Gamma-Ray Bursts in the Multi-messenger Era

Abstracts book

Table of contents

Abstract ID : 0

How Long Does a Burst Burst?

Content :

Several gamma-ray bursts (GRBs) last much longer (~ hours) in gamma-rays than typical long GRBs (~ minutes), and recently it was proposed that these "ultra-long GRBs" may form a distinct population, probably with a different progenitor than typical GRBs. We perform a comprehensive study on a large sample of Swift GRBs with XRT observations to investigate GRB central engine activity duration and to determine whether ultra-long GRBs are unusual events. We define burst duration t_burst based on both gamma-ray and X-ray light curves rather than using gamma-ray observations alone. We find that t_burst can be reliably measured in 343 GRBs. Within this ``good'' sample, 21.9% GRBs have t_burst >= 10^3 s and 11.5% GRBs have t_burst >-=10^4 s. There is an apparent bimodal distribution of t_burst in this sample. However, when considering an ``undetermined'' sample (304 GRBs) with t_burst possibly falling in the gap between GRB duration T90 and the first X ray observational time, as well as a selection effect against t_burst falling into the first Swift orbital ``dead zone'' due to observation constraints, the intrinsic underlying t_burst distribution is consistent with being a single component distribution. We found that the existing evidence for a separate ultra-long GRB population is inconclusive, and further multi wavelength observations are needed to draw a firmer conclusion. The central engine activity duration is generally much longer than the gamma-ray T90 duration and it does not even correlate with T90. It would be premature to make a direct connection between T90 and the size of the progenitor star.

Presentation type :

Oral

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Co-authors :

Presenter :

Track classification :

Contribution type : --not specified--

Submitted by : Dr. BINBIN, Zhang

Submitted on Wednesday 26 February 2014

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Track judgments :

Abstract ID : 1

Limits on Lorentz Violations and Cosmological Dispersion from GRBs

Content :

One of the great uses of GRBs to fundamental physics is their ability to constrain spectrally dispersive properties of light traveling across the universe, which can be translated into constraints on the magnitude of Lorentz violations. Although some theories of quantum gravity predict such violations near the Planck scale, no such violations have yet been seen in GRBs, which hold promise to probe spacetime even well below the Planck scale. The latest limits are reviewed, in particular highlighting results derived recently from Fermi LAT data from GRB 090510A and GRB 130427A.

Presentation type :

Poster

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Co-authors :

Presenter :

Track classification :

Contribution type : --not specified--

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Comments :

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Track judgments :

Abstract ID : 3

Fall back accretion and energy injections in the ultra-long GRB 111209A

Content :

The ultra-long Swift Gamma Ray Burst 111209A, which occurred at a redshift of $z = 0.677$, is the longest duration burst ever observed due to a rest frame prompt emission duration of order of 10^{4} s. The very early X-ray afterglow of Gamma Ray Burst 111209A showed many interesting features, such as the significant bump observed at around 2000 s after the Swift/BAT trigger. Here, we present a detailed numerical calculation
of the mass fall back process, which is the possible explanation for the significant bump, to reproduce the very early afterglow light curve of Gamma Ray Burst 111209A at X-ray wavelength. For the afterglow at late times, we apply external shock by adding energy injections. We assume two constant energy injection process in our model. One of the two periods of energy injection starts at 8.0×10^{3} s and ends at around
1.6×10^{4} s, with an injection rate of 9.0×10^{47} ${\rm erg}$ ${\rm s^{-1}}$; this energy injection can help to explain the plateau at X-ray wavelength in the early stage. The other injection starts at 6.5×10^{4} s and ends at around 8.1×10^{4} s, with an injection rate of 6.0×10^{46} ${\rm erg}$ ${\rm s^{-1}}$. This second energy injection accounts for the other X-ray plateau and the optical rebrightening observed at about 10^{5} s. Our results support the idea that a significant amount of material
may fall back toward the central engine after the prompt burst phase, resulting in a relative long-lasting period with an enhanced accretion rate and an associated Poynting-flux-dominated outflow.

Presentation type :

Poster

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Presenter :

Track classification :

Contribution type : --not specified--

Submitted by : Dr. YU, Yong-bo

Submitted on Thursday 27 February 2014

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Comments :

Status : SUBMITTED

Track judgments :

Abstract ID : 4

The effect of leptohadronic feedback processes on high-energy signatures from GRBs

Content :

We investigate the high-energy signatures, namely gamma-rays, neutrinos and ultra-high energy (UHE) cosmic rays, from a compact region under the sole assumption that this is an efficient proton accelerator (<1.e19 eV) and is sufficiently magnetized (e.g. 1.e3-1.e4 G). For this we implement a numerical code that incorporates the main physical leptonic and hadronic processes in a self-conistent way.
We find that for low values of the proton injection luminosity, the only photon field present
in the source is the one created by proton synchrotron radiation which corresponds to the trivial case. However, if the proton luminosity exceeds a critical value, the system undergoes a transition that is triggered by the instability of automatic gamma-ray quenching. This results in an abrupt increase of the photon luminosity that causes the source to get in a high photon compactness state making the
energy exchange between leptons and photons dominant. The resulting photon spectral shapes resemble, in general, those of Gamma Ray Bursts in the sense that (i) they match the required luminosity and (ii) they can be described by a Band function around the sub-MeV region. It is this self-consistently produced
radiation field that becomes the target for photopion interactions and efficiently drains energy from UHE protons, part of which is transfered to high-energy electron and muon neutrinos and relativistic neutrons, which consist an effective means for UHECR escape from the source. We show that for modest values of the bulk Lorentz factor (Γ~100-600) all three components, namely neutrinos, UHECRs and photons, are energetically similar.

Presentation type :

oral

Primary authors : Dr. PETROPOULOU, Maria (Purdue University)

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Presenter :

Track classification :

Contribution type : --not specified--

Submitted by : Dr. PETROPOULOU, Maria

Submitted on Monday 03 March 2014

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Track judgments :

Abstract ID : 6

Jet propagation and its collimation in the ejecta of double neutron star merger

Content :

Double neutron star (DNS) mergers are possible candidates for the origin of Short GRBs.
However, there are many uncertainties to produce GRBs based on the DNS merger scenario.
One of the important problems is the collimation mechanisim of the jet.
Indeed, recent observations of jet breaks in the afterglows indicate that there are some Short GRBs with well collimation (< 10 degree).

Motivated by these problems, we numerically investigate the jet propagation in the material ejected by the double neutron star merger, and demonstrate that the jet can be well confined if the ejecta mass is larger than 0.01 M_{sun}.
Based on our numerical results, we discuss the possible progenitor of GRB 130603B, which is associated with the first kilonova/macronova candidate.
In addition, we also give the constraint the equation of state of neutron stars.

In this conference, I introduce our main results and discuss the new canonical picture of Short GRBs.

Presentation type :

oral

Primary authors : Dr. NAGAKURA, Hiroki (Yukawa Institute for Theoretical Physics)

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Presenter :

Track classification :

Contribution type : --not specified--

Submitted by : Dr. NAGAKURA, Hiroki

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Track judgments :

Abstract ID : 7

Fermi-LAT observations of GRB 130427A

Content :

I will present the observations of the exceptionally bright gamma-ray burst GRB 130427A by the Fermi Large Area Telescope (Fermi-LAT), which provide constraints on the nature of these unique astrophysical sources. GRB 130427A had the largest fluence, highest-energy photon (95 GeV), longest gamma-ray duration (20 hours), and one of the largest isotropic energy releases ever observed from a GRB. The temporal and spectral analyses of the late-time high-energy emission observed by Fermi-LAT of GRB 130427A challenge the widely accepted model that the non-thermal high-energy emission in the afterglow phase of GRBs is synchrotron emission radiated by electrons accelerated at an external shock.

Presentation type :

oral

Primary authors : PIRON, Frédéric (CNRS/IN2P3/LUPM)

Co-authors :

Presenter :

Track classification :

Contribution type : --not specified--

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Track judgments :

Abstract ID : 8

Gravitational Waves and Neutrinos from Central Engine of Gamma-Ray Bursts

Content :

One of the most important missing pieces for gamma-ray bursts is the jet production mechanism from the central engine. We showed that using the gravitational wave we can constrain the jet production mechanism. Among possible candidates of the jet production mechanism, neutrino-pair annihilation is one of the most well-discussed. In this mechanism, copious amount of neutrinos are emitted from neutrino cooling accretion flow. In addition, we found that the infalling material in this flow can accelerate neutrinos and the non-thermal components enhance the annihilation rate more than 10 times larger.

Presentation type :

oral

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Track classification :

Contribution type : --not specified--

Submitted by : Dr. SUWA, Yudai

Submitted on Friday 21 March 2014

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Comments :

Status : SUBMITTED

Track judgments :

Abstract ID : 9

Statistical Study of Observed and Intrinsic Durations among BATSE and Swift GRBs

Content :

Studies of BATSE bursts (e.g. Kouveliotou et al. 1993) have resulted in the widespread adoption of a two-group categorization: long bursts (those with durations ≥ 2 seconds) and short bursts (those with durations ≤ 2 seconds). This categorization, one must recall, used the observed T_{90} time durations for bursts (during which 90 \% of a burst's fluence is measured).

In this work, we have explored two ideas: 1) a statistical search for a possible third, intermediate category of bursts (between the ``short" and the ``long" ones) among 2041 \textit{BATSE}GRBs and 757 \textit{Swift} ones; 2) a study of bursts' intrinsic durations, where durations in the bursts' reference frames (instead of the observed durations) are considered; for this, 248 \textit{Swift} bursts that have redshift measurements were statistically analyzed for the same categorization goal.

We first use a Monte Carlo method to determine the proper binning of each GRB, considering that bursts come with different uncertaintieson their durations. Then, using a Kolmogorov-Smirnov statistical test, we search for the best fit of the normalized frequency distributions $\frac{1}{N_0}\frac{dN}{d\ln{T}}$ of durations; this allows us to compare the fits that use two GRB groups (``short" and ``long") with those that use three groups (``short", ``long", and ``intermediate").

Our results indicate that the distributions of both durations (observed and intrinsic) are better fitted by three groups than two groups. Moreover, the ``intermediate" group appears more clearly when we adopt intrinsic durations rather than observed ones.

Presentation type :

Poster

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Presenter :

Track classification :

Contribution type : --not specified--

Submitted by : Dr. ZITOUNI, Hannachi

Submitted on Sunday 23 March 2014

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Comments :

Status : SUBMITTED

Track judgments :

Abstract ID : 10

Clustering of LAT light curves: a clue to the origin of the high-energy emission in GRBs

Content :

The physical origin of the temporally extended high-energy emission (0.1-100 GeV) detected from Gamma-Ray Bursts is still unclear. The most accredited models invoke radiation from electrons accelerated at the forward external shock. Both synchrotron and inverse Compton emission have been suggested as possible radiative processes responsible for the observed radiation. In this talk I focus on the synchrotron mechanism and I discuss the evidences that support this scenario. In particular, I will present an additional evidence in favour of this model: the LAT light curves of different GRBs overlap when they are renormalised using the prompt energetics. This behaviour is expected in the context of the synchrotron/external-shock model and it reinforces the hypothesis that this scenario is a viable explanation for the origin of the high-energy emission. In this context, the overlapping of the GeV light curves can be used to derive interesting conclusions on two parameters entering the prompt and afterglow physics: i) the fraction of shock-dissipated energy that goes into the accelerated electrons and ii) the overall efficiency of the mechanism producing the prompt emission.

Presentation type :

oral

Primary authors : Dr. NAVA, Lara (Hebrew University of Jerusalem)

Co-authors :

Presenter :

Track classification :

Contribution type : --not specified--

Submitted by : Dr. NAVA, Lara

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Status : SUBMITTED

Track judgments :

Abstract ID : 11

Synchrotron Cooling in Hard and Bright Gamma-Ray Bursts Observed by the Fermi Gamma-Ray Burst Monitor

Content :

We study the spectral properties of hard and bright gamma-ray bursts (GRBs) observed by the Gamma-Ray Burst Monitor (GBM) onboard the Fermi Gamma-Ray Space Telescope. We use their time-resolved spectral parameters to test the cooling scenarios within the synchrotron shock model (SSM) in order to better understand the prompt emission mechanisms of GRBs. We find that the fitted values of parameters are consistent with the "Slow, low" or "Both" cases, which implies that the break energy of our sample bursts corresponds to the lower frequency break or both, and therefore the second line-of-death, $\alpha = −3/2$, could be avoided for a considerable number of time bins. We further tested the bursts with a synchrotron slow cooling plus thermal spectral model and found that the "Both" case could be a viable process which smooths out the breaks in the observed spectra.

Presentation type :

oral

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Presenter :

Track classification :

Contribution type : --not specified--

Submitted by : Mr. YU, Hoi-fung

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Track judgments :

Abstract ID : 12

GRBs with CTA

Content :

In recent years GRBs have been routinely detected at GeV energies by the Fermi/LAT, opening up a new window for the study of GRB prompt and afterglow emission. Obtaining data at very high energies can strongly constrain emission models, distinguish intrinsic versus extragalactic background light effects and probe issues in the source physics and fundamental physics. As yet there has been no confirmed detection of a GRB from a ground-based atmospheric Cherenkov telescope. This situation is soon to change with the advent of the Cherenkov Telescope Array (CTA), which will provide an order of magnitude increase in sensitivity across a very wide bandpass (20 GeV to hundreds of TeV), rapid response capability (few tens of seconds) and both northern and southern sky coverage. The predicted detection rates are modest (few per year) but each event will provide orders of magnitude more photons that Fermi/LAT observations. I will discuss the importance of VHE observations and the capabilities of CTA for improving our understanding of GRB physics.

Presentation type :

Invited

Primary authors : Prof. O'BRIEN, Paul (UNIVERSITY OF LEICESTER)

Co-authors :

Presenter :

Track classification :

Contribution type : --not specified--

Submitted by : Prof. O'BRIEN, Paul

Submitted on Thursday 27 March 2014

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Comments :

Status : SUBMITTED

Track judgments :

Abstract ID : 13

Magnetorotational instability in hypermassive neutron stars

Content :

A differentially rotating supramassive or hypermassive neutron star (SMNS or HMNS) is a very likely outcome of a binary neutron star merger, which represents a leading scenario to explain the phenomenology of short gamma-ray bursts (SGRBs). According to current models, powering the SGRB prompt emission requires extremely high magnetic field strengths, orders of magnitude higher than those of the progenitor NSs. Strong magnetic field amplification can already occur at the time of merger via, e.g., the Kelvin-Helmholtz instability or in the newly-formed NS via magnetic winding and possibly the magnetorotational instability (MRI). We investigate the evolution of magnetic fields in a HMNS by performing global three-dimensional simulations in general-relativistic magnetohydrodynamics. Our results provide direct evidence that the MRI can develop in HMNS interiors and act as a powerful magnetic field amplification mechanism.

Presentation type :

Poster

Primary authors : SIEGEL, Daniel (Max Planck Institute for Gravitational Physics (Albert Einstein Institute))

Co-authors : Dr. CIOLFI, Riccardo (Max Planck Institute for Gravitational Physics (Albert Einstein Institute))

Presenter :

Track classification :

Contribution type : --not specified--

Submitted by : SIEGEL, Daniel

Submitted on Thursday 27 March 2014

Last modified on : Wednesday 14 May 2014

Comments :

Status : SUBMITTED

Track judgments :

Abstract ID : 14

Magnetically driven winds from differentially rotating neutron stars and X-ray afterglows of short gamma-ray bursts

Content :

Besides being among the most promising sources of gravitational waves, merging neutron star binaries also represent a leading scenario to explain the phenomenology of short gamma-ray bursts (SGRBs). Recent observations have revealed a large subclass of SGRBs with roughly constant luminosity in their X-ray afterglows, lasting 10−10^4 s. These features are generally taken as evidence of a long-lived central engine powered by the magnetic spin-down of a uniformly rotating, magnetized object. We propose a scenario in which the central engine powering the early X-ray afterglow emission is a differentially rotating hypermassive or supramassive neutron star (HMNS or SMNS). This emission is associated with a quasi-isotropic and baryon-loaded wind driven by the magnetic field, which is built-up through differential rotation. Our model is supported by long-term, three-dimensional, general-relativistic, and ideal magnetohydrodynamic simulations, showing that this isotropic emission is a very robust feature. We show that our results are compatible with the timescales and luminosities of the observed X-ray afterglows.

Presentation type :

oral

Primary authors : Dr. CIOLFI, Riccardo (Max Planck Institute for Gravitational Physics (Albert Einstein Institute))

Co-authors : SIEGEL, Daniel (Max Planck Institute for Gravitational Physics (Albert Einstein Institute))

Presenter :

Track classification :

Contribution type : --not specified--

Submitted by : Dr. CIOLFI, Riccardo

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Status : SUBMITTED

Track judgments :

Abstract ID : 15

Compact Binary Progenitors of Short Gamma-Ray Bursts

Content :

In recent years, detailed observations and accurate numerical simulations have provided support to the idea that mergers of compact binaries containing either two neutron stars (NSs) or an NS and a black hole (BH) may constitute the central engine of short gamma-ray bursts (SGRBs). The merger of such compact binaries is expected to lead in some cases to the production of a spinning BH surrounded by an accreting torus. If the torus were magnetized, then magnetic fields could extract energy from the system and power a SGRB. I will discuss how current SGRB observations could be used to estimate the mass of such tori and, by comparing with the results of fully general relativistic simulations, infer the properties of SGRB binary progenitors and their possible gravitational wave signals.

Presentation type :

oral

Primary authors : GIACOMAZZO, Bruno (University of Trento)

Co-authors :

Presenter :

Track classification :

Contribution type : --not specified--

Submitted by : GIACOMAZZO, Bruno

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Comments :

Status : SUBMITTED

Track judgments :

Abstract ID : 16

Radiation from accelerated particles in relativistic jets with shocks, shear-flow, and reconnection

Content :

We investigated particle acceleration and shock structure associated with an unmagnetized relativistic jet propagating into an unmagnetized plasma. Strong magnetic fields generated in the trailing shock contribute to the electron's transverse deflection and acceleration. Kinetic Kelvin-Helmholtz instability (KKHI) is also responsible to create strong DC magnetic fields. The velocity shears in core-sheath jets create strong magnetic field perpendicular to the jet. We examine how the Lorentz factors of jets affect the growth rates of KKHI. We have calculated, self-consistently, the radiation from electrons accelerated in these turbulent magnetic fields in the shocks. We found that the synthetic spectra depend on the bulk Lorentz factor of the jet, its temperature and strength of the generated magnetic fields. We will investigate synthetic spectra from accelerated electrons in strong magnetic fields generated by KKHI. The calculated properties of the emerging radiation provide our understanding of the complex time evolution and/or spectral structure in gamma-ray bursts, relativistic jets in general, and supernova remnants.

Presentation type :

oral

Primary authors : Dr. NISHIKAWA, Kenichi (University of Alabama in Huntsville)

Co-authors :

Presenter :

Track classification :

Contribution type : --not specified--

Submitted by : Dr. NISHIKAWA, Kenichi

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Comments :

Co-authors will be included with my talk.

Status : SUBMITTED

Track judgments :

Abstract ID : 17

Monte Carlo simulations for thermal radiation from GRB jet

Content :

Recently, thermal radiation from gamma-ray burst (GRB) jets attracts attention as the origin of the GRB prompt emission. It is expected that the spectrum and the light curve of thermal radiation from GRB jet is complicated because the jet itself has a very complicated structure. Thus, in order to treat the thermal radiation from GRB jets properly, both the radiative transfer in the jets and the complicated inner structures of the jets should be taken into account. We developed a numerical code to calculate the radiative transfer in relativistic jets, based on the Monte Carlo method. The code enables us to calculate the electron scatterings as a postprocessing in relativistic jets with complicated structures obtained by 2D relativistic hydrodynamical simulations. We will present the results of the calculations.

Presentation type :

oral

Primary authors : Mr. SHIBATA, Sanshiro (Konan university)

Co-authors : Dr. TOMINAGA, Nozomu (Konan university)

Presenter :

Track classification :

Contribution type : --not specified--

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Submitted on Friday 28 March 2014

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Comments :

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Track judgments :

Abstract ID : 18

Prospects for joint gravitational wave and electromagnetic observations of neutron star black hole coalescing binaries

Content :

Coalescing neutron star black hole binaries are a promising source of gravitational-wave (GW) signals detectable with large-scale laser interferometers such as Advanced LIGO and Virgo. These systems are also one of the main progenitor candidates for short gamma-ray bursts (SGRBs). If the neutron star is tidally disrupted by its black hole companion before merger, an SGRB may be ignited when a sufficiently massive accretion disc forms around the remnant black hole. Detecting a neutron star black hole coalescence both in the GW and the electromagnetic (EM) spectrum offers a wealth of information about the nature of the source. How much can actually be inferred from a joint detection is unclear, however, as the accuracy of the GW measurement can be significantly reduced by the presence of a mass/spin degeneracy. In order to shed light on this problem, we combine recent semi-analytical predictions for the remnant disc mass with estimates of the parameter-space portion that is selected by a GW detection. By varying the model for the currently unknown neutron star equation of state, we identify cases in which the ignition of an SGRB is assured, others in which it can be excluded, and finally others in which the outcome depends on the chosen equation of state. We pinpoint a range of systems that would allow us to place lower bounds on the equation of state stiffness if both the GW emission and its EM counterpart are observed. The methods we develop can be tied into existing GW detection and parameter-estimation algorithms in order to broaden their scope, and they extend our understanding of the potential of joint EM+GW observations.

Presentation type :

Oral

Primary authors : Dr. PANNARALE, Francesco (Cardiff University)

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Presenter :

Track classification :

Contribution type : --not specified--

Submitted by : Mr. PANNARALE, Francesco

Submitted on Friday 28 March 2014

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Comments :

Status : SUBMITTED

Track judgments :

Abstract ID : 19

Towards the determination of the outflow properties from the photospheric emission

Content :

The model of photospheric emission of a relativistically expanding plasma is used to interpret the thermal component observed in some Gamma-Ray-Bursts (GRBs). When a photospheric component is detected, it can be linked to the properties (Lorentz factor and photospheric radius) of the outflow following Pe'er et al. (2007). Their approach assumes that the outflow behaves like an infinite, coasting and steady wind, and that it does not undergo sub-photospheric dissipation.
I will show how to recover the properties of the outflow when considering all possible regimes of transparency in thermally accelerated baryonic outflow defined by Ruffini, Siutsou and Vereshchagin (2013), namely accelerating photon thick (pair or baryon dominated), coasting photon thick and coasting photon thin asymptotic.

Presentation type :

Poster

Primary authors : Mr. BEGUE, Damien (Universita Roma La Sapienza and ICRANet)

Co-authors :

Presenter :

Track classification :

Contribution type : --not specified--

Submitted by : Mr. BEGUE, Damien

Submitted on Friday 28 March 2014

Last modified on : Wednesday 14 May 2014

Comments :

Status : SUBMITTED

Track judgments :

Abstract ID : 20

Getting a handle on the nature of long GRB jets.

Content :

The collapsar model explains the association of long duration gamma-Ray Bursts (GRBs) with stellar collapse. It involves a relativistic jet that forms at the core of a collapsing massive star. The jet penetrates the stellar envelope and produces the prompt GRB emission well outside the star. Although there are many observational evidence that verify this connection, we are yet to identify the nature of the compact object at the center of collapsars nor do we know the magnetic content in the jet or it's launching mechanism. Since the jet is launched deep in the star and the emission site of the prompt gamma-rays is located far from the star, there is no way of directly probing the central region of the progenitor. Thus there is little hope of answering these questions just from the observations of the prompt emission.
In this talk I will focus on the propagation of the jet inside the star, prior to its breakout from the stellar surface. I will describe the difference between the propagation of a hydrodynamic jet and a Poynting dominated jet, and show that each type of jets has a distinctive breakout time.The breakout of the jet leaves an imprint on the distribution of GRB durations: a plateau at durations much shorter than the typical breakout time. I will show that this plateau exists in the GRB duration distributions of all major GAB satellites and indicate a typical breakout time of ten seconds or more. I will also show observational indications that a large fraction of collapsar jets, in fact, fail to breach the surface and don't produce a regular GRB. These observational evidence favour a particular type of jet to propagate in the star. They also place constraints on the properties of the internal engine and the location where most of the jet's magnetic energy should be dissipated. Thus they form an important step in the path of solving some of the basic questions in long GRBs.

Presentation type :

oral

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Presenter :

Track classification :

Contribution type : --not specified--

Submitted by : Dr. BROMBERG, Omer

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Track judgments :

Abstract ID : 21

CTA is Well Suited to Follow Up Gravitational Wave Transients

Content :

The first gravitational-wave (GW) observations will greatly benefit, or even depend on, the detection of coincident electromagnetic counterparts. These counterparts will similarly enhance the scientific impact of later detections. Electromagnetic follow-ups can be, nevertheless, challenging for GW event candidates with poorly reconstructed directions. Localization can be inefficient in several important scenarios: (i) in the early advanced detector era, only the two LIGO observatories will be operating; (ii) later, even with more observatories, the detectors' sensitivity will probably be non-uniform; (iii) the first events, as well as a significant fraction of later events, will likely occur near the detectors' horizon distance, where they are only marginally detectable, having low signal-to-noise ratios. In these scenarios, the precision of localization can be severely limited. Follow-up observations will need to cover hundreds to thousands of square degrees of the sky over a limited period of time, reducing the list of suitable follow-up telescopes or telescope networks. Compact binary mergers, the most anticipated sources for the first GW observations, will be detectable via advanced LIGO/Virgo from hundreds of megaparsecs, setting the scale to the sensitivity required from follow-up observatories. We demonstrated that the Cherenkov Telescope Array will be capable of following up GW event candidates over the required large sky area with sufficient sensitivity to detect short gamma-ray bursts, which are thought to originate from compact binary mergers, out to the horizon distance of advanced LIGO/Virgo. CTA can therefore be invaluable starting with the first multimessenger detections, even with poorly reconstructed GW source directions. This scenario also provides a further scientific incentive for GW observatories to further decrease the delay of their event reconstruction.

Presentation type :

oral

Primary authors : Mr. BARTOS, Imre (Columbia University)

Co-authors :

Presenter :

Track classification :

Contribution type : --not specified--

Submitted by : Mr. BARTOS, Imre

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Track judgments :

Abstract ID : 22

GRB TEMPORAL VARIABILITY IN THE CONTEXT OF THE ONE-ZONE HADRONIC MODEL

Content :

Gamma Ray Bursts (GRB) are rapidly varying transients, yet there are very few models that address directly their temporal properties. As far
as one-zone leptonic models are concerned, one expects that as the associated cooling timescales are very short, it would be safe to treat
the overall emission as snapshots of steady states, thus the variability should mimick the particle injection mechanism. For hadronic models, however, this picture does not hold as (i) proton loss timescales are usually longer than the dynamical timescale and (ii) high energy protons are suspectible to various feedback loops that can produce temporal signatures of photons which do not relate directly to the proton injection. Here we examine the temporal behaviour of the hadronic one-zone GRB model by using a fully time-dependent numerical code that couples hadrons (protons and neutrons) to electron-positron pairs and photons. Protons are injected in the active region with a varying luminosity and radiate by photopair, photopion and synchrotron radiation. The ensuing electromagnetic cascade is followed in detail and the produced photons can serve as extra targets for the cooling of the protons. We show that variations in the luminosity of the injected protons can cause the Power Spectral Density of the emitted photons to exhibit differing behaviours which largely depend on the compactness of the source. It is in the high compactness state where the system shows some interesting GRB-like behaviour, both in the spectral and temporal domain, and we will discuss this in relation to the observations.

Presentation type :

Poster

Primary authors : Prof. MASTICHIADIS, Apostolos (University of Athens)

Co-authors : Dr. PETROPOULOU, Maria (Purdue University)

Presenter :

Track classification :

Contribution type : --not specified--

Submitted by : Prof. MASTICHIADIS, Apostolos

Submitted on Saturday 29 March 2014

Last modified on : Wednesday 14 May 2014

Comments :

Status : SUBMITTED

Track judgments :

Abstract ID : 23

Follow-up of high energy neutrinos detected by the ANTARES telescope

Content :

The ANTARES telescope is well suited to detect neutrinos produced in astrophysical transient sources as it can observe a full hemisphere of the sky at every moment with a duty cycle close to unity. Potential sources are gamma-ray bursts, core-collapse supernovae and flaring active galactic nuclei. To enhance the sensitivity of ANTARES to such sources, a new detection method based on the optical and/or X-ray follow-up observation of neutrino direction has been developed. This program, TAToO, includes a network of robotic optical telescopes (TAROT, ROTSE and ZADKO) and the SWIFT/XRT telescope which are triggered when an “interesting” neutrino is detected by ANTARES. A follow-up of special events, such as neutrino doublets in coincidence in time and space or single neutrino having a very high energy or in the specific directions of local galaxies , significantly improves the perspective for the detection of transient sources.

Presentation type :

oral

Primary authors : MATHIEU, Aurore (CPPM)

Co-authors :

Presenter :

Track classification :

Contribution type : --not specified--

Submitted by : MATHIEU, Aurore

Submitted on Saturday 29 March 2014

Last modified on : Saturday 29 March 2014

Comments :

Status : SUBMITTED

Track judgments :

Abstract ID : 24

High-energy offline electromagnetic follow-up of LIGO-Virgo gravitational-wave binary coalescence candidate events

Content :

We present the implementation of two different searches for electromagnetic counterparts to ground-based gravitational-wave events using archival NASA high-energy data from the Fermi-GBM and RXTE-ASM instruments. To perform the search, we begin with a limited number of representative gravitational-wave candidate events (from time-shifted data) from the final two months of the LIGO-Virgo S6/VSR3 joint science run, and use the time and sky location provided by the GW data to trigger a targeted search in the high-energy data. We demonstrate two custom pipelines that search for both prompt gamma-ray counterparts in GBM, as well as a variety of X-ray afterglow model signals in ASM. We discuss how this technique can be used to follow-up candidate binary coalescence gravitational-wave events from advanced LIGO and advanced Virgo. Since only a small fraction of standard jet-driven short GRBs will be oriented along our line of sight, it will be important to search for weak non-standard electromagnetic emission in association with all potential low mass compact binary inspiral gravitational-wave triggers from advanced LIGO and advanced Virgo.

Presentation type :

oral

Primary authors : Prof. CHRISTENSEN, Nelson (Carleton College)

Co-authors : Dr. LINDY, Blackburn (NASA Goddard) ; Dr. CAMP, Jordan (NASA Goddard) ; Dr. VEITCH, John (Birmingham) ; Dr. BRIGGS, Michael (NASA/GBM) ; Dr. CONNAUGHTON, Valerie (NASA/GBM) ; Dr. JENKE, Peter (NASA/GBM) ; Dr. REMILLARD, Ron (MIT)

Presenter :

Track classification :

Contribution type : --not specified--

Submitted by : Prof. CHRISTENSEN, Nelson

Submitted on Sunday 30 March 2014

Last modified on : Tuesday 01 April 2014

Comments :

Status : SUBMITTED

Track judgments :

Abstract ID : 25

Science and Feasibility of a Next Generation Rapid IR-Optical Response GRB Satellite (NGRG)

Content :

An instrument that can respond to GRB locations with optical-Near IR instruments with ~ 1 sec. response time would make important contributions to GRB studies in many ways. Swift has been limited by a minimum optical response time of ~ 60 s after GRB triggers, missing most prompt emission. Ground-based instruments have responded rapidly to some GRBs, but rapid detections are still few, not very sensitive, rarely measure the optical rise phase of rapid-peaking GRB, and do not cover IR bands. However, measurements of prompt optical emission are a powerful discriminator of basic emission mechanisms through measurements of broad-band (optical-X-ray) slopes, simultaneous measurements of the low-energy and high-energy (possibly up-scattered) components, and with sufficient spectral coverage to measure an absorption frequency would determine electron energy distribution, magnetic field strength, and emission radius. This wealth of information is missing for the majority of GRB even at this late stage of this field. Near-IR (NIR) response would not only broaden the spectral coverage of such observations, but would also enable the study of extinguished GRBs; rapid-NIR response would also make possible dynamic measurements of dust evaporation in GRBs, an exciting new tool to study dust in individual star systems, separately from the larger-scale galaxy dust. We therefore discuss the performance and science for our Next Generation Rapid IR-Optical Response GRB (NGRG) space observatory, which features a wide-field X-ray camera for GRB location and a rapid-pointing telescope with optical and IR broad-band cameras operating simultaneously.

Using Swift data, we make reliable predictions of the performance of an observatory composed of BAT X-ray and UVOT Optical instruments "scaled-down" in collecting area, but with an added rapid optical-NIR response capability. Rapid-response could be easily achieved with a flat, gimbal-mounted, motorized beam-stearing mirror mounted in front of the optical-NIR telescope; the components of such a beam-steering system are mostly commercially available. We selected the fastest-response UVOT observations available to derive a distribution of early GRB brightness. Using this early distribution distribution, we can make conservative estimates of early detection rates. We find that for a BAT-like X-ray instrument barely 1/5 the collecting area of Swift BAT, we would still achieve a detection and location of 65 GRB/year. We estimate that for a 30 cm diameter IR-optical telescope, more than 14 detections in the optical, and more than 19 detections in the Near-IR would be made each year. With modern X-ray detectors responding down to ~ 5 keV (instead of BAT's ~ 15 keV threshold) would significantly increase these numbers. The addition of NIR sensitivity also increases optical rates by detection of moderately extinguished GRB. We also find that our beam-steering system would allow image stabilization via image feedback; this would in turn eliminate the need for an expensive arc second stabilized purpose-built spacecraft, allowing the mission to "piggyback" on a more typical spacecraft with other instruments, further reducing the mission cost. A modest-cost mission with high scientific return and new rapid-response capability that would also provide rapid optical-quality positions for the GRB community could have significant advantage in the current space funding regime.

Presentation type :

Oral

Primary authors : Dr. GROSSAN, Bruce (UC Berkeley Space Science Laboratory)

Co-authors :

Presenter :

Track classification :

Contribution type : --not specified--

Submitted by : Dr. GROSSAN, Bruce

Submitted on Monday 31 March 2014

Last modified on : Monday 31 March 2014

Comments :

Status : SUBMITTED

Track judgments :

Abstract ID : 26

What are the Under Luminous GRBs?

Content :

Previous works on X-ray light-curves of Gamma-Ray Bursts afterglows have shown the existence of three populations, according to the behavior of the light curve after the plateau phase. Here we focus on the under-luminous GRBs. We first present the method used to select them from the full burst sample. Then we will discuss various bias and we show that they do not influence the distribution of under-luminous GRBs. We present a study of their spectral and decay indexes in the context of the closure relation for afterglows, both for a wind and constant ISM model. We show that these events does differ significantly from the general GRB population.

Presentation type :

poster

Primary authors : Ms. DERELI, Husne (ARTEMIS-Observatoire de la Côte d'Azur)

Co-authors :

Presenter :

Track classification :

Contribution type : --not specified--

Submitted by : Ms. DERELI, Husne

Submitted on Monday 31 March 2014

Last modified on : Wednesday 02 April 2014

Comments :

Status : SUBMITTED

Track judgments :

Abstract ID : 28

Spectral evolution and pulse decomposition of Gamma-ray Burst light curves

Content :

We analyzed spectral evolution of GRBs registered by INTEGRAL and Fermi observatories. Light curves of GRBs were decomposed into several single exponential pulses. And then spectral evolution was analyzed for well determined isolated pulses. It was found that for individual pulses of GRBs the dependence of spectral lag on energy band can be approximated by the relation t~Alog(E), where A is a positive parameter, which correlates with pulse duration. We did not found any negative lag for individual pulses of GRBs. Negative lag may appear in case of GRB with complex multipulse structure due to different spectral parameters of individual pulses. We also investigated simple kinematic model describing such behaviour of GRB spectral evolution.

Presentation type :

Poster

Primary authors : Mr. MINAEV, Pavel (Space Research Institute)

Co-authors : Dr. POZANENKO, Alexei (Space Research Institute) ; Dr. GREBENEV, Sergei (Space Research Institute) ; Dr. MOLKOV, Sergei (Space Research Institute)

Presenter :

Track classification :

Contribution type : --not specified--

Submitted by : Mr. MINAEV, Pavel

Submitted on Monday 31 March 2014

Last modified on : Wednesday 14 May 2014

Comments :

Status : SUBMITTED

Track judgments :

Abstract ID : 29

Radiative transfer analysis across an ultra-relativistic shock in different inertial frames

Content :

We have investigated radiative transfer in a relativistic jet that may result in a gamma-ray burst (GRB). The relativistic jet formed around a compact object is a likely candidate producing the GRB because it requires less energy budget than a spherical phenomenon due to the collimated nature and can produce high-energy particles owing to the ultra-relativistic scattering flow even if matter temperature is not so high. However, the jet structure is responsible for not only the anisotropic distribution but also the emitted spectra, so coupling analysis with the flow structure and radiative transfer is needed for specifying a feasible GRB engine based on the observed events. The development of a computational method of the radiative transfer for high energy photons traveling in the relativistic flow is required for a reliable coupled computation with relativistic hydrodynamics.
Monte Carlo (MC) method was employed for solving the radiative transfer equation with Thomson and Compton scatterings. The developed code was assessed in detail for realizing a consistent transform between a comoving frame and an observer frame in an ultra-relativistic background flow through a test problem of a steady shock wave model in which equivalent shock waves were set in a shock-rest frame and two shock-moving frames (Lorentz factors and 10 and 100). The shock wave was determined by the relativistic Rankine-Hugoniot relations. In the test problem, the photons initially emitted from the downstream of the shock wave travel through the background flow with stochastic scatterings by the MC method, and some of them gain a large amont of energy due to the relativistic upstream velocity that corresponds to Lorentz factor of 220 in the shock rest frame.
In comparative study among three inertial frames, the Lorentz-transformed directional distributions of the escaped photons were fairly in agreement with each other by employing a small time interval for update of the background flow. The obtained spectra were also equivalent among three frames. The energy of some photons was boosted toward high energy side due to inverse Compton scatterings across the flow velocity jump between the upstream side and the downstream side of the shock and was severely affected by the optical depth of the upstream side. Moreover, the obtained results depend on the time interval of the flowfield because there is only a small difference between the shock velocity and the speed of light for the shock moving cases. The results suggested that the time interval smaller than 1/5 of the photon mean-free-path can reproduce the reliable directional distribution in any inertial frames.

Presentation type :

Poster

Primary authors : Ms. ISHII, Ayako (Department of Aerospace Engineering, Tohoku University)

Co-authors : Prof. OHNISHI, Naofumi (Department of Aerospace Engineering, Tohoku University) ; Dr. NAGAKURA, Hiroki (Yukawa Institute for Theoretical Physics) ; Dr. ITO, Hirotaka (Astrophysical Big Bang Laboratory, RIKEN) ; Prof. YAMADA, Shoichi (Advanced Research Institute for Science and Engineering, Waseda University)

Presenter :

Track classification :

Contribution type : --not specified--

Submitted by : Ms. AYAKO, Ishii

Submitted on Monday 31 March 2014

Last modified on : Wednesday 14 May 2014

Comments :

Status : SUBMITTED

Track judgments :

Abstract ID : 30

Short GRB from compact mergers, the role of Fermi GBM in the identification of advanced LIGO/Virgo detections

Content :

co-authors: V. Connaughton, M. S. Briggs, A. Goldstein, B. Zhang (UAH), E. Troja (GSFC)

Short Gamma-Ray Bursts (sGRB) are thought to originate from accreting stellar-mass black holes resulting from compact mergers. For the merger events occurring nearby, gravitational wave radiation will be observable after 2015 by the next generation of gravitational waves (GW) detectors (Advanced LIGO/Virgo). The Gamma-Ray Burst Monitor (GBM) on-board the Fermi space telescope will complement GW observations by detecting and localizing possible gamma-ray counterparts to merger candidates. The wide field-of-view and broad energy range of the GBM make it a prolific detector of sGRB: currently 45 sGRB on-board detections per year, many of them likely close-by, therefore within the Advanced LIGO/Virgo horizon for detecting compact mergers. This number can now be increased further thanks to a ground search for short transients, performed using individual GBM photon data collected over the full orbit since November 2012. We provide predictions for the rate of joint detections by GBM and the Advanced LIGO/Virgo detectors, and present how GBM can contribute to the rapid identification and follow-up of future GW triggers.

Presentation type :

oral

Primary authors : PELASSA, Veronique (University of Alabama in Huntsville)

Co-authors :

Presenter :

Track classification :

Contribution type : --not specified--

Submitted by : PELASSA, Veronique

Submitted on Monday 31 March 2014

Last modified on : Monday 31 March 2014

Comments :

Status : SUBMITTED

Track judgments :

Abstract ID : 31

How to switch on and off a GRB through a magnetar

Content :

One of the most elusive features of Gamma Ray Bursts (GRBs) is the sporadic emission prior to the main prompt event observed in at least 15% of cases. These precursors have spectral and temporal properties similar to the main prompt emission, and smaller, but comparable, energetics. They are separated from the main event by a quiescent time that may be extremely long and, in some cases, more than one precursor has been observed in the same burst. Precursors are still a puzzle: despite many attempts none of the proposed models can account for all the observed features. Based on the complete sample of bright long GRBs observed by Swift (BAT6), we propose a new scenario for which precursors are explained by assuming that the central GRB engine is a newly born magnetar. In this model the precursor and the prompt emission arise from accretion of matter onto the surface of the magnetar. The accretion process can be halted by the centrifugal drag exerted by the rotating magnetosphere onto the in-falling matter, allowing for multiple precursors and very long quiescent times. The fraction of GRBs powered by accreting magnetar may be even higher: we present the analysis of the extraordinarily bright GRB 130427A to show that an accretion-powered magnetar gives a unique view of the properties of long GRBs.

Presentation type :

oral

Primary authors : Dr. BERNARDINI, Maria Grazia (INAF - Osservatorio Astronomico di Brera)

Co-authors :

Presenter :

Track classification :

Contribution type : --not specified--

Submitted by : Dr. BERNARDINI, Maria Grazia

Submitted on Monday 31 March 2014

Last modified on : Monday 31 March 2014

Comments :

Status : SUBMITTED

Track judgments :

Abstract ID : 32

Off-Axis Orphan GRB Afterglow Searchs with SUBARU/Hyper-Suprime-Cam

Content :

We present ongoing off-axis orphan GRB afterglow survey by using the world-leading new wide-field imager Hyper-Suprime-Cam (HSC). The existence of off-axis orphan GRB afterglows provides direct evidence of collimated jets and actual occurrence rate of GRBs. However, orphan GRB afterglows are still theoretically predicted events and have not yet been observationally confirmed.
The expected properties of GRB orphan afterglows are (1) a lack of prompt emissions at high-energy wavelengths, (2) fainter brightness than that of on-axis GRB optical afterglows, (3) three-component light curves that contain rising, peak and rapid decay (same as the on-axis afterglow) (4) the same optical color as on-axis afterglows, and (5) similar host-galaxy properties as those of on-axis GRBs. With these expected observational features, an untargeted time domain deep survey in optical and/or radio is required Because the special distributions of GRBs are uniform, the same wide field-of-view is required as in gamma-ray detectors onboard GRB satellites. However, by considering the tilling observation strategy with proper cadence, the long lifetimes of the afterglows are helpful for reducing the FOV of instrument (which then reduces the difficulties of producing the new instrumentation). Optical wide-field imagers, HSC attached to Subaru telescope suffice to perform these surveys. HSC is a gigantic digital camera for 8.2 m Subaru telescope. The new camera uses the high sensitivity Hamamatsu CCD and the pixel number is 870 Mega pixels in total that cover 1.5 deg FOV in diameter. With this new powerful instrument, our Subaru HSC science consortium is awarded 300 nights of Subaru observing time over 5 years and just started the strategic survey in this March. Under this survey, we have been preparing the time domain survey to find out the first off-axis orphan GRB afterglow. We present status of the survey and possible Radio follow-up observations with ALMA and JVLA.

Presentation type :

oral

Primary authors : Dr. URATA, Yuji (IANCU)

Co-authors :

Presenter :

Track classification :

Contribution type : --not specified--

Submitted by : Dr. URATA, Yuji

Submitted on Monday 31 March 2014

Last modified on : Monday 31 March 2014

Comments :

Status : SUBMITTED

Track judgments :

Abstract ID : 33

Synchrotron self-inverse Compton radiation from reverse shock on GRB120326A

Content :

We present multi-wavelength observations of a typical long duration GRB 120326A at z=1.798, including rapid observations using a submillimeter array, and a comprehensive monitoring in X-ray and optical. SMA observation provided the fastest detection to date among seven submillimeter afterglows at 230 GHz.
The prompt spectral analysis, using Swift and Suzaku yielded a spectral peak energy of Epeak(src) =107.8^{+15.3}_{-15.3} keV and equivalent isotropic energy of Eiso as 3.18^{+0.40}_{-0.32} x 10^{52} erg. The temporal evolution and spectral properties observed in optical were consistent with the standard forward shock synchrotron with jet collimation 6.69+/-0.16 deg. The forward shock modeling using a 2D relativistic hydrodynamic jet simulation also determined the reasonable burst explosion and the synchrotron radiation parameters for the optical afterglow. The X-ray light curve showed no jet break and the temporal decay index relation between the X-ray and optical (alpha_opt -alpha_X=-1.45+/-0.10) indicated different radiation processes in the X-ray and optical. Introducing synchrotron self-inverse Compton radiation from reverse shock is a possible solution, and a the detection and the slow decay of the afterglow in submillimeter supports that this is a plausible idea. The observed temporal evolution and spectral properties as well as forward shock modeling parameters, enabled to determine reasonable functions to describe the afterglow properties. Because half of events share similar properties in the X-ray and optical to the current event, GRB120326A will be a benchmarks with further rapid follow-ups, using submillimeter instruments such as SMA and ALMA.

Presentation type :

poster

Primary authors : Dr. URATA, Yuji (IANCU)

Co-authors :

Presenter :

Track classification :

Contribution type : --not specified--

Submitted by : Dr. URATA, Yuji

Submitted on Monday 31 March 2014

Last modified on : Monday 31 March 2014

Comments :

Status : SUBMITTED

Track judgments :

Abstract ID : 34

HOW BAD IS THE EXTERNAL SHOCK AFTERGLOW MODEL FOR GAMMA-RAY BURST?

Content :

The external shock afterglow model for gamma-ray burst (GRB) require that the afterglow light curves in all bands should be achromatic. However, a very small fraction of GRBs with the achromatic feature in both optical and X-ray afterglows have been reported. Is that external shock model inadequacy? How bad is the external shock afterglow model for GRB? These observational puzzles require a systematic analysis both the X-ray and optical data. In this paper, we systematically analyze the Swift X-ray Telescope (XRT) data and the corresponding optical light by the ground-based telescopes. A well sample of 94 GRBs with both X-ray and optical detection were included, and characterize them into six grades: Gold sample (Grade I and Grade II) that show the achromatic behavior in X-ray and optical bands, and both bands satisfy the closure relation of external shock model, they are the external shock model candidates; Silver sample (Grade III and Grade IV) that show the achromatic behavior in X-ray and optical bands, and but at least on band could not satisfy the closure relation of external shock model, they may be candidates for long lasting reverse shock; Grade V that due to data is not enough in one band that could not rule out whether is achromatic behavior; Grade VI that have ahromatic behavior between X-ray and optical band.We classify these light curves behaviors as 4 types, energy injection break, edge effect jet break, energy injection jet break and single paw law (SPL) decay. The statics analysis result demonstated that most of GRBs afterglows can be interpreted with the external shock model well, only a small fraction are chromatic. We get 45/94 GRBs Gold sample, 39/94 GRBs Silver sample, 6/94 GRBs Grade V sample and only 4/96 GRBs Grade VI sample.For the Gold sample 22/45, 5/45, 10/45 and 20/45 GRBs are constrained as energy injection break, edge effect jet break, energy injection jet break and SPL decay , respectively. We derive parameters e.g. p, beta, energy injection parameter q, jet opening angle from Gold sample.

Presentation type :

Oral

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Co-authors : Prof. ZHANG, Bing (University of Nevada Las Vegas, USA) ; Prof. LIANG, En-wei (Guangxi University, China)

Presenter :

Track classification :

Contribution type : --not specified--

Submitted by : Dr. XIANG-GAO, Wang

Submitted on Monday 31 March 2014

Last modified on : Monday 31 March 2014

Comments :

Status : SUBMITTED

Track judgments :

Abstract ID : 35

GRBs luminosity indicators from the prompt emission

Content :

We study GRBs spectral and temporal properties to verify if these properties can be used as luminosity or redshift indicators. We analyze various classical relations (Epi-Eiso, Epi-Liso, Lag-Luminosity...) established with a new sample of GRBs detected by Swift and Fermi. We use these relations to discuss the impact of selection effects and to compare spectral and temporal luminosity indicators. We finally show that spectral relations are partly shaped by selection effects resulting directly from the measure of the redshift, indicating a link between prompt and afterglow properties.

Presentation type :

oral

Primary authors : Mr. HEUSSAFF, Vincent (IRAP) ; Dr. ATTEIA, Jean-luc (IRAP) ; Dr. ZOLNIEROWSKI, Yves (LAPP)

Co-authors :

Presenter :

Track classification :

Contribution type : --not specified--

Submitted by : Mr. HEUSSAFF, Vincent

Submitted on Monday 31 March 2014

Last modified on : Monday 31 March 2014

Comments :

Status : SUBMITTED

Track judgments :

Abstract ID : 36

Optically Dark Gamma-ray Bursts

Content :

Despite the rapid GRB follow-up with robotic telescopes about 30% of long duration GRBs show a lack or even total absence of the optical emission. Only X-ray afterglow and observation of host galaxies of those
dark bursts allow us to study the parameters of dark GRB sources and their environment. We review recent observations and present
statistical studies of optically dark gamma-ray bursts, and their host galaxies. Also we discuss dark burst properties in comparison with
optically bright bursts.

Presentation type :

oral

Primary authors : Mrs. VOLNOVA, Alina (Space research institute of the Russian academy of sciences)

Co-authors : Dr. POZANENKO, Alexei (Space research institute of Russian academy of sciences)

Presenter :

Track classification :

Contribution type : --not specified--

Submitted by : Mrs. VOLNOVA, Alina

Submitted on Tuesday 01 April 2014

Last modified on : Tuesday 01 April 2014

Comments :

Status : SUBMITTED

Track judgments :

Abstract ID : 37

Signatures of inner-engine dynamics revealed by advanced singular spectrum analysis of gamma-ray bursts

Content :

In the emerging field of the Gravitational Wave and Electromagnetic (GW/EM) Multimessenger Astronomy the Gamma Ray Bursts are very interesting targets: their gamma ray emission brings the imprint of processes expected to emit GWs.

An advanced, data-adaptive spectral method - Monte Carlo Singular Spectrum Analysis (MC-SSA) has been designed to study the EM emission and extract deterministic components among the structureless noise.

Using a bright sample of GRBs detected by the CGRO/BATSE mission, we found that the GRB light-curves are partially modulated by an erratic, though deterministic, process. The characteristic timescales associated with the reconstructed orbits are compatible with a black-hole–disk precessing system that is expected to act as a GW source.
The analysis of deterministic components in GRB signals gives insight into what kind of GW signals can be expected from a GRB - providing a fundamental experimental testbench for numerical relativity.

The talk will give an overview of the powerful data analysis techniques and also the main physical implications of our findings in the current GW/GRB models.

Presentation type :

oral

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Presenter :

Track classification :

Contribution type : --not specified--

Submitted by : Dr. GRECO, Giuseppe

Submitted on Thursday 03 April 2014

Last modified on : Sunday 06 April 2014

Comments :

Status : SUBMITTED

Track judgments :

Abstract ID : 38

A New Model for GRB Prompt Emission

Content :

GRB prompt emission spectra are usually considered as adequately fitted with the so-called Band function. Although purely empirical, the Band function has usually a non-thermal shape, but incompatible with the most popular synchrotron emission scenarios. Despite decades of use, the Band function clearly shows its limitations for interpreting the initial phase of the GRB phenomenon. Recent observation of bright GRBs with Fermi reveal significant spectral deviations to the Band function: a thermal-like component adequately approximated with a black body (BB) spectral shape and interpreted as the jet photospheric emission, and/or an additional power law (PL).

In this presentation, I show a sample of famous bright Fermi GRBs exhibiting the presence of the three components simultaneously. This new model completely changes the view that we had on those GRBs previously. While the fit of a Band function alone to the data results in dramatic changes of its parameter values on very short time scales - difficult to interpret - the three components of our new models vary much smoother. More importantly, in our new model, the Band function shape becomes (more) compatible with synchrotron model predictions. In addition, despite the presence of three distinct components, we succeed in reducing the complexity of this new model in making it statistically very competitive with a single Band function with only one additional degree of freedom. Through the presentation, we will see how the various components evolves with time and how this new model lead to an hardness-intensity relation which could ultimately be used as a tool for cosmology. Finally, we will see that the validity of this new model is supported by observation with other instruments such as CGRO/BATSE, Swift and WIND/Konus.

Presentation type :

oral

Primary authors : Dr. GUIRIEC, Sylvain (NASA Goddard Space flight center / CRESST / UMD)

Co-authors :

Presenter :

Track classification :

Contribution type : --not specified--

Submitted by : Dr. GUIRIEC, Sylvain

Submitted on Monday 07 April 2014

Last modified on : Monday 07 April 2014

Comments :

Status : SUBMITTED

Track judgments :

Abstract ID : 39

Searches for Neutrinos from Gamma-Ray Bursts with the ANTARES Neutrino Telescope

Content :

ANTARES is the largest high-energy neutrino telescope in the Northern Hemisphere. Its main scientific purpose is the search for astrophysical muon neutrinos that are detected via their charged-current interaction in Earth and the subsequent Cherenkov emission of the secondary muon in the water of the Mediterranean Sea. Gamma-ray bursts are among the most promising candidates for the experiment as they are thought to accelerate not only electrons - leading to the observed gamma rays - but also protons, which would yield the emission of EeV neutrinos.
The recent searches for muon neutrinos from
gamma-ray bursts using data of the ANTARES telescope will be presented.

Presentation type :

oral

Primary authors : SCHMID, Julia (ECAP, University Erlangen)

Co-authors :

Presenter :

Track classification :

Contribution type : --not specified--

Submitted by : SCHMID, Julia

Submitted on Wednesday 09 April 2014

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Comments :

Status : SUBMITTED

Track judgments :

Abstract ID : 40

Acceleration of UHECR at GRB internal shocks

Content :

Recent results from the Pierre Auger Observatory suggest that there might be a significant heavy component in high energy cosmic rays. It is therefore interesting to explore the possibility to accelerate not only protons but also complex nuclei in relativistic jets. We have investigated the acceleration of a mixed composition of cosmic rays in GRBs internal shocks, taking into account all the relevant energy loss mechanisms during the acceleration process. Three dimensional trajectories during the relativistic Fermi cycles are derived inspired by the work done by Niemiec and Ostrowski (04), and using the model of Daigne and Mochkovitch (98, 02) to model GRBs internal shocks. We calculate the cosmic rays fluxes escaping from the GRBs environment and secondary photons and neutrinos -produced both during the acceleration process and the UHECRs extragalactic propagation; the conditions for the GRBs to be sources of UHECRs as well as the role of the key physical parameters of the internal shocks(magnetic field intensity, composition, equipartition factors) will be discussed.

Presentation type :

Oral

Primary authors : Mr. ALLARD, Denis (APC)

Co-authors :

Presenter :

Track classification :

Contribution type : --not specified--

Submitted by : Mr. ALLARD, Denis

Submitted on Thursday 10 April 2014

Last modified on : Thursday 10 April 2014

Comments :

Status : SUBMITTED

Track judgments :

Abstract ID : 42

The Metal Aversion of LGRBs

Content :

Recently, it has been suggested that the metallicity aversion of Long-duration Gamma Ray Bursts (LGRBs) is not intrinsic to their formation, but rather a consequence of the anti-correlation between star formation and metallicity seen in the general galaxy population. To investigate this proposal, we compare the metallicity of the hosts of LGRBs, broad-lined Type Ic (Ic-bl) supernovae (SNe), and Type II SNe to each other and to the metallicity distribution of star-forming galaxies using the Sloan Digital Sky Survey (SDSS) to represent galaxies in the local universe and the Team Keck Redshift Survey (TKRS) for galaxies at intermediate redshifts. The differing metallicity distributions of LGRB hosts and the star formation in local galaxies forces us to conclude that the low-metallicity preference of LGRBs is not primarily driven by the anti-correlation between star formation and metallicity, but rather must be overwhelmingly due to the astrophysics of the LGRBs themselves. Three quarters of our LGRB sample are found at metallicities below $12+\log(O/H) < 8.6$, while less than a one-tenth of local star formation is at similarly low metallicities. However, our SN samples are statistically consistent with the metallicity distribution of the general galaxy population. Additionally, we show that the star formation rate distribution of the LGRB and SNe host populations are consistent with the star formation rate distribution of the SDSS galaxy sample. Using the TKRS population of galaxies, we can exclude the possibility that the LGRB host metallicity aversion is caused by the decrease in galaxy metallicity with redshift, as this effect is clearly much smaller than the observed LGRB host metallicity bias over the redshift span of our sample. The presence of the strong metallicity difference between LGRBs and Type Ic-bl SNe largely eliminates the possibility that the observed LGRB metallicity bias is a byproduct of a difference in the initial mass functions of the galaxy populations. Rather, metallicity below half-solar must be a fundamental component of the evolutionary process that separates LGRBs from the vast majority of Type Ic-bl SNe and from the bulk of local star formation.

Presentation type :

oral

Primary authors : Dr. GRAHAM, John (Max Planck Institute for Extraterrestrial Physics)

Co-authors :

Presenter :

Track classification :

Contribution type : --not specified--

Submitted by : Dr. GRAHAM, John

Submitted on Thursday 10 April 2014

Last modified on : Thursday 10 April 2014

Comments :

Status : SUBMITTED

Track judgments :

Abstract ID : 43

Photo-Detector Module electronics for EUSO-TA and EUSO-Balloon

Content :

One of the key open questions in the field of astroparticle physics and high-energy astrophysics concerns the origin of the so-called Ultra-High-Energy Cosmic Rays (UHECR). They consist in protons and nuclei traveling through the universe with macroscopic energies, reaching 10^20 eV and beyond. While these UHECRs are the most energetic particles known in the universe, their sources and acceleration mechanism are still to be identified. A major challenge is the very low UHECR flux, which amounts to about 1 particle per km^2 per millennium at the highest energies! For this reason, huge detectors must be developed to study UHECRs with reasonable statistics.
In other words, UHECRs arrive at the outer limits of the earth's atmosphere too infrequently to be directly detected by passing through instrumentation. Instead we detect the UV fluorescence light generated by the Extensive Air Showers (EAS) of secondary particles generated as UHECRs pass into the earth's atmosphere.
JEM-EUSO is a space mission to observe UHECRs using this fluorescence technique to explore the origin and propagation of the energetic extraterrestrial particles above the GZK-cut-off through observations of their arrival directions and energies at the Japanese Experimental Module on the International Space Station. This is a new type of observatory that will utilize an extremely large volume of the Earth's atmosphere as a detector for high-energy particles from space. JEM-EUSO provides an unprecedented Field-of-View (±30°), recording EASs with a time resolution of 2.5 microseconds.
Two pathfinder experiments are currently being prepared: one to observe the fluorescence background from the edge of the atmosphere (EUSO-Balloon), and the other to demonstrate the capability of the instrument to detect air showers with the EUSO telescope (EUSO-TA) on the ground.
Both pathfinder experiments use a detector consisting of one Photo Detector Module (PDM), identical to the 137 that will be present on the JEM-EUSO focal surface. UV light generated by high-energy particle air showers passes the UV filter and impacts the MAPMTs. Here UV photons are converted into electrons, which are multiplied by the MAPMTs and fed into the EC-ASIC boards, which perform the photon counting and charge estimation. The PDM board interfaces with these ASIC boards, providing power and configuration parameters, collecting data and performing the level 1 trigger. In this presentation, I will describe details of the design and fabrication of the PDM, as well as its preliminary test results.

Presentation type :

poster

Primary authors : Ms. JUNG, Aera (Department of Physics, Paris Diderot-Paris 7 University, Paris, France)

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Lech Wiktor (RIKEN, Wako, Japan) ; Dr. TSUNO, Katsuhiko (RIKEN, Wako, Japan) ; Dr. LEE, Jik (Department of Physics, Sungkyunkwan University, Suwon, Korea) ; Prof. PARK, Ilhung (Department of Physics, Sungkyunkwan University, Suwon, Korea) ; Prof. SANTANGELO, Andrea (Institute for Astronomy and Astrophysics, Kepler Center, University of Tübingen, Tübingen, Germany)

Presenter :

Track classification :

Contribution type : --not specified--

Submitted by : Ms. JUNG, Aera

Submitted on Thursday 10 April 2014

Last modified on : Thursday 10 April 2014

Comments :

Status : SUBMITTED

Track judgments :

Abstract ID : 44

Improved ultra-high energy cosmic ray and neutrino predictions from gamma-ray bursts

Content :

The high luminosities of gamma-ray bursts (GRBs) make them ideal candidate sources of the ultra-high energy cosmic rays (UHECRs). GRB fireball models posit that magnetically-confined protons or nuclei in relativistic matter ejecta are shock-accelerated up to the energies of <~ 10^21 eV that are needed to explain the UHECR observations; in the basic models, only neutrons are able to escape and, after decaying into protons, they are eventually observed at Earth as UHECRs. As a result of the interaction between the protons and the photons in the source, UHE neutrinos are produced: their detection in correlation with GRBs would constitute the smoking gun of the occurrence of hadronic acceleration in them. Recently, neutrino telescopes have started to reach sensitivities that put tension on the analytical GRB fireball models that have traditionally been used to make the predictions. We will present here an updated, numerical model of the neutrino flux from GRBs (NeuCosmA) which relieves the tension by yielding a prediction that lies safely one order of magnitude below the current IceCube upper bounds. Furthermore, we will explore the possibility of joint UHE proton and neutrino production in GRBs within a self-consistent, generalised model where the magnetic confinement of the protons in the source is imperfect so that some of them are able to "leak out" before interacting, thereby affecting both the UHECR and neutrino fluxes. During their propagation to Earth, protons experience energy losses and produce cosmogenic neutrinos via interactions with the cosmological photon backgrounds. Armed with this, we will attempt to clarify the cosmic ray-neutrino connection and we will show that current observations of the UHECR spectrum by giant air shower detectors, together with the upper bounds on the flux of both neutrinos from GRBs and cosmogenic neutrinos, are already able to strongly constrain the emission and propagation properties of UHECRs and neutrinos under the hypothesis that GRBs are the sources of both. We will end by showing preliminary results obtained with a dynamical fireball model, where we build up the particle spectra by treating separately the individual collisions among the emitted ejecta, thus making more realistic flux predictions.

Presentation type :

Oral

Primary authors : BUSTAMANTE, Mauricio (DESY / Universität Würzburg)

Co-authors : Dr. WINTER, Walter (DESY) ; Dr. BAERWALD, Philipp (Penn State)

Presenter :

Track classification :

Contribution type : --not specified--

Submitted by : Mr. BUSTAMANTE, Mauricio

Submitted on Thursday 10 April 2014

Last modified on : Thursday 10 April 2014

Comments :

Status : SUBMITTED

Track judgments :

Abstract ID : 45

Development of a multidimensional relativistic radiative transfer code

Content :

We develop a multidimensional relativistic radiative transfer code. The code is an extension of the spherical harmonic discrete ordinate method (SHDOM), which solves a static radiative transfer equation with a ray tracing in the discrete ordinate and a source function with the spherical harmonics. We implement time dependence, Lorentz transformation, and Compton scattering to solve the relativistic radiative transfer equation in relativistic jets of gamma-ray bursts. In this presentation, we report various test problems for radiative transfer calculations, e.g., searchlight beam test, two beam with shadow test, radiative pulse test, and relativistic beaming test, and comparisons with a Monte Carlo method.

Presentation type :

Poster

Primary authors : Dr. TOMINAGA, Nozomu (Konan University)

Co-authors : Mr. SHIBATA, Sanshiro (Konan university) ; Prof. BLINNIKOV, Sergei (ITEP)

Presenter :

Track classification :

Contribution type : --not specified--

Submitted by : Dr. TOMINAGA, Nozomu

Submitted on Friday 11 April 2014

Last modified on : Wednesday 14 May 2014

Comments :

Excuse me for the late submission. I very appreciate your kind management.

Status : SUBMITTED

Track judgments :

Abstract ID : 46

Searches for coincident High Energy Neutrinos and Gravitational Wave Bursts using the ANTARES and Virgo/LIGO detectors

Content :

Cataclysmic cosmic events can be plausible sources of both gravitational waves (GW) and high energy neutrinos (HEN), alternative cosmic messengers carrying information from the innermost regions of the astrophysical engines. Possible sources include long and short gamma-ray bursts (GRBs) but also low-luminosity or choked GRBs, with no or low gamma-ray emissions.

The ANTARES Neutrino Telescope can determine accurately the time and direction of high energy neutrino events, and the Virgo/LIGO network of gravitational wave interferometers can provide timing/directional information for gravitational wave bursts. Combining these informations through GW+HEN coincidences provide a novel way of constraining the processes at play in the sources, and also help confirm the astrophysical origin of a HEN/GW signal in case of concomitant observation.

This contribution describes the joint GW+HEN searches performed using data taken with the ANTARES telescope both in 2007 (while Antares was half its final size) and in 2009-2010 (with the full Antares) combined with data from the Virgo/LIGO interferometers during the VSR1/S5 and VSR2-3/S6 (with improved sensitivites) science runs. These joint analyses allow to place upper limits on the density of joint GW+HEN emitters, which can be compared to the densities of binary mergers or core-collapse events in the local universe – processes potentially at the origin of GRBs.

Presentation type :

ORAL

Primary authors : Mr. PRADIER, Thierry (Université de Strasbourg & IPHC/DRS)

Co-authors :

Presenter :

Track classification :

Contribution type : --not specified--

Submitted by : Mr. PRADIER, Thierry

Submitted on Friday 11 April 2014

Last modified on : Friday 11 April 2014

Comments :

on behalf of the ANTARES, LSC and Virgo Collaborations

Status : SUBMITTED

Track judgments :

Abstract ID : 47

ISS-Lobster: A Future Observatory for the Multi-Messenger Era

Content :

The detection of electromagnetic counterparts to gravitational wave and neutrino transient sources is both a promising and challenging prospect. The wide-field soft-X-ray telescope ISS-Lobster will provide a sensitive all-sky survey for monitoring of persistent and variable source, detection of X-ray transients, and the ability to rapidly and efficiently chase transient sources detected elsewhere. With a proposed launch in 2019, and placement on the International Space Station, it will be ideally timed for the advanced era of gravitational wave detectors. ISS-Lobster will contribute to gamma-ray bursts studies by providing GRB triggers with arcminute localizations, sensitivity to high redshift bursts, and contribute to both prompt emission and afterglow science.

Presentation type :

oral

Primary authors : Dr. RACUSIN, Judith (NASA/GSFC)

Co-authors :

Presenter :

Track classification :

Contribution type : --not specified--

Submitted by : Dr. RACUSIN, Judith

Submitted on Friday 11 April 2014

Last modified on : Friday 11 April 2014

Comments :

Status : SUBMITTED

Track judgments :

Abstract ID : 48

GRB110731A: Early afterglow in stellar wind powered by a magnetized outflow

Content :

One of the most energetic gamma-ray burst GRB 110731A was observed from optical to GeV energy range by Fermi and Swift Observatories, and by the MOA and GROND optical telescopes. Previous analysis on the prompt phase revealed similarities with the brightest gamma-ray burst: i) a delayed onset of the high-energy emission (> 100 MeV), ii) a short-lasting bright MeV peak at later times and iii) a long-lasting GeV component starting during this phase and lasting hundred of seconds. Additionally to the prompt phase, multiwavelength observations over different epochs (from trigger time to more than 800 s) showed that the spectral energy distribution was better fitted by a wind afterglow model. Taking into account the spectral and temporal features of the long-lasting high-energy emission and the brightest peak in the LAT lightcurve exhibited at the later prompt phase, we present a leptonic model based on an early afterglow emission which evolves in a stellar wind and is powered by a magnetized outflow. The origin of these components is modeled by means of synchrotron self-Compton emissions in the external shocks: the long-lasting GeV emission at forward shock and the brightest peak at reverse shock. The dynamics of reverse shock is developed in the thick regime. The calculated fluxes and break energies are all consistent with the observed values.

Presentation type :

Oral

Primary authors : Dr. FRAIJA, Nisism (IA - UNAM)

Co-authors : Dr. LEE, William H. (IA - UNAM)

Presenter :

Track classification :

Contribution type : --not specified--

Submitted by : Dr. FRAIJA, Nissim

Submitted on Saturday 12 April 2014

Last modified on : Saturday 12 April 2014

Comments :

Status : SUBMITTED

Track judgments :

Abstract ID : 49

Resonant oscillations of GeV - TeV neutrinos caused by internal shocks in GRBs

Content :

Collapsing massive stars in the long gamma-ray bursts framework have been related with the high-energy neutrino detections of IceCube. These neutrinos and photons are produced in internal shocks which take place inside stars. Being these neutrinos the only signature while jet has not broken out or failed we show the importance of considering the internal shock effect on the neutrino. For that we calculate the neutrino effective potential generated by internal shocks in low- and high-luminosity gamma-ray bursts when a Wolf-Rayet star and Blue Super Giant are considered as progenitors. By considering two (solar, atmospheric and accelerator parameters) and three neutrino mixing, we show that GeV - TeV neutrinos can oscillate resonantly from one flavor to another. Based on this effect, we estimate the neutrino flavor ratios ν_x/ν_y for $x, y=e,\mu$ and τ showing a deviation up to 13\% of the standard flavor ratio.

Presentation type :

poster

Primary authors : Dr. FRAIJA, Nissim (Astronomy Institute - UNAM)

Co-authors :

Presenter :

Track classification :

Contribution type : --not specified--

Submitted by : Dr. FRAIJA, Nissim

Submitted on Sunday 13 April 2014

Last modified on : Sunday 13 April 2014

Comments :

Status : SUBMITTED

Track judgments :

Abstract ID : 50

Photo-Detector Module electronics for UFFO pathfinder and EUSO

Content :

There are many types of detectors that can be used with high energy observation for Gamma Ray Bursts (GRBs) and Ultra High Energy Cosmic Rays (UHECRs). Here I focus on the use of Field-Programmable Gate Array (FPGA) high-speed data processing of Multi-Anode Photo-Multiplier Tube (MAPMT) detectors. This poster introduces two space missions, the Ultra-Fast Flash Observatory (UFFO) pathfinder for observing GRBs and the Japanese Experiment Module - Extreme Universe Space Observatory (JEM-EUSO) for observing UHECRs.

The UFFO pathfinder is a space mission devoted to the measurement of Gamma-Ray Bursts (GRBs), especially their early light curves which will give crucial information on the progenitor stars and central engines of the GRBs. It consists of two instruments: the UFFO Burst Alert & Trigger telescope (UBAT) for the detection of GRB locations with then triggers observation with the Slewing Mirror Telescope (SMT) for the UV/optical afterglow observations. The UBAT employs a coded-mask γ/X-ray camera with a wide Field-of-View (FOV), and is comprised of three parts: a coded mask, a hopper, and a detector. The UBAT detector consists of a YSO scintillator crystal array, MAPMTs, and analog and digital readout electronics. We present here the design and fabrication of the UBAT detector, as well as its preliminary test results. UFFO pathfinder is intended to be the predecessor of a much larger space mission of a similar scaled up design.

JEM-EUSO is a space mission to observe UHECRs using this fluorescence technique to explore the origin and propagation of the energetic extraterrestrial particles above the GZK-cut-off through observations of their arrival directions and energies at the Japanese Experimental Module on the International Space Station. This is a new type of observatory that will utilize an extremely large volume of the Earth's atmosphere as a detector for high-energy particles from space. JEM-EUSO provides an unprecedented FOV (±30°), recording Extensive Air Showers (EAS) with a time resolution of 2.5 microseconds.
Two pathfinder experiments are currently being prepared: one to observe the cosmic ray fluorescence background from the edge of the atmosphere (EUSO-Balloon), and the other to demonstrate the capability of the instrument to detect UHECR air showers with the EUSO telescope (EUSO-TA) on the ground.
Both EUSO pathfinder experiments use a detector consisting of one Photo Detector Module (PDM), identical to the 137 that will be present on the JEM-EUSO focal surface. UV light generated by high-energy particle air showers passes the UV filter and impacts the Multi-Anode Photo-Multiplier Tubes (MAPMT). Here UV photons are converted into electrons, which are multiplied by the MAPMTs and fed into the EC-ASIC boards, which perform the photon counting and charge estimation. The PDM board interfaces with these ASIC boards, providing power and configuration parameters, collecting data and performing the level 1 trigger. In this poster, I will describe details of the design and fabrication of the PDM, as well as its preliminary test results.

Presentation type :

Poster

Primary authors : Ms. JUNG, Aera (Université Paris Diderot-Paris 7)

Co-authors :

Presenter :

Track classification :

Contribution type : --not specified--

Submitted by : Dr. LACHAUD, Cyril

Submitted on Monday 14 April 2014

Last modified on : Monday 14 April 2014

Comments :

Status : SUBMITTED

Track judgments :

Abstract ID : 51

Testing of Performance of UFFO Burst Alert & Trigger Telescope

Content :

The Ultra-Fast Flash Observatory pathfinder (UFFO-p) is a space mission dedicated to detect Gamma-Ray Bursts (GRBs) and rapidly follow their afterglows to provide early optical/UV measurements. GRB location is determined in a few seconds by the UFFO Burst Alert & Trigger telescope (UBAT) employing the coded-mask technique and detector compound of YSO scintillating crystals and multi-anode photomultiplier tubes (MAPMTs). Here we describe the results of the laboratory tests of its functionality and performance. The x-ray imaging capability of sources as strong as typical GRBs has been proven as well as its good response close to the designed energy range 10-150 keV. We also describe test results of its energy resolution and localization accuracy. The UBAT instrument is assembled and integrated with other equipment on UFFO-p and should be launched on board of the Lomonosov satellite next year.

Presentation type :

poster

Primary authors : Dr. RIPA, Jakub (Sungkyunkwan University)

Co-authors :

Presenter :

Track classification :

Contribution type : --not specified--

Submitted by : Dr. GOTZ, Diego

Submitted on Tuesday 15 April 2014

Last modified on : Tuesday 15 April 2014

Comments :

Status : SUBMITTED

Track judgments :

Abstract ID : 52

A curious mathematical method for the calculation of the luminosity distance for the flat cosmological model using the elliptic integral of the first kind

Content :

The dependence of the luminosity distance on the redshift is a key relation in the cosmology. It is known that this dependence can well be given by standard functions for the zero cosmological constant. On the other hand, it is widely meant that for the non-zero cosmological constant a numerical integration is necessary. Here we show that also for the case of non-zero cosmological constant, if the universe is spatially flat, an analytical integration is still possible. The integration ends in an elliptic integral of the first kind. The contribution is based on the article Meszaros and Ripa (2013); A, 556, A13.

Presentation type :

poster

Primary authors : Dr. RIPA, Jakub (Sungkyunkwan University)

Co-authors :

Presenter :

Track classification :

Contribution type : --not specified--

Submitted by : Dr. GOTZ, Diego

Submitted on Tuesday 15 April 2014

Last modified on : Tuesday 15 April 2014

Comments :

Status : SUBMITTED

Track judgments :

Abstract ID : 53

GRB Prompt and Afterglow Observations

Content :

Gamma-ray bursts (GRBs) are powerful explosions, visible to high redshift, and thought to be the signature of black hole formation. There are a large number of highly-capable observatories currently involved in GRB observations including Swift, Fermi, Konus, and INTEGRAL for prompt emission and telescopes across the electromagnetic spectrum for follow-up. This talk will summary current observations of prompt and afterglow emission and will highlight recent active areas. One hot topic is the similarities and differences of short and long bursts. Another one of intense activity and debate is the presence of thermal black-body components in the prompt emission. An interesting area opened up by the current observatories is the study of correlations between prompt and afterglow emission.

Presentation type :

Invited

Primary authors : Prof. GEHRELS, Niel (NASA/GSFC)

Co-authors :

Presenter :

Track classification :

Contribution type : --not specified--

Submitted by : Dr. GOTZ, Diego

Submitted on Tuesday 15 April 2014

Last modified on : Tuesday 15 April 2014

Comments :

Status : SUBMITTED

Track judgments :

Abstract ID : 54

The physical origin of the prompt GRB emission: the case of GRB 130427A

Content :

The prompt GRB emission is produced by internal dissipation in an ultra-relativistic outflow. Depending on the energy content of the outflow, three main dissipation mechanisms are possible : photospheric emission, internal shocks, magnetic reconnection. I will discuss recent constraints on these three theoretical models obtained from recent Swift and Fermi observations, with a focus on GRB 130427A, an especially interesting case due to an excellent spectral coverage of the prompt emission from the optical to the GeV range.

Presentation type :

poster

Primary authors : DAIGNE, Frédéric (Institut d'Astrophysique de Paris - Université Pierre et Marie Curie)

Co-authors :

Presenter :

Track classification :

Contribution type : --not specified--

Submitted by : Dr. GOTZ, Diego

Submitted on Thursday 17 April 2014

Last modified on : Thursday 17 April 2014

Comments :

Status : SUBMITTED

Track judgments :

Abstract ID : 55

Search for gravitational waves associated with gamma-ray bursts detected by the InterPlanetary Network

Content :

We present the results of a search for gravitational waves associated with 223 gamma-ray bursts (GRBs) detected by the InterPlanetary Network (IPN) in 2005–2010 during LIGO's fifth and sixth science runs and Virgo's first, second and third science runs. The IPN satellites provide accurate times of the bursts and sky localizations that vary significantly from degree scale to hundreds of square degrees. We search for both a well–modeled binary coalescence signal, the favored progenitor model for short GRBs, and for generic, unmodeled gravitational wave bursts. Both searches use the event time and sky localization to improve the gravitational-wave search sensitivity as compared to corresponding all–time, all–sky searches. We find no evidence of a gravitational-wave signal associated with any of the IPN GRBs in the sample, nor do we find evidence for a population of weak gravitational-wave signals associated with the GRBs. For all IPN–detected GRBs, for which a sufficient duration of quality gravitational-wave data is available, we place lower bounds on the distance to the source in accordance with an optimistic assumption of gravitational-wave emission energy of 10–2M⊙c2 at 150 Hz, and find a median of 13Mpc. For the 27 short-hard GRBs we place 90% confidence exclusion distances to two source models: a binary neutron star coalescence, with a median distance of 12 Mpc, or the coalescence of a neutron star and black hole, with a median distance of 22Mpc. Finally, we combine this search with previously published results to provide a population statement for GRB searches in first–generation LIGO and Virgo gravitational-wave detectors, and a resulting examination of prospects for the advanced gravitational–wave detectors.

Presentation type :

poster

Primary authors : Dr. PREDOI, Valeriu (Cardiff University)

Co-authors :

Presenter :

Track classification :

Contribution type : --not specified--

Submitted by : Dr. GOTZ, Diego

Submitted on Thursday 17 April 2014

Last modified on : Thursday 17 April 2014

Comments :

Status : SUBMITTED

Track judgments :

Abstract ID : 56

Electromagnetic follow-up of gravitational wave candidates: perspectives in INAF

Content :

The electromagnetic (EM) emission associated with a gravitational wave (GW) signal is still an unexplored field. The phenomena involved, merger of neutron stars and/or black holes and core-collapse of massive stars, are expected to cause rapid transient electromagnetic signals. The EM follow-up of GW signals will have to deal with large position uncertainties. The gravitational sky localization is expected to be tens to hundreds of square degrees. Consequently, wide-field cameras to cover the entire GW error box and rapid follow-up observations to characterize the EM candidates will be crucial for the first EM counterpart identification.
In this poster we want to present some of the activities that we are currently doing to optimize the response of the INAF network of facilities that will represent an efficient operational framework capable of fast reaction on large error box triggers and direct identification and characterization of the candidates.

Presentation type :

poster

Primary authors : Dr. PIRANOMONTE, Silvia (INAF OAR)

Co-authors :

Presenter :

Track classification :

Contribution type : --not specified--

Submitted by : Dr. GOTZ, Diego

Submitted on Thursday 17 April 2014

Last modified on : Thursday 17 April 2014

Comments :

Status : SUBMITTED

Track judgments :

Abstract ID : 57

INTEGRAL observations of GRBs: spectral properties and investigation of the emission on long time scales

Content :

We present the spectral properties of the gamma-ray bursts detected by the INTEGRAL satellite. In the period between December 2002 and February 2012 INTEGRAL observed 83 GRBs. The spectral parameters were derived by combining the data from the two main instruments on board INTEGRAL, the spectrometer SPI (Spectrometer on INTEGRAL) nominally covering the energy range 18 keV - 8 MeV, and the imager IBIS (the Imager on Board the INTEGRAL Satellite) with spectral sensitivity in the range 15 keV - 10 MeV. We compare the prompt emission properties of the INTEGRAL GRB sample with the BATSE and Fermi samples. INTEGRAL IBIS data allow the investigation of the GRB emission on long time scales before and after the main event. We present the preliminary results of the precursor/late emission searches using the IBIS GRB data.

Presentation type :

Poster

Primary authors : Dr. BOSNJAK, Zeljka (University of Rijeka)

Co-authors : Dr. GOTZ, Diego (CEA Saclay)

Presenter :

Track classification :

Contribution type : --not specified--

Submitted by : Dr. GOTZ, Diego

Submitted on Monday 28 April 2014

Last modified on : Monday 28 April 2014

Comments :

Status : SUBMITTED

Track judgments :

Abstract ID : 58

Ground-based Wide Angle Camera: an instrument for short-time-scale optical transients

Content :

Ground-based Wide Angle Camera (GWAC) is designed to detect optical prompt emission of GRBs simultaneously with Eclairs and GRM aboard SVOM. GWAC consists of 36 cameras, has an assembled field of view of about 5,000 square degrees. Each camera, equipped with a 4kx4k, 12x12mm back-illuminated CCD, has limiting magnitude of about 16.0V(5s) in dark night with 10-second exposure. Data processing pipelines are developed to pick out optical transients in real time even without trigger information from other facilities. There are three dedicated telescopes, two 60 centimeter telescope and one 30 centimeter telescope, to identify and follow up transients detected by GWAC. Beside GRB prompt emission, GWAC is also a powerful instrument for hunting other short-time-scale optical transients, such as shock-break-out of supernovae, optical counterparts of NS-NS mergers, short-time-scale gravitational micro-lensing, and fast moving near Earth objects (NEO).

Presentation type :

Solicited

Primary authors : Dr. WEI, Jianyan (NAOC Beijing)

Co-authors :

Presenter :

Track classification :

Contribution type : --not specified--

Submitted by : Dr. GOTZ, Diego

Submitted on Monday 28 April 2014

Last modified on : Monday 28 April 2014

Comments :

Status : SUBMITTED

Track judgments :

Abstract ID : 59

Search for properties of Gamma-Ray Bursts at high redshift

Content :

I shall report on an ongoing search for particular properties belonging to Gamma-Ray Bursts at high redshift.

Presentation type :

Poster

Primary authors : Dr. PIZZICHINI, Graziella (INAF/IASF Bologna)

Co-authors :

Presenter :

Track classification :

Contribution type : --not specified--

Submitted by : Dr. LACHAUD, Cyril

Submitted on Wednesday 30 April 2014

Last modified on : Wednesday 30 April 2014

Comments :

Status : SUBMITTED

Track judgments :

Abstract ID : 60

Investigations into the Spectral and Temporal Behavior of Short GRBs Using Multiple Instruments

Content :

Fermi observations of short GRBs suggest complex spectral behavior, including extra components beyond the Band function and extended high-energy emission. Swift observations of short GRBs indicate there may be multiple populations of short GRBs. We combine the bright, short GRBs detected by GBM and BATSE to investigate possible prompt and possible extended emission. We are also comparing the temporal and spectral behavior of short GRBs detected by GBM and Swift.

Presentation type :

Poster

Primary authors : Mr. BURNS, Eric (University of Alabama in Huntsville)

Co-authors :

Presenter :

Track classification :

Contribution type : --not specified--

Submitted by : Dr. LACHAUD, Cyril

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Comments :

Status : SUBMITTED

Track judgments :

Abstract ID : 61

Gamma-Ray Bursts and Ultrahigh Energy Cosmic Rays in the Multi-Messenger Era

Content :

GRBs have long been considered one of the promising candidates for the sources of UHECRs, although the viability of this picture has also been challenged from various viewpoints. We overview the current status of the GRB-UHECR origin hypothesis in light of the latest cosmic ray, neutrino and multiwavelength observations, and highlight selected theoretical issues. The prospects for future multi-messenger measurements are also addressed.

Presentation type :

Invited

Primary authors : Dr. INOUE, Susumu (ICRR Tokyo)

Co-authors :

Presenter :

Track classification :

Contribution type : --not specified--

Submitted by : Dr. GOTZ, Diego

Submitted on Tuesday 13 May 2014

Last modified on : Tuesday 13 May 2014

Comments :

Status : SUBMITTED

Track judgments :

Abstract ID : 62

GRBs as sources of Gravitational Waves

Content :

Both long and short Gamma Ray Bursts are potentially strong emitters of gravitational waves. In particular, neutron star binary mergers, the preferred progenitor model for short GRBs, are one of the most promising sources of gravitational waves. In this talk, I review the expected waveforms and the sensitivity of the gravitational wave detector network to these signals. I summarize the results of searches performed to date as well as discussing the prospects for observations of gravitational wave signals associated to GRBs in the coming years.

Presentation type :

Invited

Primary authors : Dr. FAIRHURST, Stephen (Cardiff University)

Co-authors :

Presenter :

Track classification :

Contribution type : --not specified--

Submitted by : Dr. GOTZ, Diego

Submitted on Tuesday 13 May 2014

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Comments :

Status : SUBMITTED

Track judgments :

Abstract ID : 63

Progenitors of Short Gamma-Ray Bursts

Content :

In this review talk I will begin by summarizing about a decade of observations of short GRBs, their afterglows and occasional extended emission (both plateaus and flares), host galaxies, and environments. I will then discuss how this wealth of observations has helped to shed light on the nature of their progenitors, pointing to a likely origin in the merger of two compact objects, though several open questions still remain. I will conclude by highlighting the expectations for short GRB science in connection with gravitational wave detections.

Presentation type :

Invited

Primary authors : Dr. PERNA, Rosalba (Stonybrook University)

Co-authors :

Presenter :

Track classification :

Contribution type : --not specified--

Submitted by : Dr. GOTZ, Diego

Submitted on Tuesday 13 May 2014

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Comments :

Status : SUBMITTED

Track judgments :

Abstract ID : 64

The Large High Altitude Air Shower Observatory in the landscape of GRBs

Content :

The Large High Altitude Air Shower Observatory (LHAASO) project is dedicated to the sub TeV-PeV gamma-ray astronomy as well as the 5 TeV-1 EeV cosmic ray physics. It will detect air showers over a wide energy range with a large field of view, high duty cycle, and with a powerful gamma/hadron discrimination. With such characteristics, and its location at 4400m, LHAASO will be a major actor for the search of the high energy component of Gamma Ray Burst.

Presentation type :

Invited

Primary authors : Mrs. LHENRY-YVON, Isabelle (IPN Orsay)

Co-authors :

Presenter :

Track classification :

Contribution type : --not specified--

Submitted by : Dr. GOTZ, Diego

Submitted on Tuesday 13 May 2014

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Comments :

Status : SUBMITTED

Track judgments :

Abstract ID : 65

GRBSs and SKA

Content :

Gamma Ray Burst studies in the radio band will soon be possible thanks to the advent of the Square Kilometer Array (SKA) and its precursors. Observations of the early phase of the afterglow emission possibly coupled to late time calorimetry will unveil several physical aspects of the afterglow emission and constrain the GRB global energetics. Results of numerical simulations for the detection and study of GRBs with SKA and its precursors are presented. The synergy of SKA with forthcoming optical/X-ray and gamma-ray observations is discussed. Finally, the possibility that forthcoming deep/wide field surveys (in the radio and Optical band) will detect the population of orphan GRBs is presented and the implications for the current knowledge of GRB physics/geometry is discussed.

Presentation type :

Invited

Primary authors : Dr. GHIRLANDA, Giancarlo (INAF OAB)

Co-authors :

Presenter :

Track classification :

Contribution type : --not specified--

Submitted by : Dr. GOTZ, Diego

Submitted on Tuesday 13 May 2014

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Comments :

Status : SUBMITTED

Track judgments :

Abstract ID : 66

Particle acceleration at relativistic shock waves

Content :

The origin of non-thermal radiation in powerful astrophysical sources with relativistic outflows represents a central question in modern high energy astrophysics. In a generic model, particles are accelerated at a relativistic shock wave and then radiate in the ambient magnetic or radiation fields. Our understanding of the physics of particle acceleration at relativistic shock waves has progressed substantially in the past decade. This talk will discuss these aspects, and in particular when and how particle acceleration can take place at relativistic shock waves. In a second part, the talk will discuss some consequences with respect to the modelling of the afterglow of gamma-ray bursts and, if time permits, to the origin of very high energy cosmic rays.

Presentation type :

Invited

Primary authors : Dr. LEMOINE, Martin (Institut d'Astrophysique de Paris, CNRS - UPMC)

Co-authors :

Presenter :

Track classification :

Contribution type : --not specified--

Submitted by : Dr. GOTZ, Diego

Submitted on Tuesday 13 May 2014

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Comments :

Status : SUBMITTED

Track judgments :

Abstract ID : 67

Neutrinos: Ghostly Messengers from Relativistic Jets

Content :

Neutrinos play important roles in revealing energetic astrophysical explosions such as gamma-ray bursts (GRBs) and supernovae (SNe). The large neutrino detector IceCube has opened a new window of the multi-messenger astronomy. I give a overview of neutrino emission from GRBs, based on recent theoretical and observational developments. First, I discuss PeV-EeV neutrinos as a probe of ultrahigh-energy cosmic-ray accelerators. Second, I show the importance of subphotospheric emission and emphasize that GeV-TeV neutrino astrophysics is promising. Searches for GeV-PeV neutrinos from GRBs and peculiar SNe are encouraged to reveal the GRB-SN connection and the origin of neutrino events observed by IceCube.

Presentation type :

Invited

Primary authors : Dr. MURASE, Kotha (IAS)

Co-authors :

Presenter :

Track classification :

Contribution type : --not specified--

Submitted by : Dr. GOTZ, Diego

Submitted on Tuesday 13 May 2014

Last modified on : Tuesday 13 May 2014

Comments :

Status : SUBMITTED

Track judgments :

Abstract ID : 68

Gravitational Waves Detection techniques and experiments

Content :

Ground based gravitational detectors will soon reach a sensitivity such that a first direct direction is plausible.
I will briefly recall the basics of gravitational wave physics and the main sources for terrestrial detectors (in particular in conjunction with GRBs).
Then I will describe the LIGO and Virgo detectors and their advanced versions, aLIGO and Advanced Virgo.
I will finally give a summary of the main observational results obtained so far and will discuss the perspectives for the next years.

Presentation type :

Invited

Primary authors : Prof. HELLO, Patrice (LAL-Orsay)

Co-authors :

Presenter :

Track classification :

Contribution type : --not specified--

Submitted by : Dr. GOTZ, Diego

Submitted on Tuesday 13 May 2014

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Comments :

Status : SUBMITTED

Track judgments :

Abstract ID : 69

The Central Engines of Long Gamma-Ray Bursts

Content :

Long duration gamma-ray bursts originate from the deaths of massive stars, but the nature of the central engine remains hotly debated. GRBs may be powered by accretion onto a newly-formed black hole, or by the electromagnetic spin-down of a rapidly rotating, strongly magnetized neutron star (millisecond magnetar). I will review black hole and magnetar models, focusing on their compatibility with current observations. I will conclude by providing opinions on the most fruitful directions for future theoretical and observational progress.

Presentation type :

Invited

Primary authors : Dr. METZGER, Brian (Columbia University)

Co-authors :

Presenter :

Track classification :

Contribution type : --not specified--

Submitted by : Dr. GOTZ, Diego

Submitted on Tuesday 13 May 2014

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Comments :

Status : SUBMITTED

Track judgments :

Abstract ID : 70

High-Energy Neutrino Detection Techniques

Content :

Neutrinos constitute a unique probe since they escape from their sources, travel undisturbed on cosmological distances and are produced in high-energy (HE) hadronic processes. In particular they would allow a direct detection and unambiguous identification of the acceleration sites of HE baryonic cosmic rays, which remain unknown.
The detection technique requires the instrumentation of large volumes of water or ice with photomultipliers (PMTs) to detect the Cherenkov radiation induced by charged leptons (mainly muons, but also electron- or tau-induced showers) produced by cosmic neutrino interactions with the target transparent medium, inside or near the instrumented volume. A generic HE neutrino telescope consists of a 3D grid of O(10^3) detection units called Optical Modules (OMs). These OMs basically comprise one or several photomultipliers embedded in a pressure-proof glass sphere. They are arranged with a 10-30m spacing on vertical cable strings typically distant of 60-100m. In order to reduce the background due to the intense flux of down-going atmospheric muons present at ground, such detectors are buried deep under the surface.
After a short historical introduction, a description of the detectors currently taking data will be given, together with their main scientific results.

Presentation type :

Invited

Primary authors : Dr. KOUCHNER, Antoine Kouchner (Laboratoire APC)

Co-authors :

Presenter :

Track classification :

Contribution type : --not specified--

Submitted by : Dr. GOTZ, Diego

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Comments :

Status : SUBMITTED

Track judgments :

Abstract ID : 71

High-Energy neutrinos from Gamma Ray Bursts

Content :

Gamma Ray-Bursts (GRBs) have been postulated as a potential source of the highest energy cosmic rays. Observing neutrinos from GRBs would prove this assumption true. Neutrino telescopes, specially IceCube, have searched for correlations between GRBs and neutrinos using various methods. Some neutrino emission models have significantly constrained by IceCube, while other remain still possible. In this presentation I'll discuss the consequences of the lack of observation of neutrino-GRB correlations and will outline future directions for neutrino telescopes in the study of GRBs.

Presentation type :

Invited

Primary authors : Dr. TABOADA, Ignacio (Georgia Tech)

Co-authors :

Presenter :

Track classification :

Contribution type : --not specified--

Submitted by : Dr. GOTZ, Diego

Submitted on Tuesday 13 May 2014

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Comments :

Status : SUBMITTED

Track judgments :

Abstract ID : 72

Theory of prompt and afterglow emission

Content :

I will summarize our present understanding of the origin of the prompt and afterglow emission of GRBs. I will describe both what we know for sure (not so much) and what remains a matter of debate and controversy in the community.

The prompt emission results from some sort of dissipation within the relativistic jet emitted by the central engine, which can take place either below or beyond the photosphere.
Dissipation below the photosphere can transform the emergent spectrum from a thermal to a non thermal one by comptonization. Beyond the photosphere dissipation of kinetic energy by internal shocks or of magnetic energy by reconnection can accelerate electrons, which then radiate via the synchrotron process.

I will list the pros and cons of these various models, trying to identify key observational facts that may help to discriminate among them.

The afterglow is a consequence of the deceleration of the jet by the circumburst medium. It was believed to be the best understood part of GRB physics before the launch of Swift ten years ago. But the early afterglow revealed by Swift XRT has considerably complicated the picture, with unexpected new features such as the plateau phase, flares and various breaks in the light curve.

The simplest version of the standard model seems unable to account for this complex phenomenology and it has therefore been proposed to add new ingredients to the original scenario. I will discuss some of them -- energy injection from a long term activity of the central engine, variable microphysics parameters or contribution of the reverse shock.

Presentation type :

Invited

Primary authors : Dr. MOCHKOVITCH, Robert (IAP Paris)

Co-authors :

Presenter :

Track classification :

Contribution type : --not specified--

Submitted by : Dr. GOTZ, Diego

Submitted on Tuesday 13 May 2014

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Comments :

Status : SUBMITTED

Track judgments :

Abstract ID : 73

Gamma-ray burst radiation processes

Content :

The radiation mechanism of GRB prompt emission is subject to debate. Leading models include synchrotron radiation of non-thermal particles accelerated in internal shocks or magnetic dissipation regions, and reprocessed quasi-thermal emission from the photosphere of the outflow. I will critically review the current status of understanding GRB prompt emission, and present some recent progresses in understanding prompt emission spectra. I will show how a typical Band function spectrum can be reproduced within the framework of moderately fast cooling synchrotron radiation in a decreasing magnetic field, and a theoretical framework to describe sub-dominant photosphere emission in an arbitrarily magnetized GRB outflow.

Presentation type :

Invited

Primary authors : Prof. ZHANG, Bing (University of Nevada Las Vegas)

Co-authors :

Presenter :

Track classification :

Contribution type : --not specified--

Submitted by : Dr. GOTZ, Diego

Submitted on Wednesday 14 May 2014

Last modified on : Wednesday 14 May 2014

Comments :

Status : SUBMITTED

Track judgments :

Abstract ID : 74

The Chinese-French SVOM mission for gamma-ray burst study

Content :

We present the SVOM mission that the Chinese National Space Agency and the French Space Agency have decided to jointly implement for a launch target in 2020. SVOM has been designed to detect, characterize and quickly localize gamma-ray bursts (GRBs) and other types of high-energy transients. For this task the spacecraft will carry two wide field high-energy instruments: ECLAIRs, a hard X-ray imager, and the Gamma-Ray Monitor, a broadband spectrometer. Upon localizing a transient, SVOM will quickly slew towards the source and start deep follow-up observations with two narrow-field telescopes: the Micro-channel X-ray Telescope in X-rays and the Visible Telescope in the visible and near IR. The space instrumentation is completed by a ground instrumental ensemble i.e. a Wide Angle Camera and two dedicated ground robotic telescopes. The nearly anti-solar pointing of SVOM combined with the fast transmission of GRB positions to the ground in less than 1 minute, will facilitate the observations of SVOM transients by the largest ground based telescopes.
In the context of the multi messenger quest, we will present the observation strategy we plan to perform in order to maximize the detection of electromagnetic counterparts to gravitational wave and neutrino transient sources.

Presentation type :

Invited

Primary authors : Dr. CORDIER, Bertrand (DAPNIA/Service d'astrophysique)

Co-authors : Dr. WEI, Jianyan (CAS NAOC)

Presenter :

Track classification :

Contribution type : --not specified--

Submitted by : Dr. GOTZ, Diego

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Comments :

Status : SUBMITTED

Track judgments :

Abstract ID : 75

ATHENA and GRBs

Content :

Athena will be the next generation X-ray facility for the study of high-energy phenomena. Many of these are transients including the most energetic of all { Gamma-Ray Bursts (GRBs). Due to their huge energy output, GRBs are detectable at all redshifts. This not only allows for the study of the physical properties of GRBs across cosmic time but also enables their use as cosmic probes. The extraordinary light-gathering power, spectral energy resolution and timing capability of the Athena mission will revolutionize the study of GRBs. I will discuss what GRBs are thought to be, and how Athena will provide high-quality, high resolution X-ray spectra of bright Gamma-Ray Bursts at all redshifts. These data will enable us to probe the environment of their host galaxies and constrain the metal enrichment history and stellar initial mass function of the universe.

Presentation type :

Inivited

Primary authors : Dr. PIRO, Luigi (INAF - IAPS)

Co-authors :

Presenter :

Track classification :

Contribution type : --not specified--

Submitted by : Dr. GOTZ, Diego

Submitted on Friday 16 May 2014

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Comments :

Status : SUBMITTED

Track judgments :

Abstract ID : 76

NANOX - Proposed Nano-Satellite X-ray Mission

Content :

The idea of a satellite providing monitoring of specified sky areas in soft X-rays
is presented. Observation plan could include searching for X-ray afterglows of gamma-ray bursts.
The spacecraft could be of the nano-satellite class. Using of Schmidt lobster optics is proposed.
Design study of the optics is presented. The results of experimental tests of the specimen of the
optics show the mission is feasible.

Presentation type :

Poster

Primary authors : Dr. TICHY, Vladimir (CTU Prague)

Co-authors :

Presenter :

Track classification :

Contribution type : --not specified--

Submitted by : Dr. GOTZ, Diego

Submitted on Friday 16 May 2014

Last modified on : Friday 16 May 2014

Comments :

Status : SUBMITTED

Track judgments :

Abstract ID : 77

Gamma-ray burst optical light-curve zoo: comparison with X-ray observation

Content :

We present a comprehensive analysis of the optical and X-ray light curves (LCs) and spectral energy distributions (SEDs) of a large sample of gamma-ray burst (GRB) afterglows to investigate the relationship between the optical and X-ray emission after the prompt phase. We collected the optical data from the literature and determined the shapes of the optical LCs. Then, using previously presented X-ray data, we modeled the optical/X-ray SEDs and we studied the SED parameter distributions and compared the optical and X-ray LC slopes and shapes.We found that the optical and X-ray spectra become softer as a function of time while the gas-to-dust ratios of GRBs are higher than the values calculated for the Milky Way and the Large and Small Magellanic Clouds. For 20% of the GRBs the difference between the optical and X-ray slopes is consistent with 0 or 1/4 within the uncertainties (we did it not consider the steep decay phase), while in the remaining 80% the optical and X-ray afterglows show significantly different temporal behaviors. Interestingly, we find an indication that the onset of the forward shock in the optical LCs (initial peaks or shallow phases) could be linked to the presence of the X-ray flares. Indeed, when X-ray flares are present during the steep decay, the optical LC initial peak or end plateau occurs during the steep decay; if instead the X-ray flares are absent or occur during the plateau, the optical initial peak or end plateau takes place during the X-ray plateau.

Presentation type :

poster

Primary authors : Dr. ZANINONI, Elena (ICRANet - Rio de Janeiro)

Co-authors :

Presenter :

Track classification :

Contribution type : --not specified--

Submitted by : Dr. GOTZ, Diego

Submitted on Wednesday 28 May 2014

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Comments :

Status : SUBMITTED

Track judgments :

Abstract ID : 78

The Induced Gravitational Collapse and the Binary Driven Hypernovae

Content :

For the induced gravitational collapse paradigm (IGC), an evolved FeCO core with a companion neutron star (NS) in a tight binary system is supposed to be the progenitor of long and energetic ($10^{52} - 10^{54}$ erg) gamma-ray bursts (GRBs) associated to supernovae (SNe) . The observed energetic events that satisfy this paradigm are called binary driven hypernovae (BdHNe). For the IGC paradigm, four episodes can be observed: Episode 1: a NS forms from the onset of the FeCO core SN explosion. Episode 2: the SN ejecta accretes onto the companion NS; the NS mass reaches its critical value and gravitationally collapses into a black hole (BH); consequently the GRB is emitted. Episode 3: corresponds to the emission from the SN ejecta after the interaction with the GRB and is observed in the soft X-rays. Episode 4: it corresponds to the optical SN emission.

Starting from this model, we analyzed some energetic GRBs, focusing on the different episodes. We concluded that: 1) The BdHNe late time X-ray luminosity in the source rest frame shows a constant power-law behavior and they are mildly relativistic. This behavior could be explained considering the decay of heavy elements produced in the r-processes as the energy source. 2) The constant power-law decay of the late-time X-ray LCs could be used as distance indicator for BdHNe. 3) The Episode 3 features of GRB 130427A point to a common phenomena carried by the SN ejecta or in accretion processes onto the newly born BH. 4) Thanks to the study of GRB 090423 ($z = 8.2$), we extended the BdHN family to high redshifts."

Presentation type :

poster

Primary authors : Dr. ZANINONI, Elena (ICRANet - Rio de Janeiro)

Co-authors :

Presenter :

Track classification :

Contribution type : --not specified--

Submitted by : Dr. GOTZ, Diego

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