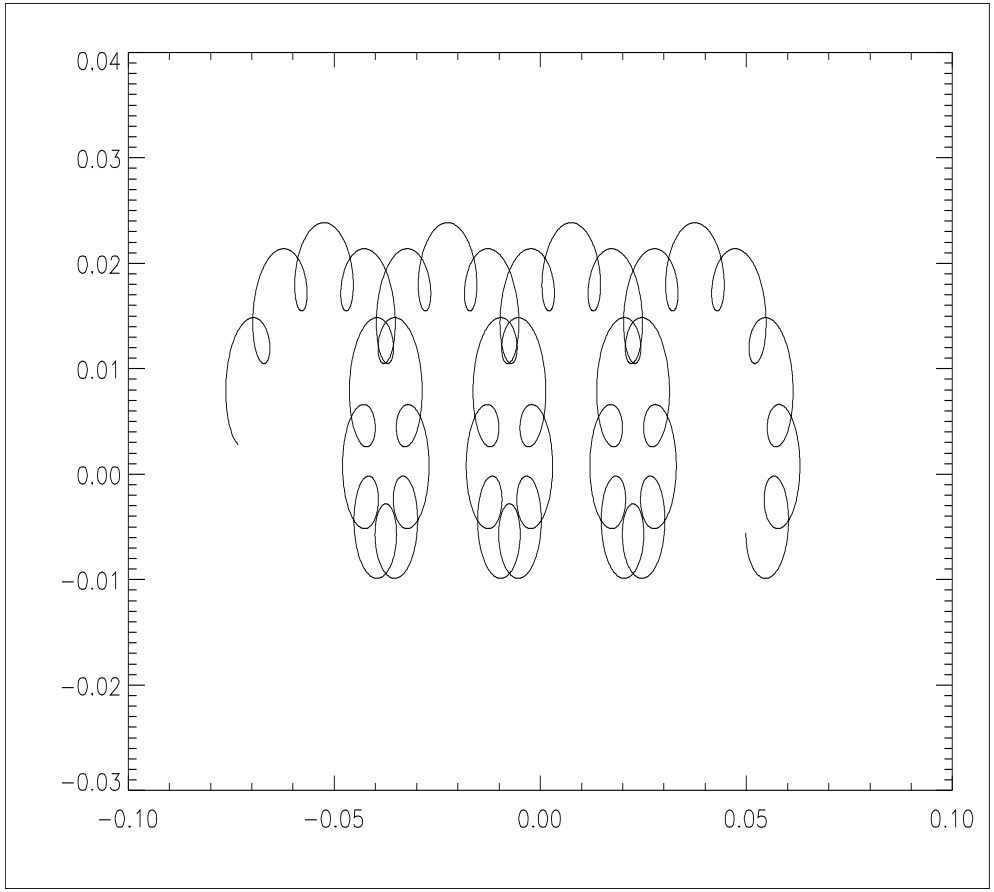


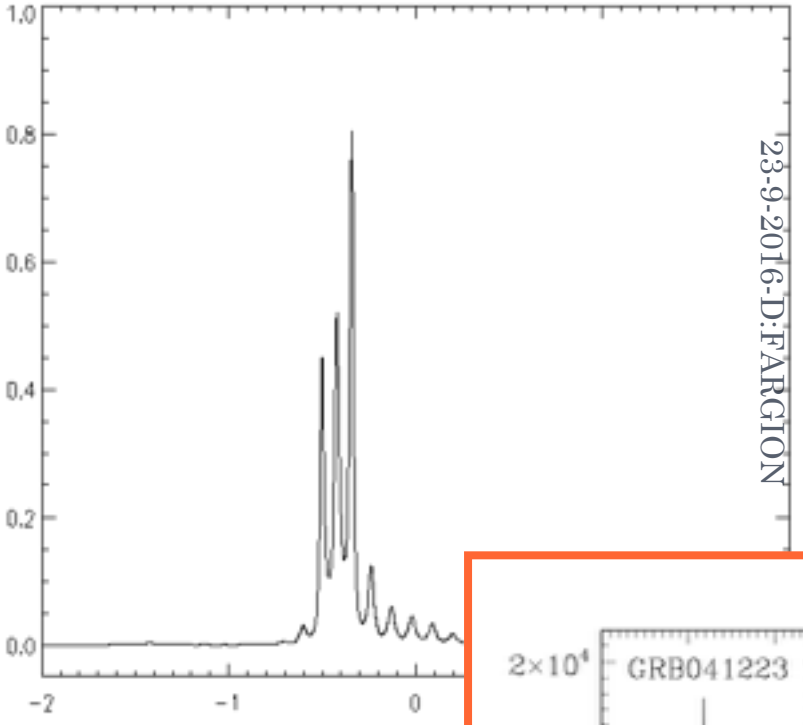
A SGRs
In binary
system

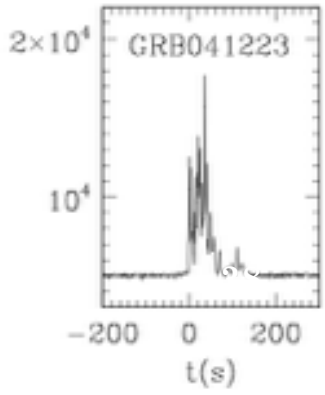
A GRBs
Explosive
Precessing Jet

3

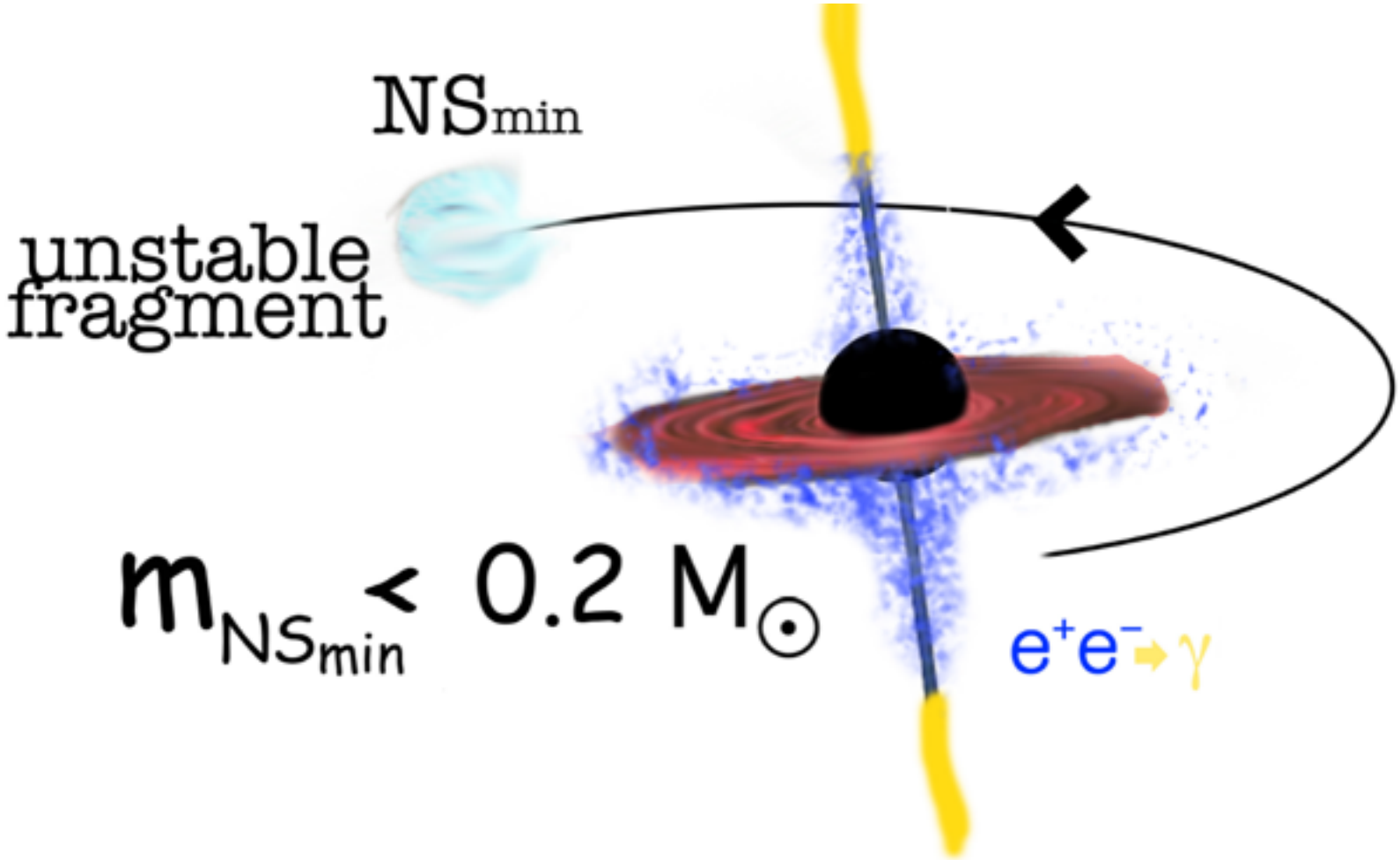
The blazing precessing Gamma jet







Making NS by striptease light and light up to unstable mass



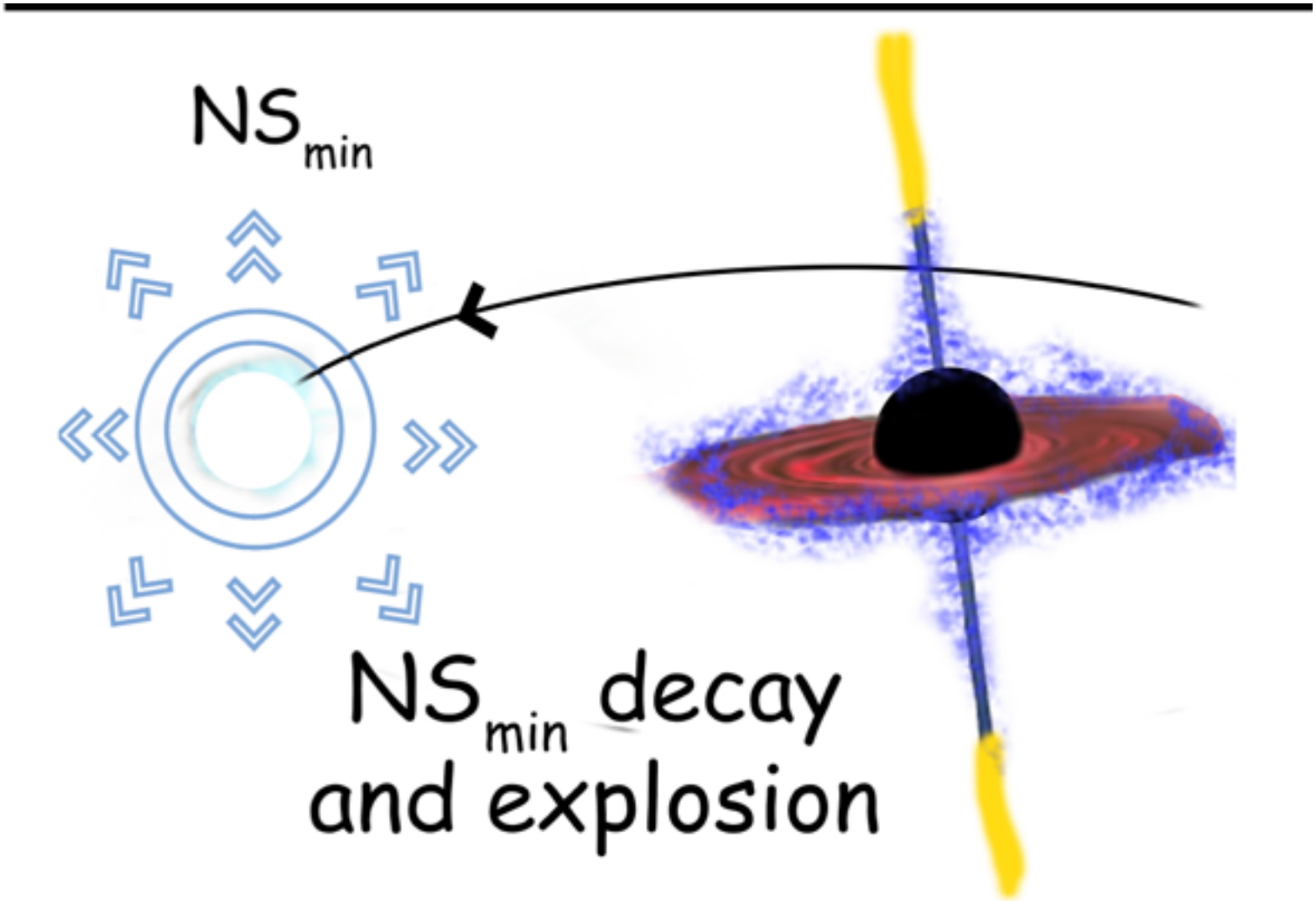


Fig. 5 Unstable NS suddenly evaporate its surface by free neutron

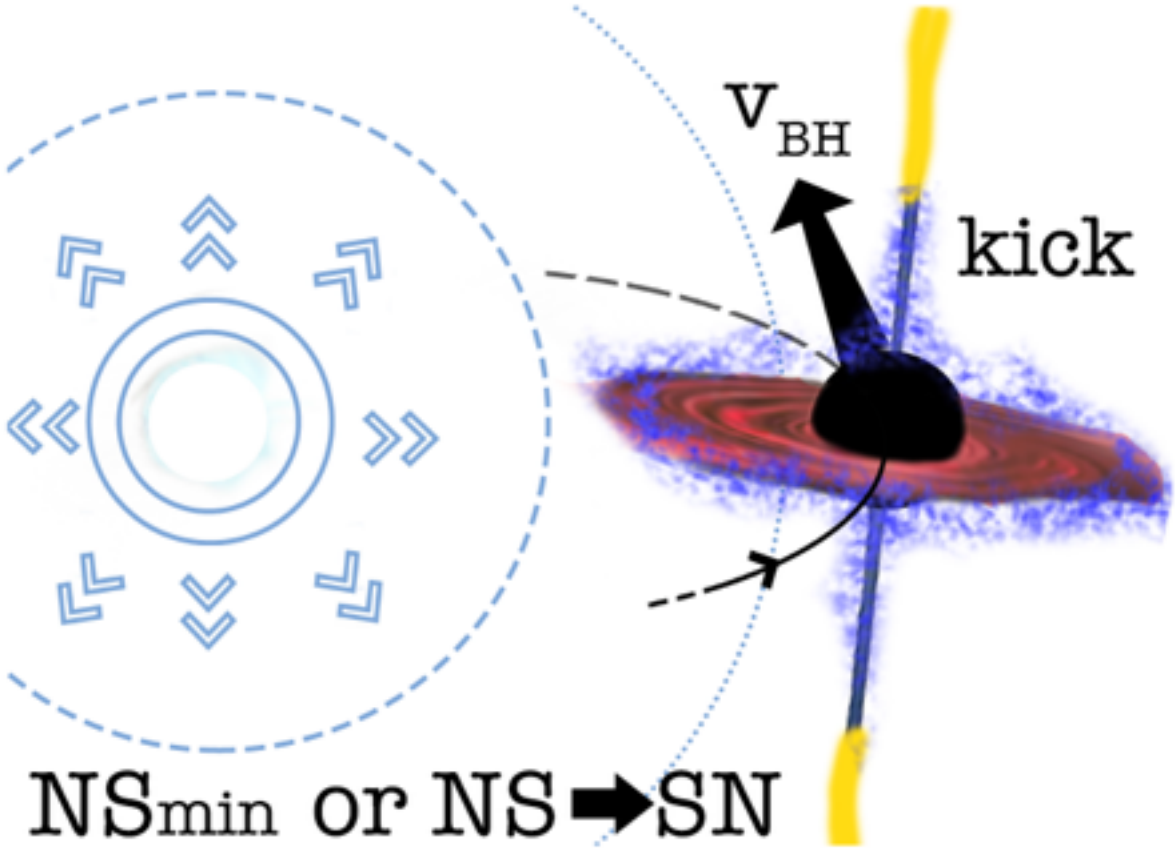
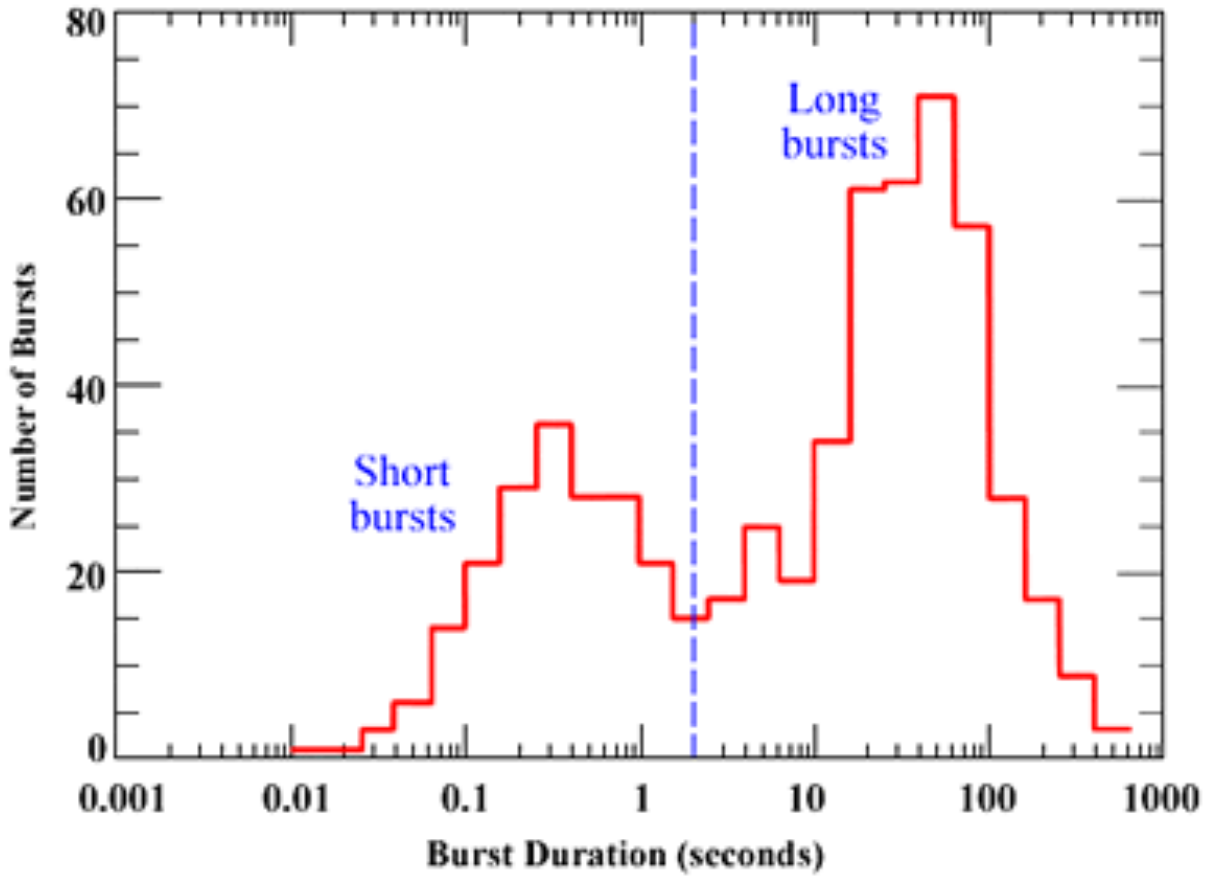


Fig. 6 Unstable NS explodes in a spherical SN-like event, observable days or weeks after first GRB blaze. Shells of energy of the supernova embrace the same BH jet. The asymmetric binary BH is suddenly without a companion and it is launched tangentially with

GRB…POPULATIONS:
SHORT NS-NS;



Conclusions

- ***Absence of much astrophysical neutrino***
- ***Absence of correlation GRB-Neutrino***
- ***Absence of any gamma tail in UHE Neutrino-X-Gamma***
- ***It Disfavours (or rejects) hadronic Jet as***
- ***(FIREBALL or thin precessing muon-electron jet)***
- ***The SN in GRB is a false SN :***
- ***it should not show the Co and Ni radioactive tail***
- ***The Model tell us that NS-BH arise and fade around tens up to thousand solar mass BH***
- ***Somehow it is connected to LIGO events:***
- ***The GRBs are NS-NS or NS-BH,***

- ***BUT***
  LIGO BH-BH should be almost always without gamma tail but just GWs

Molti Thanks

- For being here
- For full attention

CONCLUSION BASIC ONE

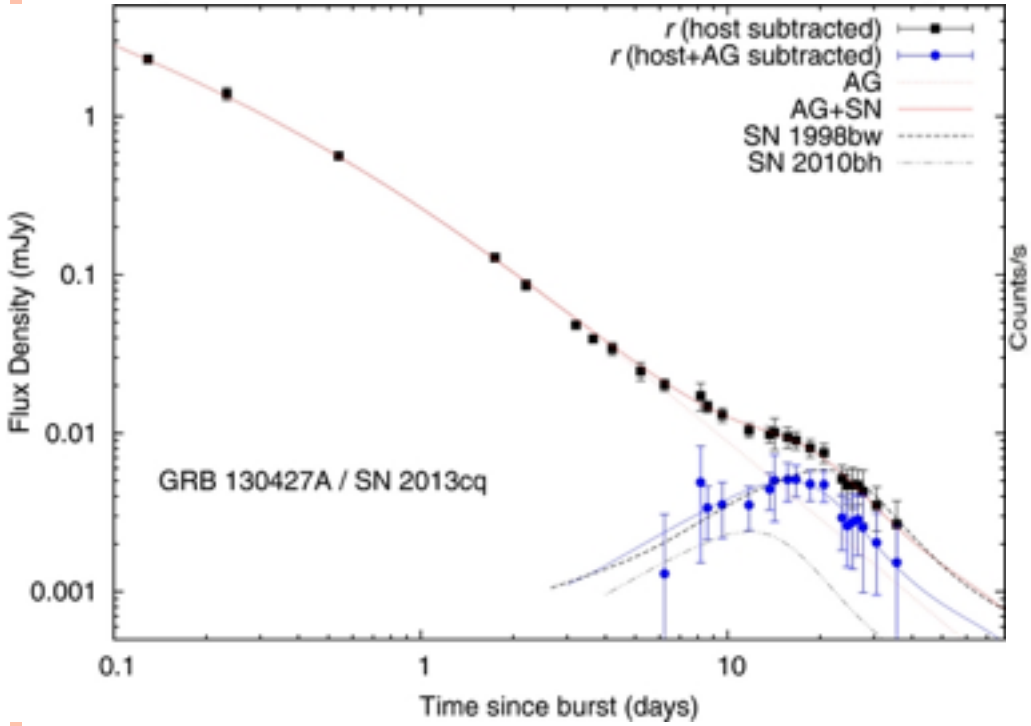
- **After any hadronic barrier**, like atmosphere (10 m. w.e.) , like 1 km rock, like 12 km rock, **the surviving e.m. traces** (future Gamma Burst) of charged pion respect the surviving neutrinos
- **Are smaller and smaller**
- Asymptotically Ratio = L (muon)/ L (neutrino)=>gamma/neutrinos
- At tens km rock size and at 3 PeV energy
- **One part over ten thousand**
- THEREFORE IF TEN THOUSAND NEUTRINO
- FOR EACH GAMMA if we cross obstacles 1km size
- **WHERE ARE HIDDEN SO MANY PeV neutrino and**
- **GRB NEUTRINO FLUENCY ?**
- **Expected fluency at least tens thousand WB one!**
- Where are the neutrino connection with GRB?
- **A severe shadow for Fireball Hadronic shock model**

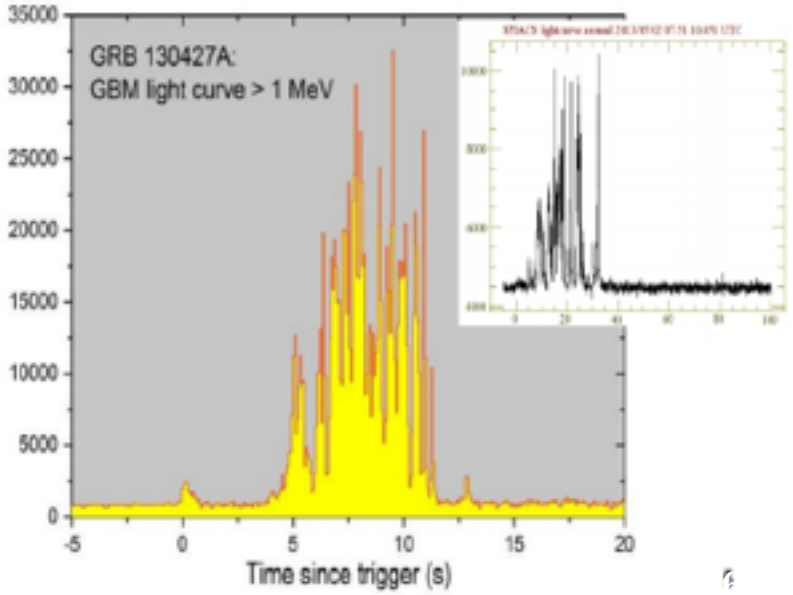
A list of GRB puzzles for Fireball

Why do their afterglows show so many bumps and rebrightening, if they are one-shot explosive event?

Indeed, why do not many GRB curves show monotonic decay (an obvious consequence of a one-shot explosive event)?

The Ruffini' predicted SN in GRB 130425 observed on 13052013: No bumps?





The Astrophysical Journal Letters, 781:L19 (5pp), 2014 January 20 doi:10.1088/2041-8205/781/1/L19

TIME EVOLUTION OF FLARES IN GRB 130925A: JET PRECESSION IN A BLACK HOLE ACCRETION SYSTEM

Shu-Jin Hou[1,2], Tong Liu[1,3], Wei-Min Gu[1], Da-Bin Lin[4], Mou-Yuan Sun[1,5], Xue-Feng Wu[2], and Ju-Fu Lu[1]

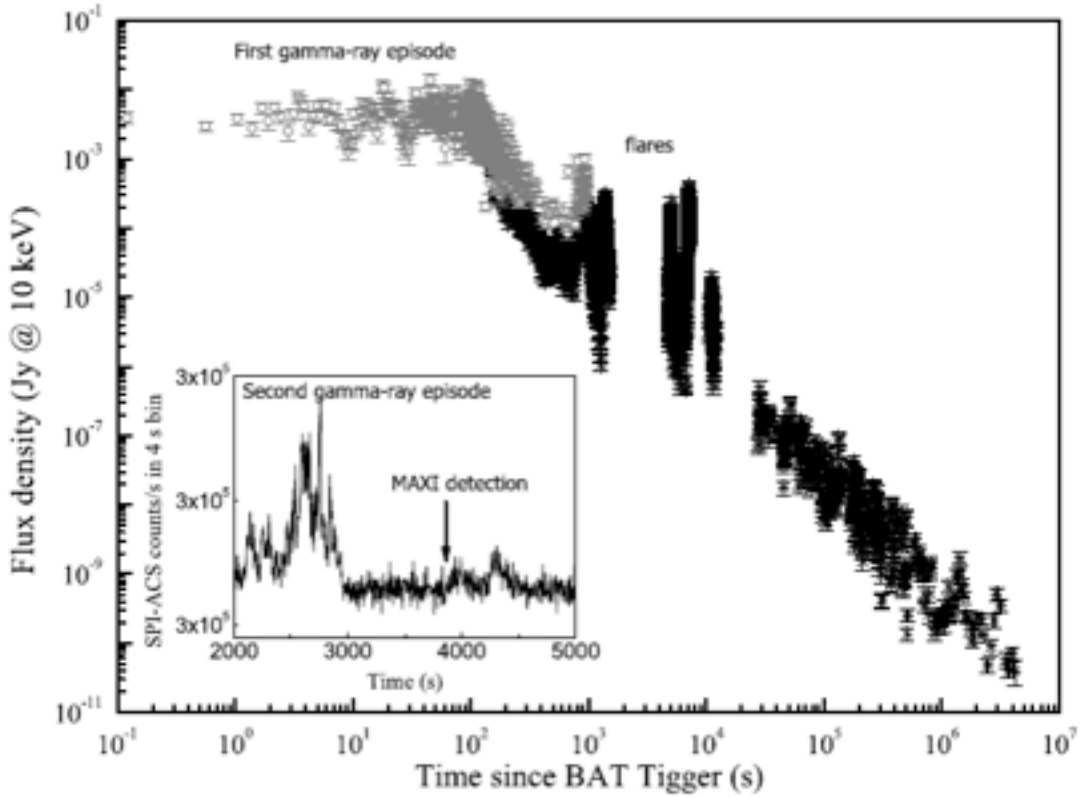
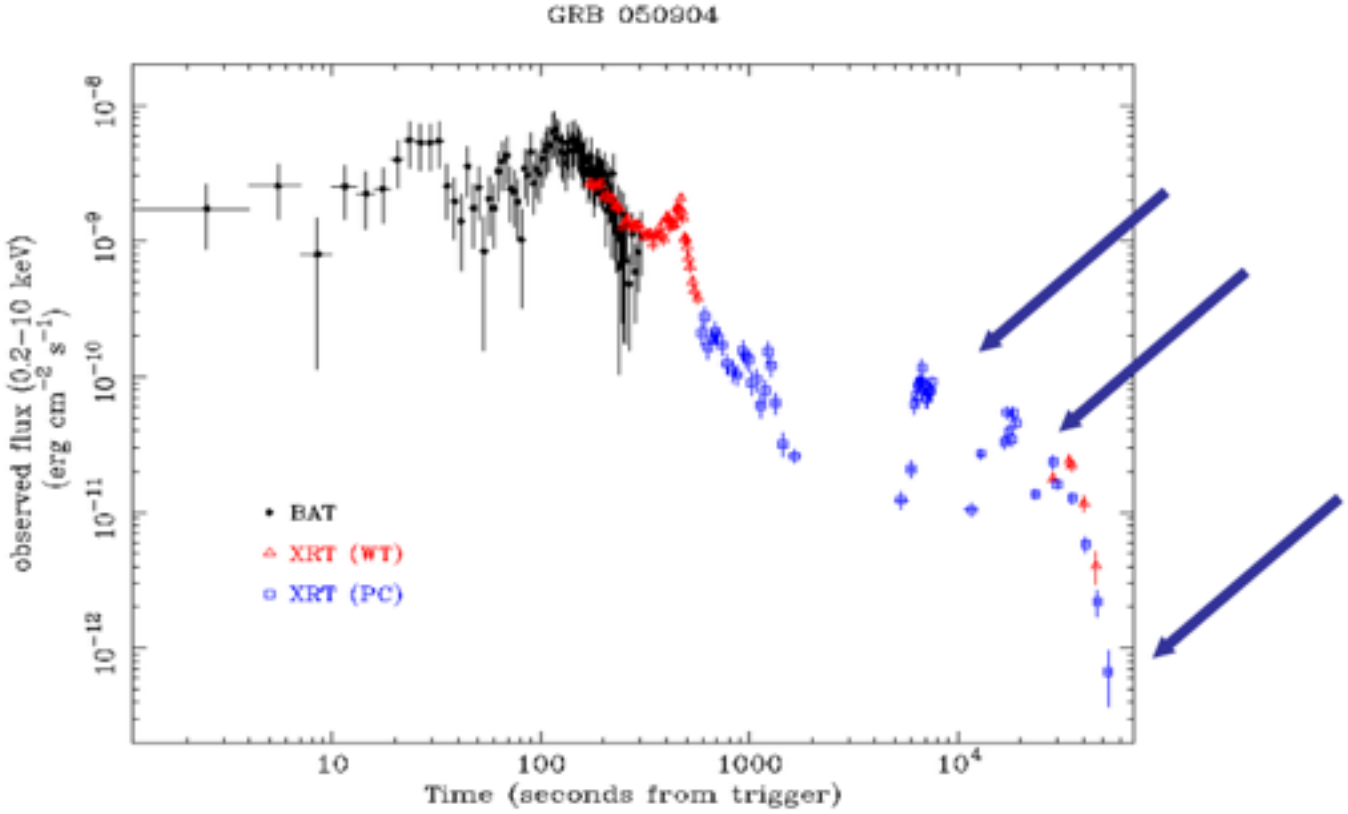


Figure 1. BAT (gray) and XRT (black) light curves of GRB 130925A. The inset shows the light curve observed by *INTEGRAL*.

Most distant z= 6, more on axis, more variability and bumps..harder ones



and Down and Hadron-Lepton

Jets

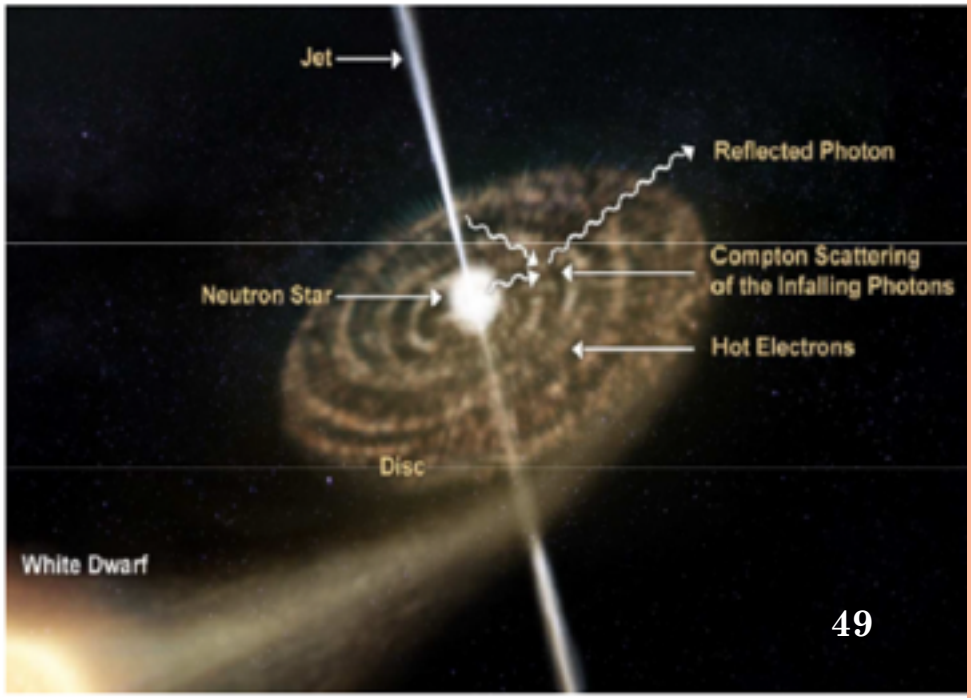
Precessing gamma jet model

We imagine the GRB and SGR nature as the early and the late stages of jets fuelled by a SN event first and then by an asymmetric accretion disk or by a companion star (white dwarf,WD, or neutron star, NS)

The GJs are born by Inverse Compton Scattering of thermal photons (optical, infrared...) onto (power law) electron jets (from GeV energies and above) produced by pulsar or black holes.

A nutation due to the asymmetric inertial momentum may lead to aperiodic behaviour of GRB signals.

SGRs are GRBs seen at the periphery of the hard energy GJ beam core!!



Precessing gamma jet model

In this model, in order to understand the GRB-SN energy equipartition, the jet must be very collimated.

$$\frac{\Omega}{\Delta\Omega} \simeq 10^8\text{-}10^{10}$$

In this way we can explain why the apparent (but beamed) GRB luminosity coexists on the same place and similar epochs with lower (isotropic) SN powers.

$$\dot{E}_{SN} \simeq 10^{44} - 10^{45} ergs^{-1}$$

$$\dot{E}_{GR-jet} \simeq 10^{53}\text{-}10^{54}\ \mathrm{erg}\ s^{-1}$$

$$\dot{N}_{GRBs} \sim 10^{-5} s^{-1}$$

$$\dot{N}_{SN} \simeq 3 s^{-1}$$

In order to fit the statistics between GRB-SN rates, the jet must have a power law decaying activity.

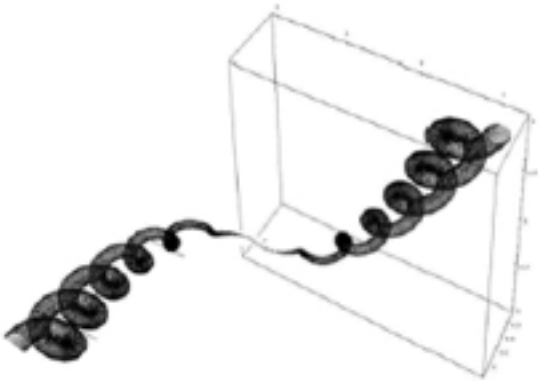
GRB must survive not just for the observed GRB duration but for a much longer time-scale, possibly thousands of time longer.

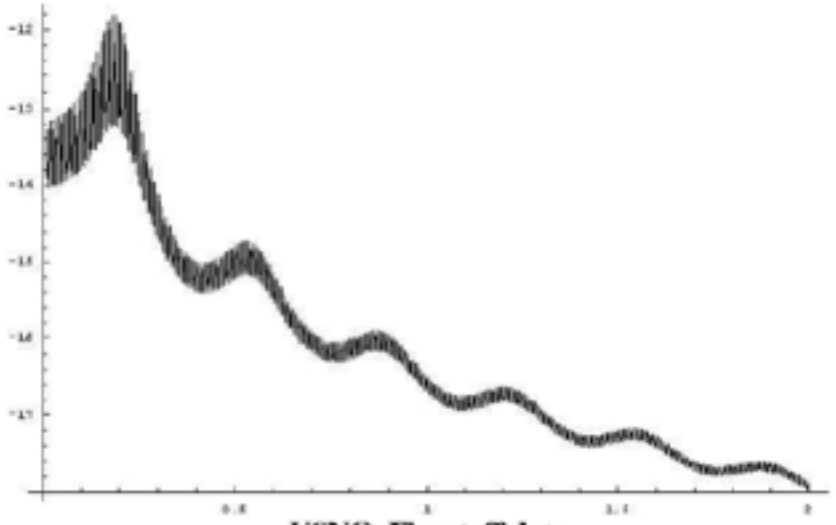
$$\frac{\dot{N}_{GRBs}}{\frac{\Delta\Omega}{\Omega}} \simeq 10^2 s^{-1} \longleftrightarrow 10^3 s^{-1}$$

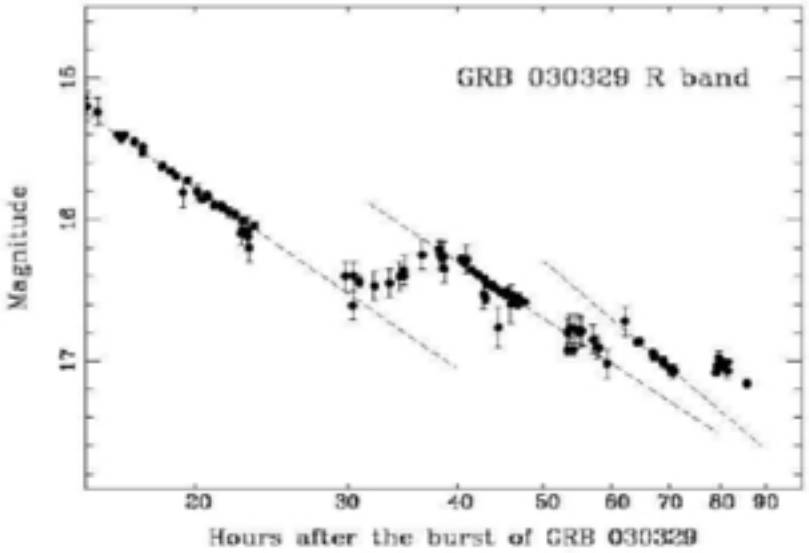
$$(\dot{L} \simeq (\frac{t}{t_o})^{-\alpha},\ \alpha \simeq 1)$$

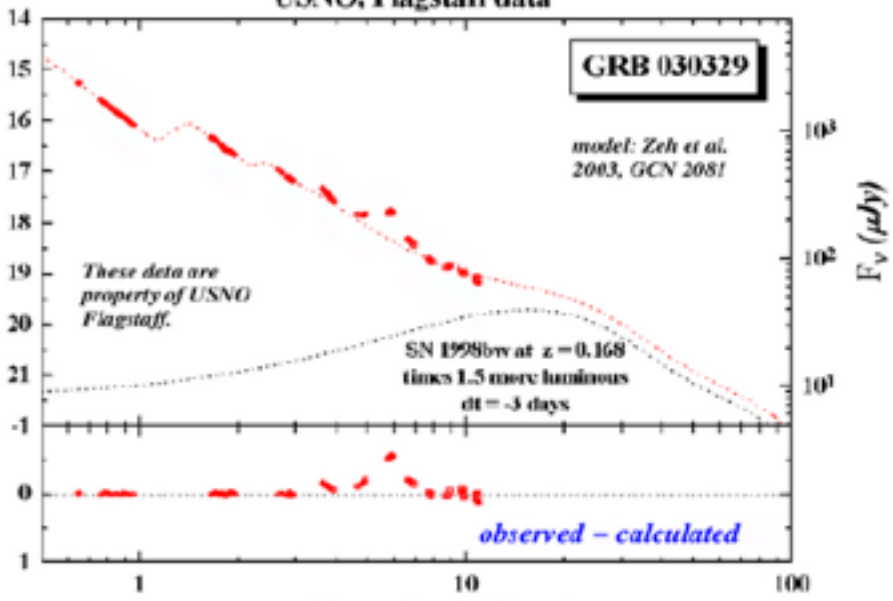
$$t_o \simeq 10^4\ s$$

Precessing gamma jet model









Inverse Compton by UHE electrons

Physics – Uspekhi **41** (8) 823 – 829 (1998)

METHODOLOGICAL NOTES

PACS numbers: 13.60.Fz, 95.30.–k, 95.85.Pw, 98.70.Rz

Inverse Compton scattering off black body radiation in high energy physics and gamma (MeV – TeV) astrophysics

D Fargion, A Salis

Contents

$$\frac{\mathrm{d}N_1}{\mathrm{d}t_1 d\epsilon_1 d\Omega_1} = \frac{2\pi\varkappa_{\mathrm{B}} T r_0^2 c}{(ch)^3} \times$$

$$\times \epsilon_1 \left(\ln \left\{ \frac{1 - \exp\left[-\gamma^2 \epsilon_1 (1 - \beta\cos\theta_1)(1+\beta)/(\varkappa_{\mathrm{B}} T)\right]}{1 - \exp\left[-\gamma^2 \epsilon_1 (1 - \beta\cos\theta_1)(1-\beta)/(\varkappa_{\mathrm{B}} T)\right.} \right\} \times \right.$$

$$\times \left[1 + \left(\frac{\cos\theta_1 - \beta}{1 - \beta\cos\theta_1} \right)^2 \right] + \left[1 - 3 \left(\frac{\cos\theta_1 - \beta}{1 - \beta\cos\theta_1} \right)^2 \right] \times$$

$$\times \int_0^{\pi} \ln \left\{ 1 - \exp \left[-\frac{\gamma^2 \epsilon_1}{\varkappa_{\mathrm{B}} T} (1 - \beta\cos\theta_1)(1 + \beta\cos\theta_0^*) \right] \right\} \times$$

$$\left. \times \sin\theta_0^* \cos\theta_0^* \, \mathrm{d}\theta_0^* \right) . \qquad (7)$$

ICS Non relativistic case

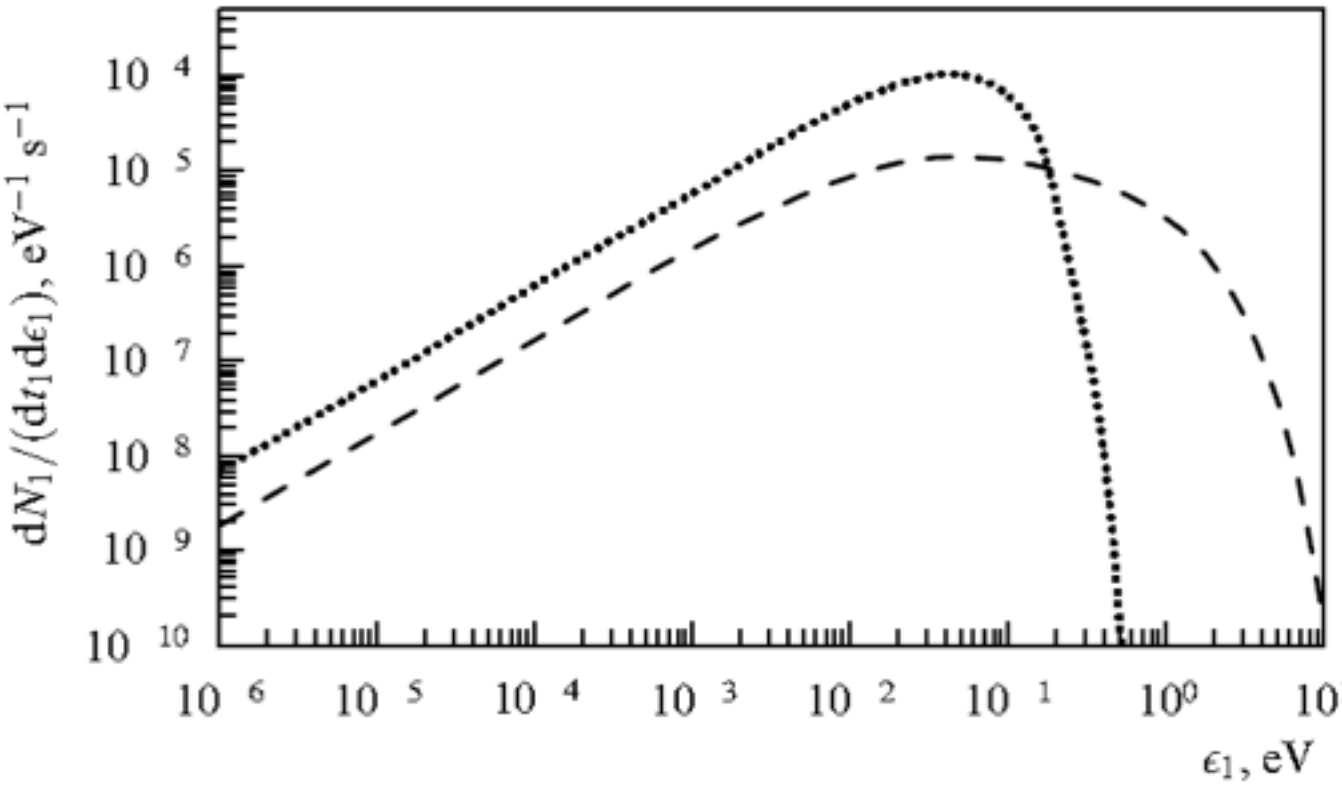


Figure 6. ICS Thomson spectra for $T = 291$ K and $\gamma = 1$ (BBR) (dot), $\gamma = 3$ (dash) Lorentz factors.

ICS IN LEP 1998: THE HUGE LOSS OF ENERGY FORCED TO LEAVE ELECTRONS AND TO MAKE LHC (PROTONS-PROTONS)

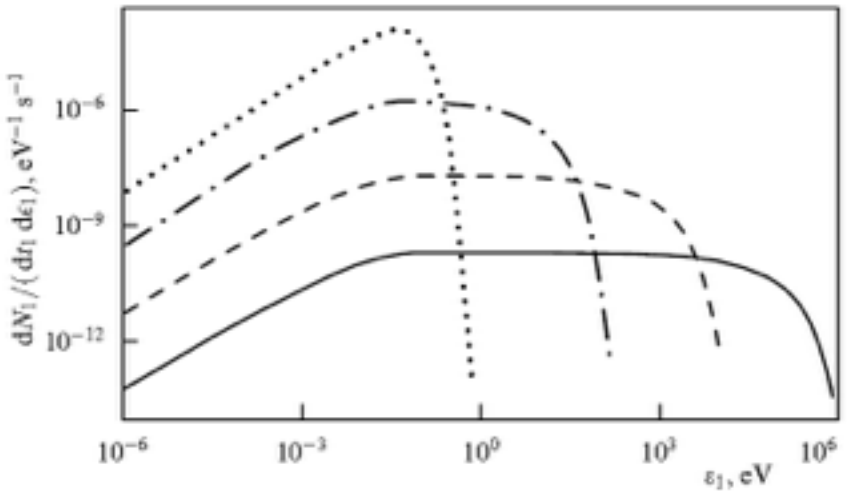


Figure 1. ICS spectrum from Eqn (8) for $T = 291$ K and non relativistic (BBR) $\gamma = 1$ (dot), and relativistic $\gamma = 10$ (dot dash), $\gamma = 10^2$ (dash), $\gamma = 10^3$ (continuous) Lorentz factor.

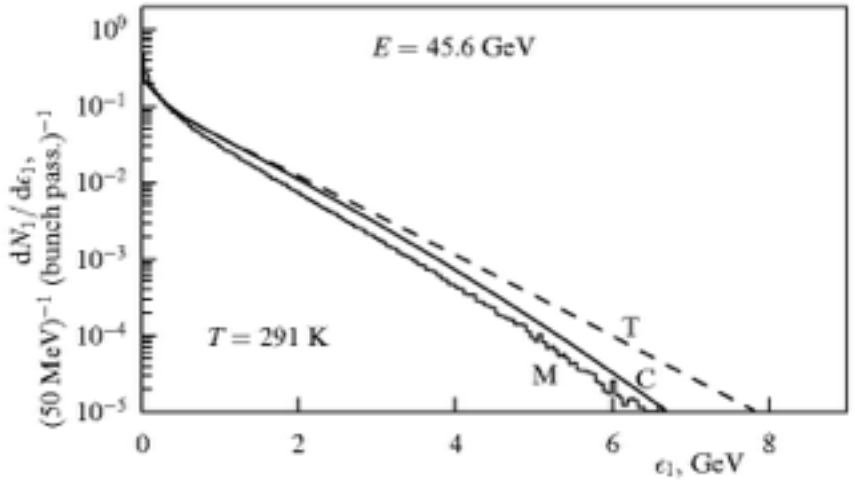


Figure 2. ICS spectra at LEP: Monte Carlo simulation (M) (Ref. [9], Fig. 6), Thomson approximation (T) [Eqn (8)], Compton approximation (C) [Eqn (6)].

GRAZIE DELLA CORTESE ATTENZIONE

UNUNSWARED GRBS PUZZLES FOR FIREBALL

Precessing gamma jet model

The Gamma Jet is originated mainly by Inverse Compton Scattering of GeVs electron pairs onto thermal photons (5000 K)

Therefore these electron pair are boosted at Lorentz factor $\gamma_e >\sim 10^3$

Their consequent Inverse Compton Scattering will induce a Gamma Jet whose beaming angle is:

$$\Delta\theta \sim \frac{1}{\gamma} \sim 5 \cdot 10^{-4} rad$$

The inner jet is dominated by the harder photons while the external cone contains softer X, optical and radio waves.

In a first approximation the constraint on the gamma energy range is given by the Inverse Compton relation:

$$< \epsilon_\gamma > \simeq \gamma_e^2 \, kT \qquad kT \simeq 10^{-3} - 10^{-1} \, eV \qquad E_e \sim GeV$$

However, the main difficulty for a jet of GeV electrons is that their propagation through the SN radiation field is highly suppressed !!

Precessing gamma jet model

$$E_\mu >\sim PeV$$

UHE muons instead, are characterised by a longer interaction length either with the circumstellar matter and the radiation field, since the $\mu - \gamma$ cross section scales as the inverse square of the mass of the lepton involved (in the Thomson regime).

$$E_\mu \sim 10^{15} - 10^{16} eV$$ ⟹ Can more easily escape from the stellar interior

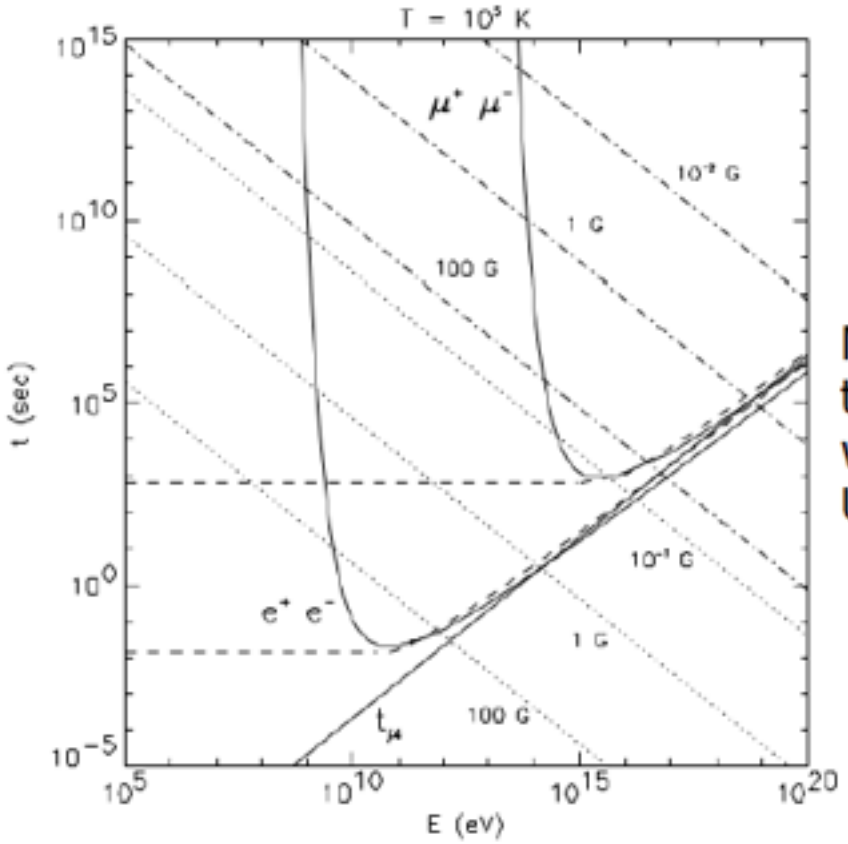
$$E_\gamma^{sync} \sim 4 \cdot 10^5 (\frac{E_\mu}{10^{16} eV})^2 (\frac{B}{1G}) eV$$

$$t_\gamma^{sync} = \frac{E}{\sigma_T^\mu c \gamma_\mu^2 U_B} \sim 5 \cdot 10^7 (\frac{E_\mu}{10^{16} eV})^{-1} (\frac{B}{1G})^{-2} \text{ s}$$

As a consequence, a jet of muons would be able to escape from the star and propagate for about 100 light-seconds before decaying into electrons.

Precessing gamma jet model

However, the main difficulty for a jet of GeV electrons is that their propagation through the SN radiation field is highly suppressed !!

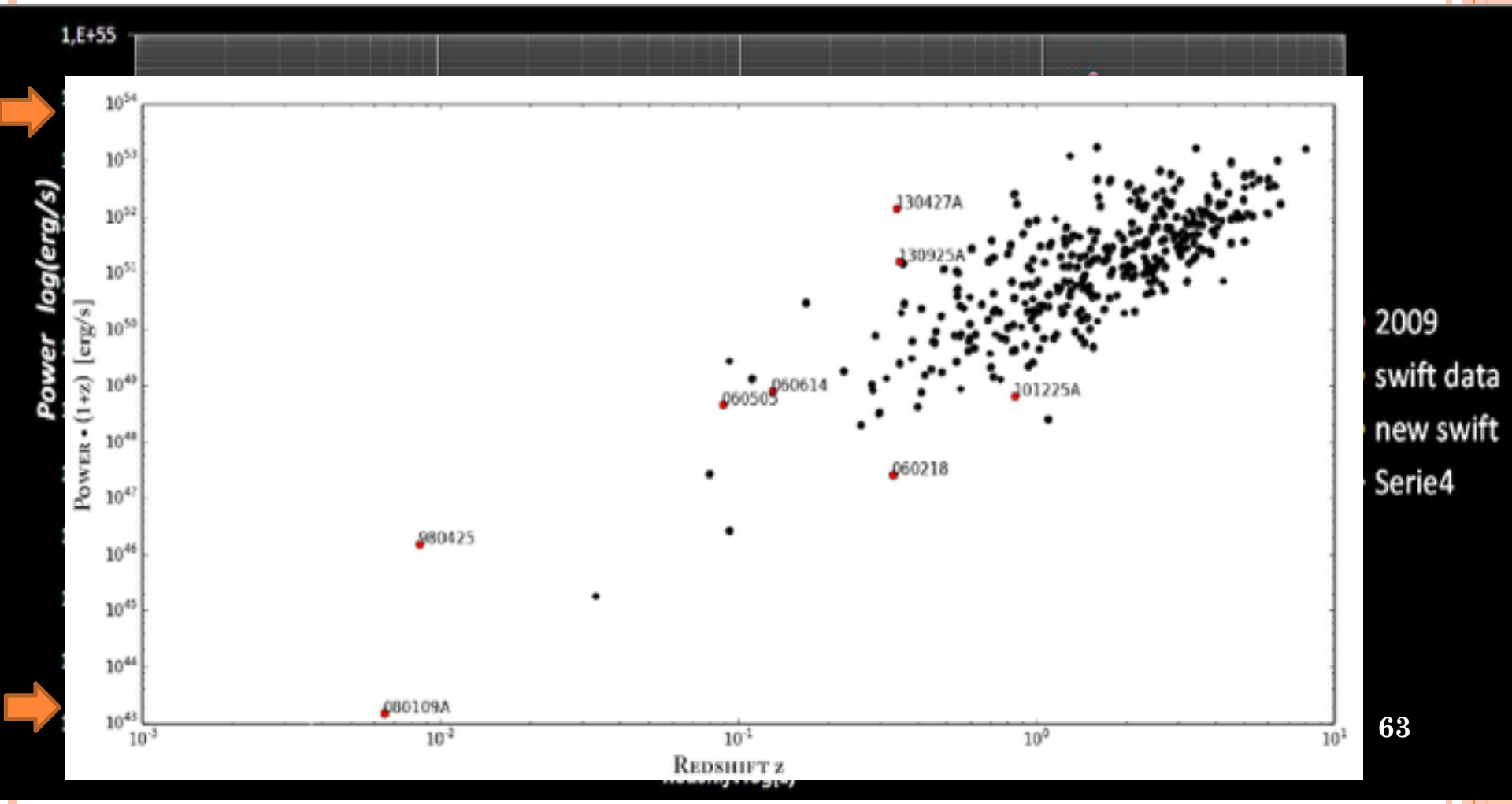


Electrons more energetic than 10 GeV can not propagate for more than 10^-3 s due to the scattering with the UV / optical emission.

Moreover at 10^−3 s (~ 300 km) from the stellar surface the baryon density would be able to reduce and block the UHE electron pair propagation!

We need of something that can propagate in the dense medium!

The rarest soft GRB are very abundant but hidden by detection threshold when far away.
The Most far GRBs are the brightest and hardest and often very variable : A thinner jet in large sample may explain it

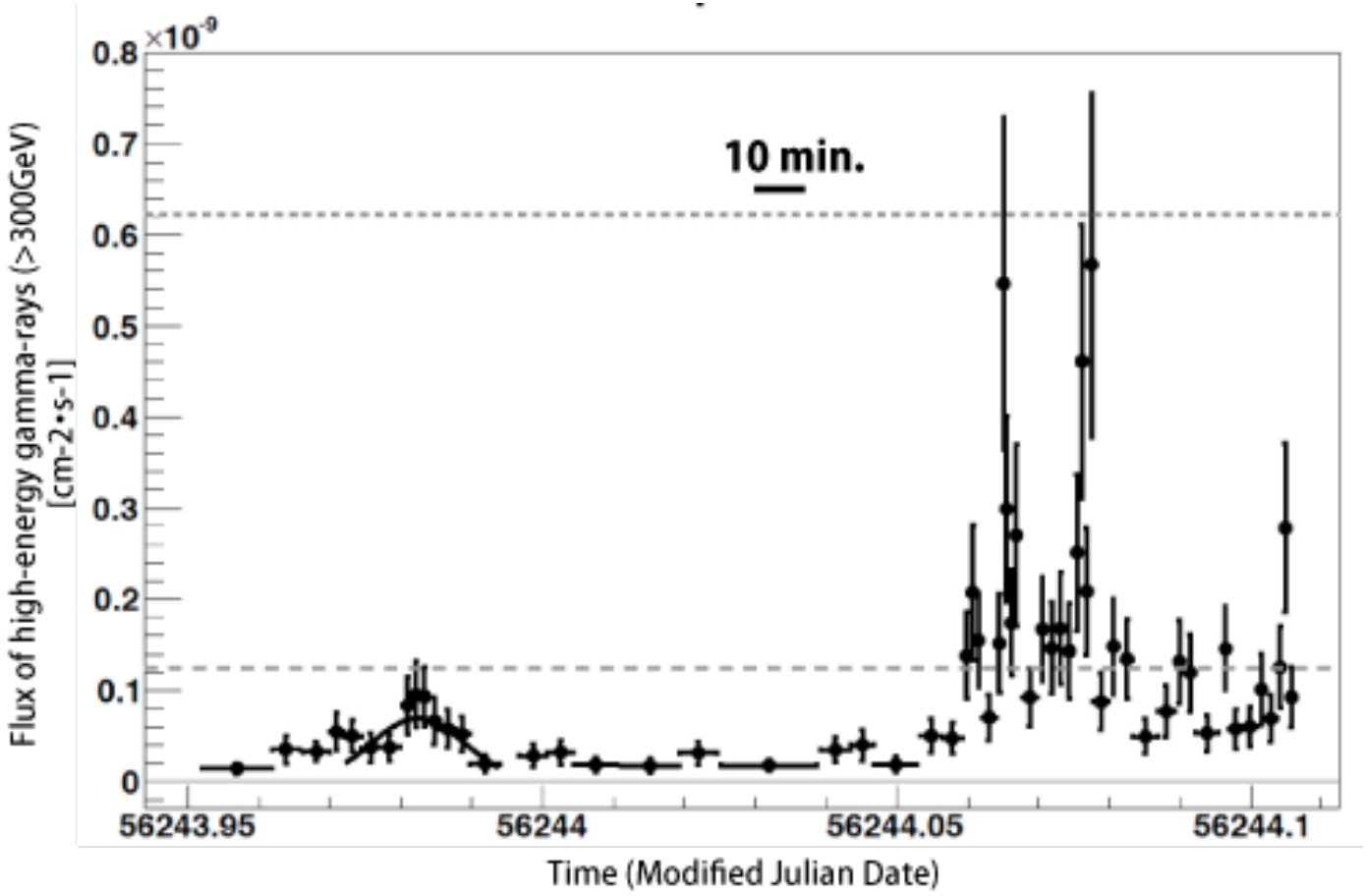


SHORTER GRBS TIME:

AGN ANALOGY : IC 310-, 260 MPC AWAY,

300 MILLION SUNS BH= 9000 S. SCHWARCHILD TIME

VARIABILITY 4.8 MIN= 300 S. NEED FOR VERY THIN PRECESSING JET



- **arXiv:1605.00177**
- **Solving the missing GRB neutrino and GRB-SN puzzles**
- Daniele Fargion, Pietro Oliva
- Every GRB model where the progenitor is assumed to be a highly **relativistic hadronic jet** whose pions, muons and electron pair secondaries are feeding the gamma jets engine, necessarily (except for very fine-tuned cases) leads to a high average neutrino over photon radiant exposure (radiance), a ratio well above unity, though the present observed average IceCube neutrino radiance is at most comparable to the gamma in the GRB one.
- **Therefore no hadronic GRB, fireball or hadronic thin precessing jet, escaping exploding star in tunneled or penetrarting beam, can fit the actual observations.**
- **A new model is shown here, based on a purely electronic progenitor jet, fed by neutrons (and relics) stripped from a neutron star (NS) by tidal forces of a black hole or NS companion, showering into a gamma jet.**

- Such thin precessing spinning jets explain unsolved puzzles such as the existence of the X-ray precursor in many GRBs. The present pure electron jet model, disentangling gamma and (absent) neutrinos, explains naturally why there is no gamma GRB correlates with any simultaneous TeV IceCube astrophysical neutrinos.

- **Rare unstable NS companion stages while feeding the jet may lead to an explosion simulating a SN event. Recent IceCube-160731A highest energy muon neutrino event with absent X-gamma traces confirms the present model expectations.**

THIS TALK FIRST SUMMARY

- **GRB billion time brighter SN needs JET**
- **Even EARLY FIREBALL are nowday beamed**
- **But one shoot.**
- **Hadronic and later electron pair-Gamma Jet very popular and alive model**

- **Even our earliest thin precessing JET** SURVIVED nearly 1994-1999-2005-2015 **also has hadron-muon-electron jet.**

- **ALL HADRONIC-ELECTRON JET ARE INCORRECT**
- GRB MOST LARGE PUZZLE: GRB and SN event
- NEED OF A **NEW JUST ELECTRON** (No muon) **JET with some rare SN-like event**

Energy is more a mixed integral of effects (beaming time), but hardness connection is there (AMATI connection)