prop_num	pi_fname	pi_lname	title	abstract
31003	MARKUS	BOETTCHER	INTERNAL GAMMA-GAMMA ABSORPTION AND SPECTRAL BREAKS IN THE FERMI SPECTRA OF BLAZARS	The Fermi spectra of several low- and intermediate-frequency peaked blazars exhibit sharp spectral breaks at photon energies of a few GeV which are inconsistent with radiative cooling of the underlying electron population. Here, we propose to investigate the possibility that such features are the result of internal gamma-gamma absorption by UV or X-ray photons within the gamma-ray production region. We propose to develop numerical tools to model self-consistently the broad-band emission, gamma-gamma absorption, and gamma-ray induced pair cascades in blazar jets. Our results will yield insight into the radiation physics and the location of the emission zone in blazars.
31010	MARGO	ALLER	RADIO BAND POLARIZATION AS A PROBE OF THE ORIGIN OF GAMMA-RAY EMISSION FROM BLAZARS	We propose to continue a UMRAO program of multifrequency, centimeter-band, linear polarization and total flux density monitoring of gamma-ray-bright AGN, combined with radiative transfer modeling of specific radio band events identified with shocks, to understand conditions in the radio jet during gamma-ray flaring. Increased sampling for the most active source will permit tracking rapid changes in linear polarization, while the models will be modified to allow for the presence of a quiescent helical magnetic field. This unique data set, in combination with VLBA images and modeling, will probe the physical location of the gamma-ray emission, explore whether conditions in the jet change from event to event, and provide key input parameters in gamma-ray emission models.
31014	ASAF	PE'ER	USING THERMAL EMISSION TO STUDY THE PROPERTIES OF GRB PROMPT EMISSION	We propose to continue our research (successful Fermi cycle 2 proposal) on identifying and studying the properties of thermal emission, and its relation to the non-thermal component during the prompt phase of GRBs. Following the breakthroughs we had last year, we intend to focus this year on (1) study of the delay of the high energy (LAT) photons and lower energies (GBM) photons; (2) gain a better estimate on the emission radius, Lorentz factor and magnetic field at the prompt emission site; and (3) to study the internal properties of the progenitor.
31016	DONG	LAI	PULSAR MAGNETOSPHERES: REVERSE ENGINEERING FROM GAMMA-RAY OBSERVATIONS	Building upon our recent work, we propose a theoretical program with the goal of using gamma-ray observations to constrain/reconstruct the structure of particle acceleration zone and magnetic fields in pulsar magnetospheres in a general way. We will use parametrized acceleration potential functions and consider both the standard retarded dipole magnetic field and other multipole field configurations. We will simulate pair cascades and determine how sensitive the gamma-ray emission properties (light curves and phase-depdendent spectra) depend on the acceleration potential and magnetic field structure.

31024	KEVIN	HURLEY	MAINTAINING THE FERMI GBM IN THE 3RD INTERPLANETARY NETWORK	We propose to continue our successful AO-2 effort to maintain the Fermi Burst Monitor in the 3rd Interplanetary Network of Gamma-Ray Burst detectors. This will 1) assist the Fermi team in understanding and reducing their systematic localization uncertainties, 2) reduce the sizes of the GBM error circles by up to 3 orders of magnitude, 3) facilitate the identification of GRB sources with objects found by ground- and space-based observatories at other wavelengths, 4) reduce the uncertainties in associating some LAT detections of high energy photons with GBM bursts, 5) discover and monitor magnetars, and 6) facilitate searches for non-electromagnetic GRB counterparts, particularly neutrinos and gravitational radiation. We will make our results public as soon as they are available.
31025	RICHARD	DUBOIS	MINING FERMI DATA FOR NEW OR CHANGING GAMMA RAY BINARY ACTIVITY	Fermi has mined the gamma ray sky to so far find three bright binary sources - LS I +61 303, LS5039, and Cyg X-3. The monitoring nature of Fermi's observing plan makes it ideal to scan the sky for activity. There are many binary systems known from x-ray observations that might be candidates to emit at higher energies, but have never been seen. An example is Cyg X-1, which was possibly observed once by MAGIC in a short flare. In addition, the systems we have observed are not static, as well shown by the sudden 40% increase in flux by LS I +61 303 in March 2009 followed by a steady average decrease since. We propose to engage in a systematic, ongoing search in Fermi data wherein currently 75 source locations are followed on a regular basis to monitor their integral and transient behavior.
31026	MARKUS	BOETTCHER	PIC SIMULATIONS OF PARTICLE ENERGIZATION AND THE RADIATIVE SIGNATURES OF TWO-COMPONENT JETS	Both observational evidence and theoretical considerations of relativistic jet acceleration and confinement suggest that the jets of AGN exhibit a two component structure. A mildly relativistic, outer jet carries most of the kinetic energy and of the jet, while a fast, highly relativistic inner jet of low density carries most of the inertia and angular momentum. At the interface, a relativistic Kelvin-Helmholtz instability may develop and lead to turbulent mixing of the inner and outer jet materials. We propose to perform Particle-in-Cell simulations of the plasma turbulence developing in the shear layers of relativistic extragalactic jets, and self-consistently evaluate the radiative signatures of particle acceleration in these regions.

31027	ABE	FALCONE	SYSTEMATIC SEARCH FOR X-RAY COUNTERPARTS OF FERMI-LAT UNASSOCIATED SOURCES USING SWIFT: NEW BLAZARS, PULSARS, AND MORE	We propose to use Swift for a search for X-ray and UV/optical counterparts of unassociated Fermi gamma-ray sources, which are likely to be new, exciting sources. Swift will observe 231 Fermi sources with no known source association at other wavelengths. These data will determine the basic properties (including ~5 arcsec localizations) of all detected X-ray sources in the Fermi-LAT localization circles, thus enabling identification, classification, and follow-up. This proposal supports the large analysis and interpretation task, which will require pipelining and automation of data reduction software. The Swift PI and Executive Committee commit to the required Swift observing time. Reduced data will be made available to the entire scientific community on a public web page.
31029	DAVIDE	LAZZATI	PROPERTIES AND NON-THERMAL FEATURES OF THE PHOTOSPHERIC EMISSION IN LONG-DURATION GAMMA-RAY BURSTS	We propose to study the spectra of the photospheric radiation of GRB jets from massive star progenitors, with emphasis on possible non-thermal features. We will attack the problem with three different techniques. We will study the behavior of the peak photon frequency with hydrodynamic numerical simulations. We will investigate the spectrum of the photospheric radiation with a semi-analytical approach as well as through a fully numerical Monte Carlo simulation. This project will provide a physically motivated framework for interpreting Fermi observations of prompt emission from Gamma-Ray Bursts from soft X-rays up to tens of MeV. The results of this project will clarify whether photospheric emission is a viable radiation mechanism for all long-duration bursts.
31030	ABE	FALCONE	OBSERVATIONS AND ANALYSIS OF BLAZARS WITH SWIFT AND FERMI: SIMULTANEOUS OPTICAL/X-RAY/GAMMA-RAY SPECTRA AND LIGHTCURVES	This proposal enables long-term multiwavelength coverage on the "sources of interest" that will be monitored by Fermi and publicly released in the form of lightcurves and spectra. We will also obtain contemporaneous Swift data during high states (LAT flux > 1 10-6 ph cm-2 s-1) from these sources or from any other new sources that exceed this threshold, thus triggering Fermi-LAT monitoring campaigns. Continuation of this highly successful effort will provide long-term simultaneous variability studies and enhance the publicly produced data products available on the web. As a Swift team member, the PI will coordinate these observations and work to maximize the science return by providing simultaneous multiwavelength observations that can be publicly accessed, analyzed, and interpreted.

31039	MARKOS	GEORGANOPOULOS	FORNAX A: EBL, LINER, OR BOTH?	We propose to use LAT observations of the radio galaxy Fornax A to measure or set strict upper limits to the extragalactic background light (EBL) through studies of its lobes and to constrain the physics of its LINER nucleus through studies of its core. In a recent paper, we have showed that, even for the lowest expected EBL level, LAT will provide a 5-sigma detection from the lobes of Fornax A after 2 years of integration. As we detail in the proposal, with 3 years of data we will further be able to constrain the localization of the emission (nucleus, lobes, or both). We will use our results to measure or set parameter-free upper limits to the EBL and to study the implications of a detection of the core for models of the high energy LINER emission (ADAFs or jets).
31050	PAUL	RAY	SEARCH FOR RADIO PULSATIONS FROM GAMMA-RAY PULSARS DISCOVERED WITH FERMI	We propose to make deep pulsar search observations using the NRAO Green Bank Telescope of any new gamma-ray selected pulsars discovered in blind searches of Fermi LAT data. These observations are important to detect radio pulsations, or establish constraining upper limits, from these gamma-ray selected pulsars. In our previous program, we were a major part of the worldwide effort that allowed us to deeply search 23 of the 24 blind search pulsars found in the first year of LAT observations. Radio pulsations were discovered from three of these gamma-ray selected pulsars, including two with radio luminosities well below the weakest previously known young pulsar. These data will be important for understanding the nature of the gamma-ray emission mechanism operating in rotation-powered pulsars.
31055	BING	ZHANG	A NEW MODEL OF GRB PROMPT EMISSION	Motivated by the Fermi observation of GRB 080916C, recently we developed a new model of GRB prompt emission in the Poynting-flux-dominated regime, namely the Internal Collision-induced Magnetic Reconnection and Turbulence (ICMART) model. In this proposal, we propose to further develop this model in the following 3 directions: (1) an analytical study of particle acceleration and radiation in an ICMART event; (2) a numerical MHD simulation of collisions of two high-sigma shells to observe developement of turbulence; (3) a multiple-shell numerical model for collisions of high-sigma shells. The results will be applied to directly model GRB 080916C and other Fermi GRBs.

31060	JOHN	TOMSICK	PROBING MICROQUASARS WITH GAMMA-RAY AND MULTI-WAVELENGTH OBSERVATIONS	Accreting stellar-mass black holes have long been known to produce emission at MeV energies, but, prior to Fermi, it was not known whether microquasars produce GeV emission. Now, for at least one system, this question has been answered with the discovery of >100 MeV emission from Cyg X-3. The detection demonstrates that very high energy particles are generated in the system. In addition, the recent work has shown very interesting radio/X-ray/gamma-ray connections, and further multi-wavelength studies of Cyg X-3 and other microquasars provide an opportunity to learn about accretion and jet ejections. We propose the combine past and future LAT measurements of Cyg X-3 with our X-ray and radio campaigns and to search the LAT data for other microquasars that may be gamma-ray emitters.
31066	TREVOR	WEEKES	VARIABILITY OF GEV-TEV GAMMA-RAYS FROM TEV-EMITTING BLAZARS	An investigation of the variability profile of a representative sample of TeV-emitting AGN will be made using data from the LAT and new observations taken with the Whipple 10m telescope. With long exposures (possible with the Whipple telescope but not with VERITAS because of the demands on its observing time) it will be possible to study variability in the TeV data. We will look for simultaneous variations at GeV {\it Fermi} and TeV (Whipple) energies in the 2010-2011 observing season. Also the archival {\it Fermi} database on these sources will be searched to establish the variability profile at GeV energies. If TeV flaring is detected, VERITAS and other ground-based telescopes will be alerted for possible ToO exposures.
31067	DANIEL	CASTRO	FERMI LAT OBSERVATIONS OF SUPERNOVA REMNANTS INTERACTING WITH MOLECULAR CLOUDS	SNR shocks are expected to be sites of cosmic ray acceleration, and clouds of dense material can provide effective targets for production of gamma-rays from pion decay. MSH 17-39, G337.0-0.1 and G9.7-0.0 are SNRs known to be interacting with molecular clouds, as evidenced by observations of OH (1720 MHz) maser emission in their directions. The radio and X-ray emission of SNR W41 is coincident with the TeV source HESS J1834-087, and has been associated with a giant molecular cloud detected using CO observations. We propose to study the gamma-ray emission coincident with these four SNRs using Fermi LAT data in order to provide constraints on the origin of these sources, and hence answer if this is indeed the signature of SNR accelerated hadrons interacting with dense molecular clouds.

31068	JOEL	PRIMACK	IMPROVED COSMOLOGICAL MODELS OF GAMMA-RAY ATTENUATION	High energy gamma-rays emitted by distant sources are attenuated by pair production on the extragalactic background light (EBL). The Fermi LAT is ideal for studying the origin and evolution of the UV background via its effect on gamma-ray spectra. Building on our research supported by Fermi theory grants, we propose to continue improving our galaxy formation models by incorporating important new cosmological data from new instruments; (2) to develop new methods to determine the EBL from observations and use the results to provide observational predictions of gamma-ray attenuation to compare with our cosmological modeling results; and (3) to update our models of the evolving UV EBL using new data from Fermi and Swift to extend our models of Fermi LAT and ACT observation of GRBs.
31072	JUSTIN	FINKE	MODELING THE SPECTRAL BREAKS IN FERMI-LAT BLAZARS	LAT observations of the FSRQ 3C454.3 show a spectral-index change of 1.2 that is inconsistent with a cooling electron distribution, and is di cult to understand with gamma-gamma absorption. A combination of Compton-scattered disk and BLR radiations explains this sharp spectral break and ts well the SED observed in 2008 August. A break can be produced independent of the emitting region's position if the BLR has a density gradient consistent with a wind model for the BLR. We propose to model 3C454.3 at other epochs, and other LAT blazars with spectral breaks with this model for the BLR to see if it can also explain their spectral breaks. We will also attempt to model the breaks resulting from local gamma-gamma absorption, to see if this offers an alternative explanation.
31073	PAUL	RAY	CONTINUED GAMMA-RAY PULSAR TIMING WITH FERMI	We propose to continue our program of precise pulsar timing of pulsars detected by the Fermi LAT, primarily the gamma-ray pulsars found in blind searches of Fermi data. In addition we will time the radio quiet pulsar Geminga, and other radio faint pulsars. Pulsar timing yields the rotational parameters and arcsecond position determinations, and allows us to study the glitch and timing noise behavior of these sources. These measurements will be critical for multiwavelength followup of these sources and provide parameters important to the astrophysics of the sources. This year, we will continue to improve our software and techniques and develop a system for batch processing that will allow us to provide regular (~monthly) updates of the timing models for these >26 pulsars.

31075	DAVID	WILLIAMS	OBSERVATIONS ABOVE 100 GEV OF GAMMA-RAY BURSTS DETECTED BY FERMI	We propose to conduct follow-up observations with VERITAS at very high energy (VHE; >100 GeV) of GRBs detected by Fermi, to analyze the resulting data, and to engage in other activities to support the observations. Many afterglow emission models show the SEDs of GRBs to be similar to those of blazars and predict an inverse Compton component with luminosity comparable to the synchrotron component, extending to VHE energies. Yet this component has eluded definitive detection. Early results from Fermi reinforce the evidence from EGRET of delayed high-energy emission from some bursts, motivating a search for such emission at the still higher energies accessible to VERITAS.
31088	ROGER	ROMANI	FROM GAMMA-RAY PULSES TO POPULATIONS AND BACKGROUNDS	We propose to extend our pulsar modeling program, extracting constraints on the contributions to the high energy backgrounds. Our tools for beam simulation and LAT lightcurve fitting allow agnostic tests of various model classes, quantitatively constraining the high energy emission zone. We will focus on the evolution of beamshape with age (possible with the large LAT sample and our revised modeling tools). With beaming selection understood, the LAT PSR give a new window to the young energetic population and allow us to estimate the e+/e- injection and its spatial and temporal variability. Understanding the MSP sample requires pulsar beam modeling at high efficiency, near shut-down, but allows us to compute the contribution of unresolved MSP to the GeV background radiation.
31089	ROGER	ROMANI	AUTOMATIC PHOTOMETRIC MONITORING OF BRIGHT FERMI AGNS	We propose a program to optically monitor the 140 brightest LAT-detected blazars accessible to the 0.76m Katzman Automatic Imaging Telescope. The project will provide high-quality unfiltered light curves on time scales as short as 3 days, with continuous coverage of about 10 months on each source. The data set will allow many important multi-wavelength studies of these AGNs, including correlated variability (gamma/optical/radio) to probe the physics of the jets, as well as triggers of multi-wavelength studies including (for lower redshift hard-spectrum sources) flare triggers to initiate TeV observational campaigns. For BL Lac objects with unknown redshift, optical spectroscopy will be triggered during unusual low states, to search for broad emission lines or host-galaxy absorption lines.

31096	SOEBUR	RAZZAQUE	GAMMA RAYS ABSORBED BY THE EBL AND CASCADE RADIATION CONTRIBUTION IN BLAZAR AND GRB SPECTRA	Photons above 10 GeV measured with Fermi LAT from blazars and GRBs are already constraining the gamma ray opacity of the universe. Results indicate a low opacity and consequently the intensity of the extragalactic background light (EBL). Gamma rays can travel long distances before they produce electron positron pairs by interacting with EBL photons. The pairs can then Compton-scatter CMB photons to initiate an electromagnetic cascade. A substantial fraction of the cascade radiation will reach us and form a hard component in the source spectrum if intergalactic magnetic field is low. We will model such cascade radiation along the directions of blazars and GRBs with hard gamma-ray spectra, and include this component in our spectral modeling codes.
31104	NICOLA	OMODEI	TEMPORAL ANALYSIS OF FERMI GAMMA-RAY BURSTS	We propose to study the temporal characteristics of Gamma-Ray Bursts in the LAT and GBN data in order to constrain the relevant GRB physics. Our analyses will be applied systematically to all bright LAT GRBs, and we will also pursue stacking analyses to search for correlations across energy bands for populations of weak bursts, including those below the LAT detection threshold. These investigations will entail developing algorithms and software tools for time series analysis of GBM Time Tagged Event (TTE) data and LAT event data. We plan to make the analysis software available as a package for analyzing light curve data in more general contexts in addition to GRBs.
31117	MARCO	AJELLO	HUNTING HIGH-REDSHIFT FERMI-LAT SOURCES	We will perform coordinated observation using Swift and GROND of all the Fermi sources (174 objects) which do not have a redshift measurement and are visible from Chile. The coupling of the 7 GROND filters and the 4 Swift/UVOT ones will allow us to determine accurate photo-z in the 1.2--8.0 redshift range.At least 50 sources will have z>1.2 and we will provide a redshift upper limit (z<1.2) for all the others. The detection of high-z blazars represents a major achievement as it probes the radiation fields close to the epoch of reionization and the evolution of the most massive galaxies. Our program will provide, for all sources, high quality sampling of their spectral energy distributions covering from IR to hard X-rays. These data will be made available to the general public.

31119	MARCO	AJELLO	UNDERSTANDING THE ORIGIN OF THE EXTRAGALACTIC GAMMA-RAY BACKGROUND *(multi-year)*	Fermi has recently determined that the spectrum of the extragalactic diffuse background (EGB) is consistent with a featureless power-law in the 200 MeV 100 GeV band. Even more recently, it has been established, using Fermi data, that the population of unresolved blazars contributes at most 30% of the EGB. Most of the GeV diffuse background is thus currently unexplained. Our aim is to assess the contribution to the EGB of the most likely source classes. We show that for the first time the diffuse emission arising from star-forming galaxies can be estimated in a straightforward way. The same holds for millisecond pulsars. The knowledge gained on the origin of the EGB will ultimately allow us to constrain robustly scenarios of cosmological dark matter annihilation.
31123	FERNANDO	CAMILO	RADIO TIMING OF KEY FERMI PULSARS	Pulsars form one of the two main classes of objects being studied with LAT, with three groups identified: (1) Gamma-ray-selected young pulsars. (2) Millisecond pulsars, which have just become established as a hugely important population of gamma-ray objects via the detection of radio pulsations from 17 unidentified LAT sources, including 13 by our group; understanding this population requires radio timing that we will carry out at the GBT and Parkes. (3) Young pulsars detected via the folding of gamma-ray photons according to rotational ephemerides obtained with radio telescopes; several of the most important of these are extremely faint, and require the GBT for effective monitoring. Here we request the support and GBT time necessary to enable this work on millisecond and young pulsars.
31125	DAVID	PANEQUE	SIMULTANEOUS FERMI LAT-MAGIC OBSERVATIONS OF THE LATE PROMPT AND EARLY AFTERGLOW EMISSION FROM GRBS	The detection of the Very High Energy (VHE) emission from GRBs would provide an unprecedented opportunity to enlighten the nature of the central engine and the interaction between the relativistic outflow and the environment of the burst progenitor. We propose to use the MAGIC telescope to observe GRBs during their prompt emission and/or early afterglow and perform a combined analysis with simultaneous Fermi/LAT data. MAGIC is currently the best suited ground-based gamma-ray instrument for GRB observations due to its fast repositioning capability (20 s to move 180 deg in azimuth) and its low energy threshold ($\sim$25 GeV for bright sources). In 2010, MAGIC started to operate in stereo mode, which improved its sensitivity by a factor of 2-3 below 100 GeV.

31126	DAVID	PANEQUE	THE EXTREME FERMI UNIVERSE	We propose to search for Fermi/LAT sources at $>$30~GeV and measure their properties $>$10~GeV using archival and year 2 data. The main goal is to characterize the sky at the highest Fermi/LAT energies, and to provide a candidate list for observations with Imaging Atmospheric Cherenkov Telescopes (IACTs). IACTs are instruments with effective fields of view of less than 3 degrees, which precludes them from performing all-sky surveys.The proposed compilation will allow IACTs to reliably assess the chances for source detection and thus to efficiently perform an effective all-sky survey. This will substantially increase the number of sources detected at very high energy gamma-rays; which will be very valuable information for the understanding of the most extreme environments in the Universe.
31127	TROY	PORTER	MODELING THE COSMIC-RAY INDUCED GAMMA-RAY EMISSION OF EARTH'S ATMOSPHERE	We propose to calculate the cosmic-ray induced gamma-ray emission from Earth's atmosphere using the most up-to-date codes for treating high-energy particle-target interactions, along with detailed models for the Earth's magnetic field and atmosphere that take into account their time variation, and including the effect of the solar cycle on the cosmic-ray primary fluxes. This modeling will allow the prediction of the intensity and spectrum of atmospheric gamma rays from 511 keV up to TeV energies for any orbital location, or location in the atmosphere for different epochs. The broad energy coverage of our calculation will provide a tool for ballon- and space-borne instruments for modeling the high-energy photon background from cosmic-ray interactions in the Earth's atmosphere.
31128	CHARLES	DERMER	SYNCHROTRON SELF-COMPTON MODELS IN THE FERMI ERA	Many Fermi sources display a low-frequency nonthermal synchrotron component, and an SSC component at gamma-ray energies. A realistic synchrotron/SSC model must include effects that are often overlooked. These include internal opacity and pair cascades, conservation of photon number in the Compton scattering process, and second- and higher-order Compton scatterings. Measurement of large optical polarization indicates that the usual assumption of a randomly oriented magnetic field is invalid. Calculations of minimum bulk Lorentz factors in GRBs and blazars depend on the internal opacity, which is affected by the cascade contribution to the high-energy emission. We propose to include these effects in a complete synchrotron/SSC model for blazars and GRBs.

31131	ALICE	HARDING	MODELING OF FERMI-DETECTED MILLISECOND PULSAR LIGHT CURVES	We plan to study the emission from the growing collection of gamma-ray millisecond pulsars by using geometric models of the radio and gamma-ray light curves. Fitting these models to the existing data will constrain the magnetic inclination and observer angles and the altitude of emission in the magnetosphere. Using different magnetic field geometries, including retarded vacuum dipole, force-free and pair starved magnetospheres, may constrain the magnetic field structure at large altitude. We will use our light curve fits to study the distribution of inclination angles and light curve classes as a function of spin parameters.
31132	MAXIM	LYUTIKOV	RESOLVING THE LORENTZ FACTOR CRISIS IN BLAZARS WITH FERMI	We will perform a theoretical study of the high energy emission properties of Fermi detected blazars using correlated MOJAVE observations of the dynamics of radio emitting blobs. In particular, we will address the problem of disparate Lorentz factors inferred from the radio monitoring of the motion of the emitting blobs and from the modeling of the high energy emission, the so-called Lorentz Factor Crisis in Blazars. We will investigate a particularly promising model - the mini-jet model, in which high energy emission comes from emission regions moving relativistically in the bulk jet frame. We will compare the model predictions with the observed distribution of apparent velocities and radio and gamma-ray luminosities, as well as dependence of variability on the observing energy.
31136	SCOTT	WAKELY	ENHANCING GEV/TEV SCIENCE CONNECTIONS WITH TEVCAT	With the success of the current generation of ground-based TeV instruments (VERITAS, HESS, MAGIC, MILAGRO), and the now-public release of Fermi LAT data, we are entering a new era of GeV/TeV gamma-ray science. We propose to enhance and better enable this science by increasing the breadth and capabilities of TeVCat (tevcat.uchicago.edu), a public online catalog of TeV gamma-ray sources. In direct support of collaborative Fermi LAT research, we will 1) import relevant Fermi LAT catalog information into TeVCat; 2) enhance existing tools for the identification of TeV counterparts to GeV sources (and vice versa); 3) produce and maintain tools for assisting multiwavelength analyses.

31141	DEMOSTHEN	KAZANAS	AGN UNIFICATION AND THEIR FERMI GAMMA RAY SPECTRA	Past and more recent Fermi LAT-driven multiwavelength blazar studies have argued that their observed gamma-ray emission is due to Compton scattering of photons external to the relativistically moving plasma, usually attributed to contribution by the AGN broad line clouds. However, the gamma-ray emission apparently takes place at distances much larger than those of the AGN Broad Line Region (BLR) adopted from line reverberation studies. What is the extended source of the requisite photons? The answer seems to lie with an MHD wind model, successfully employed to account for the Seyfert galaxy unification and their Warm Absorber properties. The present proposal requests funds to extend the development of this model to Radio Loud AGN and its application to the LAT blazar observations.
31143	MICHAEL	BRIGGS	TERRESTRIAL GAMMA-RAY FLASH (TGF) OBSERVATIONS WITH GBM ON THE FERMI OBSERVATORY *(multi-year)*	Terrestrial Gamma-Ray Flashes (TGFs) are brief (~ms), intense, single or multiple pulses of very energetic gamma-rays associated with thunderstorms and lightning. Some TGFs are observed as electrons and positrons. GBM has already discovered new features of TGFs, such as strong positron annihilation lines in some TGFs and that pulses are either symmetrical or have faster rise times than fall times. We will continue this research with spectral analyses of both gamma-ray and electron/positron TGFs, comparing the observations to physical models. We will correlate TGFs to their associated lightning strokes, as observed with VLF radio, determining the temporal order of TGFs and lightning, and characteristics of the lightning strokes.
31146	TAKANORI	SAKAMOTO	OPTICAL COORDINATION WITH FERMI BY GRT AND GRT-WF: INVESTIGATION OF PATICLE ACCELERATION IN AGNS, GRBS AND TGFS	We propose the optical coordinated observations of the LAT AGNs and the optical follow-up observations of the LAT GRBs using the Goddard Robotic Telescope (GRT; 14-inch fully automated telescope). We also propose to construct an all-sky optical monitor system to detect thundercloud phenomenon called sprites, which could be associated with terrestrial gamma-ray flashes (TGFs). This all-sky optical monitor is also capable for detecting a bright prompt optical emission associated to GRBs such as Swift s naked-eye GRB 080319B. Our goal is to understand a particle acceleration process by various different phenomena combining a multi-wavelength data. Our proposal will provide a unique approach to address a fundamental problem of a particle acceleration process.

31153	ALEXANDER	KONOPELKO	A JOINT FERMI-LAT, MAGIC, AND VERITAS BROADBAND OBSERVATION CAMPAIGN ON ONE HIGH-ENERGY BLAZAR IN A MAJOR OUTBURST	The main objective of the proposed work is to perform one very intense observational campaign at GeV and TeV energies of one of the well-established northern sky TeV blazars, i.e., Mrk 421, Mrk 501, 1ES 1959+650, H 1426+428, and 1ES 2344+514 with Fermi, MAGIC, and VERITAS. The trigger for the proposed program is expected to come from the blazar monitoring programs with the Whipple, VERITAS, or MAGIC telescopes. Here we request that the proposed observation be triggered when either one of Mrk 421 and Mrk 501 exceeds the flux level of 5 Crab or any of other three blazars, 1ES 1959+650, H 1426+428, and 1ES 2344+514, exceeds a flux level of 2 Crab at TeV energies.
31154	YLVA	PIHLSTROM	A NEW TRACER FOR IDENTIFYING THE SITES OF HADRONIC COSMIC RAY ACCELERATION	It is commonly accepted that cosmic ray electrons are accelerated by supernova remnants (SNRs), but 99% of the cosmic rays are hadrons for which solid evidence of the accelerator mechanism is lacking. Assuming supernova remnant (SNR) shocks are sources of hadron acceleration, gamma-rays should be detectable: accelerated hadrons colliding with the ambient gas produce pions which will decay into gamma-rays. This gamma-ray flux depends on both the density and the distance to the SNR; two parameters that are needed to rule out that leptonic (electron) processes are causing the gamma-ray emission. We propose a Fermi/NRAO project using EVLA observations of 36 and 44 GHz methanol masers to determine both the ambient gas density and the distance to Fermi-detected SNRs. This is a PhD project.
31155	CHARLES	BAILYN	SMARTS SPECTROSCOPY OF BRIGHT FERMI BLAZARS	We propose to carry out optical spectroscopy of a sample of bright Fermi blazars in the southern hemisphere, using the SMARTS consortium 1.5m + RC spectrograph. Six of our targets have already been observed with this system, and have shown observable lines - to this sample we will add 4-10 other sources taken from among identified Fermi point sources. We will obtain spectra every two weeks, and thus build up a time series of flux determinations for the line emission. The lines are thought to be generated in the broad line region by photoionization from the disk, and thus provide a measure of accretion activity, which is otherwise hard to determine in blazars. Correlations between disk accretion events and jet activity should constrain models of jet energetics and radiation mechanisms.

31159	SVETLANA	JORSTAD	SEARCHING FOR THE SITE OF GAMMA-RAY EMISSION IN BLAZAR JETS	We propose to perform a 2-week campaign (in November 2010) of multiwaveband polarization and photometric observations of 12 gamma-ray bright blazars. The campaigns will involve (1) daily optical photometric B,V,R, and I measurements, (2) R-band polarimetric observations, and (3) VLBA total and polarized intensity imaging at 43 GHz 3 times per campaign. In addition, we will observe some of the proposed sources in X-rays and at mid-IR (8-26 microns) bands. These will be analyzed along with gamma-ray light curves that we will construct using data provided by the FSSC. Wavelength-dependent time delays in the variations accompanied by changes in the VLBA images will allow us to register the gamma-ray, X-ray, and optical emission relative to features in the compact jets.
31161	KONSTANTIN	TASSIS	DARK GAS REVEALED: PROBING THE MILKY WAY BARYON INVENTORY WITH HERSCHEL AND FERMI	The Milky Way baryon inventory is crucial for determining Galactic structure and dynamics. However, traditional tracers of neutral gas only reveal a fraction of the Galactic gas content. The existence of this dark gas has been established in gamma rays, which are excellent tracers of Galactic baryons. We propose to combine Herschel data from an upcoming survey of the Galaxy in CII (which traces gas missed by CO and 21cm surveys) with HI and CO surveys, to predict the hadronic Milky-Way gamma-ray emission, and compare these results with Fermi data. This unique consistency check between radically different gas tracers will address: 1) the origins of the gamma-ray traced "dark gas" and 2) whether there is missing baryonic gas beyond the amounts of that are about to be revealed by CII.
31162	ERIC	GOTTHELF	X-RAY AND GAMMA-RAY TIMING AND SPECTRAL STUDIES OF FIVE RADIO PULSARS (AO3)	Detecting gamma-ray emission from a full range of energetic, rotation-powered pulsars with Fermi is of great importance to fully understand particle acceleration in pulsar magnetospheres. In particular, to constrain emission models, deep searches are needed for 50 MeV - 10 GeV emission from pulsars covering a large range of spin-down powers, B-fields & geometries. We request support to continue our RXTE X-ray timing of 5 exceptional radio-quiet pulsars that cover a large parameter space of pulsar properties. We will use our ephemerieds to search Fermi data and place upper-limits on the pulsed flux, for non-detections, and to measure pulsed spectra at energies > 200 keV using archival hard X-ray data.

31167	ROBERT	JOHNSON	SEARCHES FOR YOUNG AND MILLISECOND RADIO-QUIET PULSARS WITH FERMI	In its first year of operation the Fermi-LAT was successful in detecting dozens of new gamma-ray pulsars. Twenty-four of them were young pulsars discovered in blind frequency searches based on the time-difference method that we developed prior to launch. It will be important, but challenging, to extend the search to lower fluxes and to both lower and higher frequencies. We propose to improve our already successful search program to detect isolated radio-quiet millisecond pulsars for the first time as well as more young pulsars at lower flux levels. We also propose to continue monitoring the known gamma-ray pulsars to detect and catalog glitches and to develop simulations that will allow us to quantify the flux sensitivity of our search and thus facilitate pulsar population studies.
31169	AOUS	ABDO	MULTIWAVELENGTH CAMPAIGN FOR THE STUDY OF THE PSR B1259-63/SS 2883 BE STAR BINARY SYSTEM	PSR B1259-63/SS 2883 is a unique binary system consisting of a pulsar orbiting a massive Be star. The next periastron of the system will occur on 12/10/2010. This will be the first time the periastron occur since the launch of Fermi and thus provides for the first time the opportunity to observe this source in GeV gamma-rays with such a sensitive instrument. A multiwavelength campaign at this time, exploiting the sensitivity of Fermi LAT, will enable spectral energy distributions of the emission from the system from radio to GeV to be gathered repeatedly during the periastron passage and then compared with source models. Observations in radio will be carried with the Parkes telescope and ATCA array, in optical using NOAO's SMARTS, in X-ray with Chandra, and in GeV gamma-rays with Fermi.
31179	PABLO	SAZ PARKINSON	SEARCHING FOR GAMMA-RAY PULSARS IN BINARY SYSTEMS: LS I +61 303 AS A TEST CASE	Fermi LAT observations have greatly increased our knowledge about pulsars. Young binary pulsars, however, remain unexplored by the LAT, leaving a potential deficit in our understanding of the evolutionary history of pulsars. We propose to implement techniques to search for young binary gamma-ray pulsars, focusing on LSI +61 303. A very bright gamma-ray binary, LSI +61 303 has well constrained orbital parameters, and has long been suspected of harboring a pulsar. We will develop simulations to optimize the parameter space over which to search, and ultimately, we will apply our methods to search for pulsars in all LAT gamma-ray binaries. In the event of non-detection of pulsations, we will provide meaningful upper limits to enable more complete population studies of pulsars in the Galaxy.

31183	FARHAD	YUSEF-ZADEH	THE NATURE OF THE DIFFUSE AND COMPACT GAMMA-RAY EMISSION IN THE GALACTIC CENTER	Fermi LAT has detected six cataloged sources and a diffuse gamma-ray emission from the inner two degrees of the Galactic center. The strongest gamma-ray source has an error circle that includes the massive black hole Sgr A* and a pulsar wind nebula candidate. Three other gamma-ray sources lie along the Galactic plane distributed where diffuse gamma-ray emission peaks. We propose a correlation study of the diffuse and compact gamma-ray emission with diffuse Kalpha 6.4 keV line emission, diffuse HESS emission, submillimeter and nonthermal radio continuum emission. The proposed analysis of combined radio, X-ray and gamma-ray data will elucidate the emission mechanism and constrain models that can explain the high energy activity in different wavelength bands in the nucleus of our Galaxy.
31184	CHI (TEDDY)	CHEUNG	PROMPT FOLLOW-UP OF FLARING/TRANSIENT FERMI-LAT GALACTIC PLANE SOURCES	We propose a comprehensive follow-up program of flaring/transient Fermi-LAT Galactic plane gamma-ray sources. Essential to this effort are the EVLA observations requested here; triggered Swift X-ray/optical follow-up have already been approved. At high-significance (>=5 sigma), we expect 3 such events/year visible with the EVLA, thus request 3 ToOs. We aim to identify plausible radio, X-ray, and optical counterparts following the LAT event via expected correlated variability. In case a plausible EVLA counterpart is identified, we will obtain further radio follow-up with the OVRO 40m and Effelsberg 100m. These observations will characterize the broad-band properties of each LAT transient, providing critical clues as to the nature of this enigmatic source population.
31188	MANEL	ERRANDO	USING FERMI-LAT TO SELECT VARIABLE, UNIDENTIFIED, TEV SOURCE CANDIDATES	The study of Fermi-LAT maps at high energy (E > 30 GeV) has provided critical guidance to the TeV instruments during 2009. A number of new TeV blazars have been detected, and searches for more are ongoing. Fermi-LAT data also reveal a number of hard spectrum sources which are not obviously identified with objects at other wavelengths, and whose emission may extend to TeV energies. We propose to analyze the Fermi-LAT data at energies E > 1 GeV and establish an independent all sky monitoring at those energies to select TeV source candidates, and to observe these sources over a range of wavelengths, including TeV observations with VERITAS and optical spectroscopy with MDM.

31189	DIETER	HARTMANN	COSMIC METAL ABUNDANCES FROM FERMI-GRB AFTERGLOW SPECTROSCOPY	We propose for cooperative Fermi-NOAO ToO observing time and funding for a GRB follow-up program that utilizes the enhanced Fermi-Swift synergy program. We propose optical and NIR spectroscopy of GRB afterglow emission for those Fermi bursts for which rapid Swift observations led to an X-ray localization, and either Swift/UVOT or ground based follow-up led to the detection of a sufficiently bright optical/NIR afterglow. The investigation aims at Cosmic Chemical Evolution (CCE), with abundance measurements with afterglow spectroscopy. For Fermi bursts triggering this ToO, we also propose LAT spectral analysis to constrain the diffuse extragalactic background.
31191	YURI	KOVALEV	1FGL ACTIVE GALACTIC NUCLEI AT PARSEC SCALES	1FGL AGN list has 486 unique associations with the largest VLBI catalog of extragalactic objects. They represent the 1FGL sub-sample which hosts the strongest parsec-scale cores. Associations of 168 other 1FGL AGNs North of decl. -30deg have no VLBI data since they fall below the completeness level of the VLBI catalog. We propose to perform a 72hrs VLBA+GBT survey of them at 8 GHz. As a result, we will collect parsec-scale information for all the 1FGL AGN associations down to 1.5 mJy. The proposed observations will eliminate the current VLBI sample bias towards strongest radio cores in 1FGL AGNs. It will allow robust analysis of gamma-ray / parsec-scale radio properties of the two main Fermi AGN populations, the flat-spectrum radio quasars and BL Lac objects, and constrain emission models.
31200	RITA	SAMBRUNA	FERMI OBSERVATIONS OF THE BAT SEYFERT SAMPLE: CHALLENGING STANDARD ACCRETION SCENARIOS	An exciting result from Fermi is the identification of a few radio-quiet Seyfert galaxies as possible counterparts of LAT sources. While detection of GeV emission from radio-quiet AGN is not unexpected theoretically, it is certainly not part of our standard ideas about these systems and it represents an important discovery and revision of the accretion paradigm. We propose to search for GeV gamma-ray emission in the 5-year BAT sample of radio-quiet Seyferts using 3 years of Fermi LAT exposure. The main scientific goals are to: 1) confirm Seyferts as a new class of Fermi LAT sources; 2) find observational clues to the origin of their gamma-ray emission; or 3) set stringent upper limits, in particular to their contribution to the GeV background via a stacked analysis of the LAT fields.

31212	PAUL	RICKER	SIMULATING COSMIC RAYS IN THE LARGE MAGELLANIC CLOUD	Fermi observations of the Large Magellanic Cloud (LMC) strongly support the idea that cosmic-ray acceleration is associated with regions of ongoing massive star formation. Because it is so close, the LMC is well-resolved in a variety of wavebands. We will use these observations to validate the numerical models of cosmic rays that are used in cosmological simulations. To do this, we will create a suite of 3D magnetohydrodynamics simulations of the past 100 Myr history of the LMC, including cosmic-ray models with various acceleration efficiencies and diffusive length scales. Our simulations will use existing observations of the gas distribution and recent star formation history as constraints, and we will create simulated images for comparison with observations.
31214	ANETA	SIEMIGINOWSKA	GAMM-RAY EMISSION FROM YOUNG RADIO SOURCES	This project will investigate the gamma-ray properties of young compact radio sources. The models predict that significant fraction of their energy should be radiated in gamma-rays. We will explore available Fermi/LAT observations and study (1) the intensity of the gamma-ray emission in these objects; (2) the nature of young radio sources and their energetics ; and (3) confirm whether they constitute a significant source population in gamma-rays and contribute to the gamma-ray background radiation. We will carry out a series of investigations of the data, develop a full statistical model based on a Bayesian approach to evaluate the gamma-ray flux distribution of young radio sources, and verify theoretical models predicting high energy emission in such objects.
31215	MARK	FINGER	STUDIES OF ACCRETING BINARY PULSARS WITH THE FERMI GAMMA-RAY BURST MONITOR	In cycles 1 and 2 we established a program for monitoring accreting pulsars using the Gamma-Ray Burst Monitor on Fermi. We are currently monitoring the full sky daily for pulsars with spin frequencies in the 1 mHz to 2 Hz range using a blind pulse search for discovering previously unknown or quiescent pulsars, and making source specific analyses for tracking the evolving pulse frequency of all detected pulsars. This results in histories of the pulse profile, pulsed flux, and frequency of these sources. Quick-look results are plotted on our website and available for use by the community, and refined long-term histories will be archived. For cycle 3 we propose to continue this monitoring, initiate monitoring of pulsed SFXTs, and measure the orbital parameters of three sources.

31218	ANDREI	BELOBORODOV	COLLISIONAL MECHANISM FOR GRB EMISSION	Nuclear and Coulomb collisions in GRB jets create a hot Maxwellian electron-positron plasma with a nonthermal tail. The plasma passes the heat to radiation via Compton scattering or synchrotron emission. As a result, 30-50 percent of the jet energy is converted to escaping radiation. This radiation has a well-defined spectrum that can be calculated from first principles. Remarkably, the spectrum has a Band-type shape that is consistent with observations. The proposed research aims to explore the emission produced by collisional heating using a state-of-the-art numerical code that simulates the evolution of the plasma and radiation in the expanding jet.
31219	JAMES	BUCKLEY	SEARCH FOR DARK MATTER ANNIHILATION IN SUBHALOS WITH FERMI AND VERITAS	The Fermi all-sky map could reveal evidence for dark-matter annihilation in Milky-Way subhalos either as unidentified sources, or as emission from Dwarf spheroidal galaxies. Such hints in Fermi data would provide the motivation for deep exposures with ground-based gamma-ray instruments such as VERITAS, HESS and MAGIC. We propose to periodically search the Fermi data to identify hard-spectrum, steady, high-latitude sources to trigger a Dark Matter Target of Opportunity (DMToO). This proposal would support (1) development of Fermi analysis methods to identify a DMToO; (2) routine analysis of the LAT data, communication with the LAT team and dissemination of a DMToO to the ground-based gamma-ray community and (3) performing VERITAS observations and Fermi/VERITAS data analysis.
31221	JOHN	EVERETT	COSMIC-RAY DRIVEN GALACTIC WINDS IN FERMI OBSERVATIONS	Galactic outflows play an important role in galaxy evolution and large-scale feedback on the intergalactic medium. New Fermi observations of gamma-ray emission from the starburst galaxies M82 and NGC 253, both with known large-scale winds, give us a unique opportunity to better understand cosmic-ray transport and winds, and the effects of cosmic-ray driven winds on galaxies and their environment. We propose to upgrade and apply our model of cosmic-ray and thermally driven winds to these starbursts in order to examine how efficiently cosmic rays are advected from the disk. These models will help us understand cosmic-ray production and gamma-ray emission in these galaxies, as well as galactic-wind feedback, and will help us interpret continuing Fermi observations of galaxies with winds.

31230	DANIEL	KOCEVSKI	TIME RESOLVED SPECTROSCOPY OF GAMMA-RAY BURSTS	We propose to focus on the time resolved spectral analysis of prompt gamma-ray burst (GRB) emission detected by the GBM on board the Fermi spacecraft. There have now been over 50 GRB simultaneously detected by both the Swift and Fermi spacecrafts, with roughly half this number having known redshifts. This combination of a broad energy window to perform spectral evolution studies and a frowning sample of events with known redshift will represent a unique parameter set in GRB astronomy allowing for several new avenues of research. We propose to concentrate our analysis on quantifying the evolution of GRB spectral parameters and how this evolution is related to a burst s source frame quantities such as the peak luminosity, total emitted energy Eiso, and source frame Epk.
31232	MICHAEL	STAMATIKOS	THE CROSS-CALIBRATION OF SWIFT-BAT AND FERMI-GBM VIA CORRELATIVE SPECTRAL ANALYSIS OF GRBS	This is a resubmission of an accepted proposal in Cycles 1 and 2 to cross-calibrate Swift's Burst Alert Telescope (BAT) and Fermi's Gamma-ray Burst Monitor (GBM), resulting in joint spectral GRB fits. Adding BAT's spectral response will (i) facilitate in-orbit GBM detector response calibration, (ii) augment Fermi's low energy sensitivity, (iii) enable ground-based follow-up efforts of Fermi GRBs, and (iv) help identify a subset of GRBs discovered via off-line GBM data analysis. The synergy of Swift and Fermi enables the study of peak energies, while leveraging the over eleven energy decades afforded by the inclusion of Fermi's Large Area Telescope (LAT). A status report regarding ongoing efforts is included, as well as some highlighted results from the literature.
31242	STEPHEN	CENKO	DISCOVERING THE OPTICAL AFTERGLOWS OF GBM GAMMA-RAY BURSTS WITH THE PALOMAR TRANSIENT FACTORY	To date, not a single optical afterglow has been identified solely based on a GBM localization. Because the GBM targets a different population of events from Swift (more nearby, more tightly collimated, more short-hard events), the community has likely missed out on a great deal of exciting science. We propose to remedy this situation by promptly identifying the optical afterglows of GBM bursts with the multiple automated facilities of the Palomar Transient Factory.
31243	DAVID	WILLIAMS	MULTIWAVELENGTH STUDIES OF TEV CANDIDATES SELECTED FROM HARD SPECTRUM FERMI BLAZARS	We propose multiwavelength studies of LAT-detected blazars which are promising VHE sources. We identify AGN where observations with VERITAS, in combination with the Fermi results, will give constraints on the intrinsic SED of the blazar, the density of extragalactic background light, or both. We will organize VERITAS and other wavelength observations for the most promising candidates and analyze these together with the Fermi data from the same epoch. This work will allow more detailed information to be extracted about the behavior of the studied AGN than can be obtained from the Fermi data alone.

31245	MANASVITA	JOSHI	THEORETICAL STUDY OF THE EFFECTS OF MAGNETIC FIELD GEOMETRY ON THE GAMMA-RAY EMISSION OF BLAZARS	We aim to explore the effects of different magnetic field geometries existing inside a blazar jet, parallel, transverse, oblique, helical, and tangled, on the high-energy spectral energy distribution (SED) of blazars. In order to study these effects, we will modify our existing numerical code for calculating jet emission, using a multi-zone time-dependent leptonic model with radiation-feedback scheme, to add the orientation of the magnetic field. The goal is to determine the connection between observed differences in polarization of BL Lacs and quasars and their high-energy SEDs. The appearance of some gamma-ray "orphan flares" seen in a few blazars can also be explored using the directionality of the magnetic field in the emission region.
31247	FIONA	HARRISON	FERMI GRB CALORIMETRY WITH THE EVLA AND P60	We propose to continue our successful program of multiwavelength observations of Fermi gamma-ray bursts (GRBs) with the primary objectives of 1) identifying long-wavelength counterparts and 2) measuring beaming-corrected energies (burst plus afterglow) of the brightest and most energetic GRBs. Combined with ground-based optical (robotic Palomar 60-inch telescope) and radio (EVLA) observations, we will use Fermi to target the high end of the GRB energy distribution - the recently discovered hyper-energetic (E > 10^52 erg) GRBs. This study will provide us with new insights into the least understood aspect of GRBs -- the central engine -- by constraining the maximum energy available for progenitor models (e.g. magnetars and black holes).
31249	PETER	GONTHIER	PULSAR POPULATION SYNTHESIS AND CONTRIBUTIONS TO POSITRON AND DIFFUSE GAMMA-RAY BACKGROUNDS	Recent Fermi detections of pulsars suggest a larger local density of pulsars that have escaped detection by radio surveys. Pair production from magnetospheres of a population of local pulsars is expected to contribute to the electron-positron abundance recently observed by ATIC, PAMELA, and Fermi indicating an excess in the 10 to 100 GeV region. We propose to perform a population synthesis of normal and millisecond pulsars from the Galactic Disk using our previously developed Monte Carlo computer code. We use polar cap, slot gap, and outer gap gamma-ray emission models to obtain statistics of radio-loud and radio-quiet gamma-ray pulsars. We will simulate the diffuse gamma-ray background and assess the contribution to the local cosmic ray positron spectrum from this local group of pulsars.

31250	SCOTT	RANSOM	SEARCHING FOR MORE RADIO MILLISECOND PULSARS IN FERMI UNASSOCIATED SOURCES	Fermi is revolutionizing our understanding of the GeV sky as well as the way we find millisecond pulsars (MSPs) using radio telescopes. In just 4 months, while searching a few dozen unidentified Fermi sources, the "Pulsar Search Consortium" has discovered pulsations from 18 MSPs (13 by our group, including 8 at GBT)! With this proposal we aim to continue this amazing pace of MSP and other pulsar discoveries using the GBT. The 1st Fermi LAT catalog contains several hundred pulsar-like and mostly unassociated gamma-ray sources not yet searched and visible from the GBT at |b|> 0.5 deg. We will search approximately 100 of these that, based on variability, spectral, and association criteria, are more likely to be pulsars. We request 80 hrs of GBT time for these searches.
31253	TUOMAS	SAVOLAINEN	FILMING THE JETS OF THE ARCHETYPICAL GAMMA-RAY QUASARS 3C273 AND 3C279 AT SUB-PARSEC RESOLUTION	We propose to study the relativistic jets of the two bright, archetypical gamma-ray quasars 3C273 and 3C279 by dense VLBA (144 hours requested through this proposal), Swift (time committed by the Swift project), LAT (standard survey mode), and optical polarimetry monitoring (time committed by the KVA telescope team) during the Fermi cycle 3. Unprecedentedly densely sampled polarimetric monitoring with the VLBA at 15-86 GHz will allow sub-parsec resolution "movies" to be made of the changes in the physical conditions, such as magnetic and particle energy density, in and near the mm-core, which is a likely site of gamma-ray emission. These movies will be correlated with well-sampled optical, UV, X-ray and gamma-ray light curves in order to test the high energy emission models.
31254	CHARLES	DERMER	BLAZAR SEQUENCE STUDIES WITH FERMI	Blazar spectral energy distributions exhibit a trend characterized by a shifting of the frequencies of the peak of their vFv synchrotron and Compton components toward higher energies with decreasing bolometric luminosity. This behavior could be due to selection effects, but if valid, the blazar sequence represents an important feature of blazar behavior. We propose to examine the validity of the sequence with Fermi data, to apply a model to the 1LAC sample of blazars in order to identify the physical origin of the sequence, and to use the sequence as a basis for modeling the statistics of blazars and see if evolutionary behavior is indicated.

31255	MIRIAM	KRAUSS	SEARCHING FOR GAMMA-RAY PULSATIONS FROM ACCRETION-POWERED MILLISECOND PULSARS	The discovery of spin-powered pulsations from quiescent accretion-powered millisecond pulsars (AMPs) would establish an important and elusive final link between the AMPs and the spin-powered millisecond pulsars (MSPs). We propose targeted pulsation searches of Fermi LAT data for these sources using pulse ephemerides derived during X-ray outbursts. Evidence strongly suggests that AMPs turn on as spin-powered MSPs between accretion episodes, and the observed spin-down power of at least one AMP is high enough that its detection is likely if it emits gamma-rays with comparable efficiency to the Fermi MSPs. Non-detections will place interesting limits on pulsed emission and may suggest that other spin-down mechanisms, such as gravitational wave emission, are at work.
31263	ROOPESH	OJHA	RADIO MONITORING OF SOUTHERN HEMISPHERE FERMI AGN	For Fermi sources in the third of the sky that is south of declination -30 degrees, the TANAMI (Tracking AGN with Austral Milliarcsecond Interferometry) and associated programs provide comprehensive radio monitoring of Fermi-detected AGN jets at a range of angular resolutions. The pertinency of these radio data, particularly contemporaneous radio data, to unraveling the physics of AGN is attested to by the number of early Fermi papers that TANAMI results are already a part of. We seek partial support for some aspects of the TANAMI program. We also request time for a deep multifrequency observation of the radio galaxy Centaurus A with the Very Long Baseline Array under the joint proposal opportunity with the National Radio Astronomy Observatory.
31266	GIOVANNI	FOSSATI	UNDERSTANDING THE NATURE OF BLAZARS GAMMA-RAY EMISSION WITH TIME-DEPENDENT MULTI-ZONE MODELING	We propose to investigate the nature of the high energy emission of blazars by modeling the multiwavelength variability of bright Fermi/LAT blazars with a time-dependent multi-zone jet model. Understanding the properties of their gamma-ray emission, which is sensitive to the thermal emission components from various parts of the innermost regions, would shed light on the physics, geometry and scale of their central engines. We will be able to do so for multiple sources, with a range of observed phenomenology.

31267	CHARLES	BAILYN	SMARTS PHOTOMETRY OF BRIGHT FERMI BLAZARS	We propose to carry out optical and infrared photometry of bright Fermi blazars in the southern hemisphere, using the SMARTS consortium 1.3m + ANDICAM. We will continue near-daily monitoring of 13 sources under study since Cycle 1, and add to them 22 new sources from the Fermi point source catalog. We will correlate our photometry with Fermi gamma-ray fluxes, and by extrapolating to zero gamma-ray flux, determine the contribution from the disk to the optical/IR, and thus disentangle the disk contribution from that of the jet. The jet flux can then be used to constrain the magnetic fields and particle populations in the jet. We will release our data promptly to the community through a publicly accessible web site, and carry out a careful calibration of the optical/IR fields.
31271	THOMAS	HUMENSKY	UNRAVELING THE GEV/TEV EMISSION OF SUPERNOVA REMNANTS INTERACTING WITH MOLECULAR CLOUDS	Supernova remnants interacting with molecular clouds are a tool for studying the acceleration, propagation, and diffusion of hadronic cosmic rays. We propose to study the GeV-TeV gamma-ray emission associated with SNR/MC interaction sites to assess the likelihood that the gamma-ray emission is powered by hadronic cosmic rays interacting with dense cloud material and to study the efficiency of cosmic-ray acceleration and properties of the diffusion of cosmic rays away from their acceleration sites. This study will be conducted by analyzing Fermi data along with VERITAS data in order to assemble broad-band gamma-ray spectra, study the morphological evolution of the emission with energy, and correlate the emission with spatial templates provided by tracers of matter density.
31276	DANIEL	PATNAUDE	THE ORIGIN OF THE VERY HIGH ENERGY EMISSION IN CASSIOPEIA A	Recent X-ray observations of the Galactic supernova remnant Cas A have revealed time-variability in the bright synchrotron filaments. Based on the projected location of these filaments, it has been argued that they mark the location of efficient cosmic-ray acceleration at the SNR reverse shock, a claim supported by the localization of GeV--TeV gamma-ray emission nearby. However, radio and X-ray absorption maps suggest that the SNR forward shock is interacting with nearby molecular clouds, known sites for efficient particle acceleration. We propose a broad multiwavelength study of Cas A, incorporating Fermi LAT, Chandra, and HST data as well as hydrodynamical modeling to provide the definitive answer on the origin of the gamma-ray emission in this supernova remnant.

31284	SHAMI	CHATTERJEE	PRECISION DISTANCES AND VELOCITIES FOR FERMI-DETECTED RADIO PULSARS	The distance to a source is a fundamental quantity in astrophysics. We propose multi-epoch astrometric observations of a sample of Fermi-detected radio pulsars with the VLBA in order to obtain model-independent estimates of their velocity and distance. In the first year, we will search for calibrator sources for 18 targets and obtain two epochs of astrometry on 10 sources, with more epochs to be requested in future. When completed, these measurements will enable precise comparisons of spin-down power and gamma-ray luminosity for the neutron stars, probe their birth sites and relativistic winds, help refine Galactic electron density models, and enable more stringent tests of theories of gravity.
31285	ANATOLY	SPITKOVSKY	LIGHT CURVES AND SPECTRA FROM STRONG CURRENTS IN PULSAR MAGNETOSPHERES	Recent modeling of Fermi pulsar light curves using self-consistent "force-free" magnetospheric geometry, which includes the backreaction of the plasma, has shown that the characteristic double-peak light curves can be explained by emission from the strong equatorial current sheet that separates field lines from the opposite hemispheres near the light cylinder. We will compare the atlas of light curves from the force-free model with the observations of individual pulsars, which have independent constraints on magnetic inclination angle or rotation axis direction. We will also calculate phase-resolved spectra from the plasma-filled magnetosphere by allowing finite resistivity on current-carrying field lines, and use Fermi results to learn about the physics of magnetospheric currents.
31288	ANN	WEHRLE	COORDINATED WISE+SWIFT+FERMI OBSERVATIONS OF BLAZARS	We propose to coordinate Swift, WISE and Fermi LAT observations of 18 blazars. When combined with ground-based observations, the resulting SEDs will be modeled to find the relative contributions of external Compton and synchrotron self Compton emission and the underlying physical conditions. The observations are nearly simultaneous: the Swift observations are scheduled to occur within 24 hours of the WISE survey dates. We will strongly constrain the correlations between gamma-ray spectral slope, synchrotron peak energy, inverse-Compton peak energy and X-ray spectral index initially derived by Abdo et al. (2010). Our sample includes the 17 most variable blazars in the LAT Monitored Source List plus PKS 1502+106; the six brightest flaring Fermi LAT blazars are included in our study.