prop_num	pi_lname	title	abstract
61018	LYUTIKOV	THE INVERSE COMPTON MODEL OF PULSAR NON-THERMAL EMISSION	There is growing evidence that pulsars high energy emission is generated via Inverse Compton mechanism. We will model the broad UV-X-ray component and the very high energy gamma-ray emission within the Cyclotron-Self-Compton framework. In the Klein-Nishina regime, the IC spectral bump provides a direct measurement of the particle distribution function. We will perform radiative transfer modeling, taking into account the anisotropic particle distribution and effects of pair production in the gaps. Cyclotron motion of particles in the pulsar magnetosphere may be excited due to coherent emission of radio waves at the anomalous cyclotron resonance. Thus, a whole range of Crab nonthermal emission (nearly eighteen decades in energy) may be a manifestation of inter-dependent radiation processes.
61051	KOUVELIOTOU	THE SPECTRAL EXTREMES OF THE EXTREME: CORRELATED GAMMA-RADIO STUDIES OF HIGH-ENERGY TRANSIENTS	We propose to use the Fermi/GBM in combination with the next generation wide-field low-frequency arrays (LOFAR; northern and MWA; southern, hemisphere) to study the joint behavior of extreme high-energy transients, in particular gamma-ray bursts and magnetars. With the very wide FoV of all three experiments, and the extreme pointing agility of both LOFAR and MWA, we can catch fast transients simultaneously at both ends of the EM spectrum, greatly enhancing our chances of unraveling their physics. These observations will provide a new tool in the study of known sources, identification of new types of transients, and, for the first time a comprehensive all-sky survey of high-energy transients and their radio counterparts.
61055	HURLEY	MAINTAINING THE FERMI GBM IN THE 3RD INTERPLANETARY NETWORK	We propose to continue our successful AO-2-5 efforts 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 several 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.

61069	D'ABRUSCO	UNIDENTIFIED GAMMA-RAY SOURCES: OPTICAL OBSERVATIONS OF GAMMA-RAY BLAZAR CANDIDATES	One of the main objectives of the Fermi-NOAO Cooperative Arrangement is: counterpart candidate study, including redshift determination of previously unknown BL Lacs and high-redshift blazars. This is the main aim of our proposal, requesting optical spectroscopic observations to investigate gamma-ray blazar candidates selected with our association method. The proposed observations will decrease the number of unidentified gamma-ray sources by ~20% and permit a more accurate calculation of the gamma-ray blazar luminosity function. Our investigation is also crucial for additional studies as: the measurement of the imprint of the ExExtragalactic Background Light in blazar gamma-ray spectra and the estimate of the blazar contribution to the Extragalactic Gamma-ray Background.
61077	BERGER	RAPID SPECTROSCOPY OF FERMI GRBS: REDSHIFTS, ENERGETICS, AND HOST GALAXIES	Rapid spectroscopy of GRB afterglows enables a wide range of studies related to basic GRB physics (redshifts, energetics), the progenitors (metallicities), the properties of high-redshift galaxies (chemical abundances), and potentially fundamental physics (Lorentz invariance violation). As such, rapid spectroscopy is the most essential correlative observation for Fermi GRB studies. Here we request support for our rapid spectroscopy program (using Gemini, Magellan, MMT), which will provide redshifts and metallicities. We will further combine the redshifts with late-time EVLA observations to determine beaming-independent energies for Fermi GRBs, and assess whether Fermi and Swift bursts probe the same population. The data will be released to the community in real-time via GCN circulars.
61089	GEHRELS	TANAMI: RADIO MONITORING OF SOUTHERN HEMISPHERE FERMI AGN	As the only comprehensive radio program monitoring Fermi extragalactic sources in the third of the sky that is south of declination -30 degrees, the TANAMI project anchors quasi-simultaneous multiwavelength studies of many of the most interesting AGN. Its VLBI observations are the only large program performing dual-frequency observations which provide spectral index information at parsec-scale resolution. For almost a third of the sky, TANAMI observations are the only way to obtain kinematic parameters that are essential inputs to modeling the energetics of AGN. Thus TANAMI continues to be an indispensable resource to optimize the scientific output of Fermi/LAT. This proposal requests support for the US portion of this indispensable US-lead international program.

61096	JORSTAD	PROBING THE MOST COMPACT REGIONS OF GAMMA-RAY BLAZAR JETS WITH MILLIMETER WAVE IMAGING	We propose to perform a 2 week campaign in 2014 March - April of high-frequency VLBI observations at a number of epochs at 230, 86, 43, and 22 GHz of the 7 brightest radio sources from the sample of gamma-ray blazars that the BU group monitors monthly at 43 GHz, along with photometric and polarimetric observations at optical wavelengths. This will be a joint campaign of observations with the Very Long Baseline Array, Event Horizon Telescope, and Perkins telescope (Flagstaff, AZ) to study the physical properties of the inner radiation zones of relativistic jets - size, substructure, polarization, timescale of variability, and position with respect to the base of the jet and black hole - that are of greatest relevance to gamma-ray emission.
61101	REYNOLDS	RELIC GEV EMISSION FROM MIDDLE-AGED SUPERNOVA REMNANTS	Supernova remnants (SNRs) expanding into cavities can produce long-lived populations of relativistic particles, that persist long after the blast wave has moved into the denser cavity wall and slowed to speeds too low for particle acceleration to high energies. The cavity populations of fast particles can produce GeV emission from pion decay, bremsstrahlung, or inverse-Compton scattering of CMB or other ambient photons, even without either nonthermal X-rays or TeV emission. I propose to calculate such relic GeV emission from cavity SNRs, with applications to the Cygnus Loop and possibly other middle-aged SNRs not obviously interacting with dense molecular gas. I shall also consider diffuse emission such as that from Cygnus X that may have outlived its SNR.
61103	RAY	SEARCHING FOR WIND-WIND INTERACTIONS IN MILLISECOND PULSAR BINARIES	Recent radio pulsar searches, particularly targeting Fermi LAT unassociated sources, have greatly increased the number of known millisecond pulsar binaries where wind-wind interactions are likely to occur. We propose to search the off-pulse phases of so-called black widow and redback millisecond pulsars for unpulsed gamma-ray emission arising from these interactions. We will use precise timing solutions to gate the pulsar off and then perform individual searches for orbital modulation as well a combined stacking analysis for each class. Characterizing the spectrum and orbital profile of any off-pulse emission will help us to better understand the content of the pulsar winds, how the companion stars are ablated in these systems, and the evolution of millisecond pulsar systems.
61115	ALLER	PROBING THE ROLES OF SHOCKS, ORIENTATION, AND OPACITY ON BLAZAR GAMMA-RAY FLARES	We use archival UMRAO flux & polarization data at 14.5, 8, & 4.8 GHz for a large sample of radio-bright, gamma-ray flaring blazars to untangle the effects of shocks, orientation, and opacity on cross-band variability. We fit targeted sources with shock signatures using radiative transfer models incorporating propagating shocks to identify physical conditions near the gamma-ray emission site. The work explores shock ubiquity during gamma-ray flares, identifies causes for time-dependent cross-band variability, and provides input for emission models.

61117	PINER	THE PARSEC-SCALE JETS OF AN EXPANDED SAMPLE OF TEV BLAZARS AS SEEN BY THE UPGRADED VLBA	We propose to significantly expand our successful VLBA studies of the jets of TeV-detected High-Frequency Peaked BL Lac Objects (HBLs), nearly all of which are also Fermi sources. The jets in these sources are fundamentally different from the more powerful blazar jets, and they are not well-studied by other VLBA programs. The newly detected TeV blazars tend to be faint in the radio, and we will take advantage of the VLBA Sensitivity Upgrade to produce multi-epoch parsec-scale images of these fainter sources. We will address a number of open questions about the physical properties of these jets, including placing constraints on the Lorentz and Doppler factors, and on the structure of the gamma-ray emitting region, for this relatively poorly-studied portion of the Fermi blazar catalog.
61122	GIANNIOS	THE MAGNETIC RECONNECTION MODEL OF BLAZAR FLARING	Fermi, in synergy with other observatories, has made major contributions in our understanding of the blazar phenomenology. The observational progress has been accompanied by relatively little advances in the theory of the mechanisms responsible for the jet emission. The recent discovery of ultra-fast flares in several blazars introduced more questions than answers. We have proposed that the blazar emission is powered by magnetic reconnection in the jet. Our previous work has shown that the conditions in the reconnection regions can satisfy the stringent timescale and energetic requirements in accounting for the most extreme blazar flaring. We propose to further develop the model by calculating the lightcurves, spectrum, and polarization angle changes during reconnection events in blazars.
61131	BEGELMAN	MODELING THE CRAB NEBULA'S GAMMA-RAY FLARES	The discovery of gamma-ray flares from the Crab Nebula is one of the great surprises of the Fermi era. We have explained the unexpectedly high synchrotron photon energies, extreme spectral hardness, high intensity, and rapid variability of these flares via a novel reconnection-powered linear accelerator mechanism. We will use 2.5-D and 3-D Particle-in-Cell simulations to develop this model and its observational consequences, by: 1) studying the effects of a magnetic guide field; 2) exploring the energy-dependent kinetic beaming effect that distinguishes this mechanism from ordinary Doppler boosting; and 3) studying the applicability of our extreme particle acceleration model to other classes of gamma-ray source, including other pulsar wind nebulae, striped pulsar winds, and blazars.

61139	OMODEI	SPECTRAL-TEMPORAL ANALYSIS OF IMPULSIVE SOLAR FLARES AT HIGH-ENERGY WITH FERMI	We propose to study the impulsive phase of solar flares at high gamma-ray energies observed by Fermi, characterizing the gamma-ray emission processes that shed light on the acceleration and propagation of energetic particles. We plan to combine GBM and LAT Low Energy (LLE) data to extend to high energy the time-delay relationships so far studied only at lower energies, and use different algorithms to characterize the temporal properties of the impulsive phase of solar flares at high energy. We outline a 2-year program, presenting the scientific motivation and the methodology we plan to follow, and feasibility studies to show its potential output. We also plan to deliver software and tools for public use, increasing the relevance of Fermi for the international community.
61145	BOTTACINI	ON THE NATURE OF THE FERMI-LAT UNASSOCIATED GALACTIC SOURCES	Unassociated Galactic sources of the 2nd Fermi-LAT catalog hide their nature and their energetics. They also cause uncertainties in Galactic source population studies and diffuse emission models. Even though advisable, their association to sources from hard X-ray surveys has been inefficient due to the lack in sensitivity in latter energy band, until now. We propose to associate LAT unassociated sources to sources from the very sensitive combined Swift-INTEGRAL X-ray (SIX) survey. Based on our test on the Galactic Center, we make precise predictions on the expected results on the Galactic Plane. As-yet-unknown gamma-ray source classes are possibly unveiled. Newly LAT-SIX associated sources can used to perform population synthesis studies that allow refining the diffuse emission model.
61180	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 VLA observations requested here. At high-significance (>=5 sigma), we expect 3 all-sky events/year, with ~2/3 visible with the VLA, thus request 2 ToOs. Together with pre-approved Swift XRT/UVOT observations, we aim to identify plausible radio, X-ray, and optical counterparts following the LAT event via expected correlated variability. In case a plausible VLA counterpart is identified, we will obtain further radio follow-up with our partner single-dish observatories. These observations will characterize the broad-band properties of each LAT transient, providing critical clues as to the nature of these enigmatic sources.
61188	MAX	KECK ADAPTIVE OPTICS OBSERVATIONS OF FLARES AND VARIABILITY IN THE CRAB PULSAR AND NEBULA	The Crab Nebula is a prototypical pulsar-driven supernova remnant. Astronomers had regarded the Crab's x-ray and gamma-ray fluxes as stable. But both Fermi and AGILE have observed large gamma-ray flares, during which the gamma-ray flux increased by a factor > three to ten over a period of days. To date, flares have only been seen in gamma-rays. We propose to obtain and analyze observations with near-IR adaptive optics at Keck to image the Crab during future Fermi flares, and to establish a baseline of "normal" variability. We have been awarded Keck observing time for this project. The flares have timescales on the order of days. Laser guide star adaptive optics and VLBI are the only ways to resolve light-travel distances of a few days, or 0.04 - 0.06 arc sec at the Crab.

61195	CAMILO	RADIO TIMING OF FERMI MILLISECOND PULSARS	The discovery of millisecond pulsars in radio searches of Fermi-LAT unidentified sources continues apace. In order to fulfill the promise of these discoveries, one must obtain phase-coherent rotational ephemerides over an interval of at least one year. Such ephemerides are then used to fold sparse gamma-ray photons and obtain gamma-ray pulsations, the starting point for subsequent studies. Sub-arcsecond positions also result, which are invaluable for multiwavelength studies. Here we propose to use mainly Green Bank Telescope observations in order to obtain timing solutions for 10 millisecond pulsars that our group has discovered in LAT unidentified sources, thereby making a substantial contribution to the study of this newly identified important class of Galactic gamma-ray sources.
61197	FERRARA	INVESTIGATION OF A SAMPLE OF EXTRA-ORDINARY FERMI-LAT UNASSOCIATED SOURCES	We propose a strategy to search for new classes of gamma-ray emitters in high-Galactic Latitude 2FGL Fermi-LAT unassociated sources. Using radio and GeV characteristics, we constructed a list of Fermi sources with radio counterparts that had none of the typical properties of a blazar (radio flat spectrum) and none of a MSP (peaked GeV spectrum). We propose a systematic search for multi-wavelength counterparts of the radio sources in archival data (radio and optical surveys, Swift X-ray observations) as well as dedicated follow-up observations. Through the development of broadband spectral energy distributions (SEDs), high resolution radio imaging and optical spectroscopy, we aim to reveal the nature of these mysterious gamma-ray sources and discover new types of gamma-ray emitters.
61200	COPPI	LA SILLA QUEST: USING A WIDE-FIELD TELESCOPE TO IDENTIFY THE OPTICAL COUNTERPARTS OF GBM BURSTS	The GBM has proven to be an excellent instrument for finding and studying prompt gamma-ray bursts: the GBM burst rate is ~twice that of SWIFT/BAT, probing a population more similar to that of BATSE,and GBM provides good timing and spectral information up to energies ~1 MeV. The latter is crucial for measuring E_peak, an important burst diagnostic, which SWIFT/BAT often cannot do given its 150 keV sensitivity cutoff. Unfortunately, typical GBM error circles are degrees in size, not the arcminutes required for counterpart identification and redshift measurement using conventional, narrow-field telescopes. Much potential GBM science is thus lost. We propose to use the 9.6 square degree field-of-view QUEST camera mounted on a 1m Schmidt to identify the fading optical afterglows of GBM bursts.

61220	BRIGGS	TERRESTRIAL GAMMA-RAY FLASH (TGF) RESEARCH WITH FERMI GBM	We will search the new GBM data product, continuous Time-Tagged Events, to find a large number of TGFs. We will correlate these TGFs with the VLF radio data of the World-Wide Lightning Location Network (WWLLN) to produce a large sample of accurate source locations. Both of these samples will be publicly released along with software to analyze GBM TTE data. We will also conduct observations in the LF radio to study lightning associated with TGFs and to quantitatively test models of the radio emission of TGFs. We will fit the time history and spectra of Terrestial Electron Beams (TEBs) to constrain the beam diameters and pitch angle distributions. We will use the large TGF sample to look for differences between TGF sub-samples and to correlate them with meteorological data.
61252	YANG	UNVEILING THE NATURE OF THE FERMI BUBBLES -- MHD SIMULATIONS OF COSMIC RAYS IN THE GALAXY	We propose to investigate the formation of the Fermi bubbles by a recent jet activity from the Galactic center using three-dimensional magnetohydrodynamic simulations including relevant cosmic-ray (CR) cooling and heating mechanisms. We will identify the most important physical processes responsible for the spatially uniform hard spectrum of the observed bubbles. By comparing the simulated maps and spectra to multi-wavelength observations, we will constrain the composition and spectra of CR particles within the bubbles, which may shed light on the nature of feedback from active galactic nuclei in general. This work will also have important implications for the past activity at the Galactic center, CR transport mechanisms, and magnetic fields in our Galaxy.
61260	WILSON-HODGE	GBM EARTH OCCULTATION MONITORING	We propose to use software developed for Fermi GBM Earth occultation analysis to continue to monitor a catalog of sources, providing automatically updated light curves and energy spectra for select sources as a service to the community via our website. Proposed upgrades to our service products include developing regularly updated FITS products to be available through the FSSC and improving our website so that users can easily identify currently active sources. Proposed science investigations include publishing a 6-year GBM occultation source catalog, continued monitoring of the hard X-ray variations in the Crab Nebula, black hole monitoring including enhanced QPO searches using GBM continuous TTE data.
61261	MADEJSKI	JOINT ANALYSIS OF FERMI/LAT AND NUSTAR OBSERVATIONS OF BLAZARS	We propose to perform joint analysis of simultaneous Fermi/LAT and NuSTAR data on several blazars included in the LAT + NuSTAR hard X-ray monitoring program. This program was allocated a significant portion of NuSTAR observing time, over 2 Ms. High-quality hard X-ray data, not available during the early Fermi mission, are crucial in constraining the high-energy spectral components in each of the blazar classes, providing an insight into the jet composition and energetics, and particle acceleration mechanisms. We will extract and cross-correlate gamma-ray and hard X-ray light curves, and model broad-band spectral energy distributions of FSRQs 3C 454.3, 3C 279 and PKS~1510-089, HBLs Mrk 421, Mrk 501, 1ES0229+200, and PKS 2155-304, and LBLs AO 023+164 and BL Lac.

61274	AGUDO	OPTICAL AND MILLIMETER PHOTO-POLARIMETRY OF BRIGHT GAMMA-RAY BLAZARS	We propose to continue our previous millimeter and optical photo-polarimetric programs to monitor a set of 36 of the brighter blazars visible from the northern sky. Our data -obtained with the IRAM 30m and the Calar Alto 2.2m Telescopes-, in combination with data at other wavelengths, have been extremely useful to study the location of the gamma-ray emission site and mechanism on blazars. Our results will be combined with the comprehensive data sets compiled by the Boston University Blazar Group to boost the scientific output of the Fermi data, and of the Boston University Blazar Monitoring Program by improving its ability to locate the gamma-ray emission regions through correlation of the polarimetric properties of blazars along the electromagnetic spectrum.
61287	FINGER	STUDIES OF ACCRETING BINARY PULSARS WITH THE FERMI GAMMA-RAY BURST MONITOR IN CYCLE 6	Since cycle 1 we have been monitoring accreting pulsars using the Gamma-Ray Burst Monitor on Fermi. This monitoring program includes daily full sky searches for previously unknown or quiescent pulsars using a blind search, and making source specific analyses to track the frequency evolution of all detected pulsars. Quick-look results are plotted on our website and available in fits files while refined long-term histories of pulse profile, pulsed flux, and frequency are available by request, and will be archived. We propose to continue this monitoring, expand our coverage of short period sources using the TTE now continuously available, study the transient GRO J1008-57 and study the turn-on times of Her X-1's main-high state.
61288	MOSKALENKO	GETTING MOST OUT OF THE HIGH-ENERGY SKY: A STUDY OF GAMMA-RAY PRODUCTION IN HADRONIC INTERACTIONS	Gamma rays coming from the deep space are carrying information about the most energetic processes in the universe. Given the large amount of precise observational data, it is vital to have an equally accurate description of the gamma-ray production processes. The properties of QED processes are well-understood, however, a significant uncertainty exists in the case of hadronic interactions (pp and pA). We propose to use all available relevant accelerator data (i) to test the currently available high-energy event generators, (ii) to improve the description of gamma-ray production in the transition and low energy regions (<50 GeV), (iii) to provide statistically well-defined uncertainties on these models, and propagate these uncertainties into the analysis of gamma-ray observations.
61303	WAKELY	SUPPORTING GAMMA-RAY SCIENCE WITH TEVCAT	The twin successes of the Fermi mission and the current generation of ground-based TeV instruments have left us with an enviable problem - how to best correlate and compare the properties of the multitude of discovered sources at these different wavelengths? TeVCat, an online catalog of TeV gamma-ray sources, has shown itself to be a valued resource in this regard and we propose to further improve its scope and capabilities to help advance GeV/TeV gamma-ray science. We will 1) Improve the power and flexibility of existing tools for the identification and visualization of TeV counterparts to GeV sources (and vice versa); 2) Increase the depth/granularity of the data stored on GeV/TeV sources; 3) implement and maintain tools for displaying joint GeV/TeV spectral data, including joint fits.

61310	KERR	A RADIO POLARIZATION DATABASE FOR GAMMA-RAY PULSARS: A SINE QUA NON FOR UNDERSTANDING THE PULSAR MACHINE.	Polarimetry provides a unique probe of the magnetic field configuration of radio pulsars, allowing measurement of parameters such as the inclination of the magnetic field to the spin axis and to line of sight. These quantities are critical in relating models of gamma-ray emission to the light curves observed by the Fermi Large Area Telescope (LAT). Without polarimetry, stringent tests of such models are often impossible. The LAT has now detected emission from roughly 100 radio-loud pulsars, and this population boom has left a wide gap between the available and desired polarimetry coverage. We propose to collect radio polarimetry for all radio-loud gamma-ray pulsars and release it in a database available to the community of pulsar observers and theorists.
61317	MACFADYEN	DYNAMICS AND RADIATION OF FERMI GRB AFTERGLOWS	We propose to apply advanced numerical and statistical methods to the analysis of broadband afterglows in order to constrain fundamental parameters such as outflow collimation angle and observer angle and to compare Fermi/Swift triggered bursts and non-Fermi triggered bursts. We will then study models of extended gamma-ray emission by means of numerically simulating relativistic jets with extreme Lorentz factors (> 300) inferred for Fermi GRBs, using techniques based on our recent work in numerical relativistic hydrodynamics that, for the first time, render such simulations possible. These are then combined with a radiative transfer approach to synchrotron emission and a Monte Carlo approach where scattering plays a role, to create synthetic light curves which will be fit to Fermi data.
61326	KOUSHIAPPAS	SEARCHING FOR DARK MATTER USING A STACKED DWARF GALAXY ANALYSIS IN A JOINT FERMI-LAT/VERITAS DATA SET	Fermi and VERITAS are both extremely important in the search for a dark matter signal. Currently, the strongest constraints on the annihilation cross section of dark matter are set by observations of dwarf galaxies by Fermi in the dark matter low-mass end, and by VERITAS in the high-mass end. This proposal aims at performing a joint analysis of a suite of dwarf galaxies from the combined data set between the two experiments. A joint analysis will increase the sensitivity of dark matter searches. This work has the potential of extending the reach of indirect detection to lower annihilation cross sections and thus has implications in all of cosmology and astro-particle physics as well as enhances the yield of science return from Fermi.
61328	NISHIKAWA	SYNTHETIC SPECTRA COMPARED WITH GBM SPECTRA FROM FERMI	Observational evidence and theoretical studies of relativistic jets from gamma-ray progenitors suggest that electrons accelerated in turbulent magnetic fields generated by instabilities generate the prompt and afterglow emission. RPIC simulations show that the spectrum obtained in a self-consistent way from electrons accelerated by the Weibel and KKHI instabilities is synchrotron radiation in nature. We propose to investigate the dynamics of relativistic shocks relevant to both the prompt and afterglow GRB emission using RPIC simulations. Different relativistic jet conditions will be used to emulate shock and spectral evolution. The self-consistently calculated spectra will be compared to Fermi observations and will provide diagnostics for the emission from and properties of GRB jets.

61330	LINDEN	THE SMITH CLOUD: A HIGH-VELOCITY CLOUD CONFINED BY DARK MATTER	We propose to explore a new source class for the indirect detection of particle dark matter: high velocity clouds (HVCs). Recent studies suggest that the mass density of these peculiar structures must be dominated by dark matter to explain their resilience against tidal interactions with the Milky Way disk. Should dark matter annihilate into standard model particles, HVCs are likely to be among the brightest dark-matter-powered sources in the sky. Our study will set limits on, or possibly detect, dark matter from gamma-ray observations of HVCs. We have identified a promising candidate HVC, the Smith Cloud, to search using Fermi-LAT data. We will also explore the population of ~2,000 known HVCs, to investigate improved dark matter constraints through a joint likelihood analysis of LAT data.
61335	DIGEL	SEARCH FOR COSMIC RAYS IN THE HALO OF THE MILKY WAY AND BEYOND	We propose to use Fermi LAT data to measure for the first time the cosmic-ray density in the halo of the Milky Way and in metagalactic space outside the Milky Way. This will resolve the currently-large uncertainties in the scale height of cosmic rays and the appropriate boundary conditions for calculations of cosmic-ray propagation. The results also will inform determinations of the foreground of the extragalactic diffuse emission and the Galactic magnetic field in the halo. The measurements will be made by detecting the diffuse gamma-ray emission from the interactions of cosmic rays with hydrogen in High Velocity Clouds (selected for large sizes and well-constrained distances) and the Magellanic Stream.
61339	SIEGAL-GASKINS	REVEALING THE NATURE OF DARK MATTER WITH MULTI-WAVELENGTH OBSERVATIONS OF THE GALACTIC CENTER	We propose a comprehensive multi-wavelength study of the Galactic Center (GC) region to examine recent claims of possible excesses in gamma rays and microwave emission (the "WMAP/Planck Haze") that may indicate a dark matter signal. Taking advantage of the upcoming Planck data release and the increasing LAT data, we will perform a spectral and spatial study of gamma-ray, microwave, and radio emission in the GC to determine in which models dark matter can simultaneously explain the GC gamma-ray excess and the Haze, and assess the impact of astrophysical source and magnetic field modeling on the results. We will then perform an improved characterization of the Haze, extending to regions closer to the GC than previously explored, which will be used to further constrain dark matter models.
61340	GIROLETTI	RESOLVING EXTREME ACCELERATORS: HIGH ANGULAR RESOLUTION OBSERVATIONS OF GAMMA-RAY SOURCES WITH HARD SPECTRUM	We propose to study at high resolution the low energy counterparts for the catalog of gamma-ray sources detected by the LAT at energies above 10 GeV in three years. By collecting archival high resolution radio data and obtaining new 5 GHz VLBA observations for the sources never observed before, we want to (1) describe the observational properties (positions, flux densities, compactness, brightness temperature) of the radio counterparts for a large unbiased sample of hard gamma-ray sources and to (2) connect these properties to the MWL ones for an understanding of the physics at work, e.g. through SED modelfitting.

61350	NISHIKAWA	NUMERICAL STUDIES OF GAMMA-RAY FLARES IN AGN JETS	We propose to test the hypothesis that the majority of gamma-ray flares in AGN jets are produced by the passing of new superluminal features through a recollimation shock -- either at the mm-VLBI core of blazars, or significantly downstream as in the HST-1 region of M87 -- as suggested by multi-wavelength observations. This will be performed through a detailed characterization of the magnetohydrodynamical structure of recollimation shocks making use of our 3D RMHD and Particle-in-Cell simulations. Comparison with observations will be carried out through the computation of synthetic emission maps, SEDs, and light curves of the non-thermal radiation (synchrotron-self-Compton and external Compton) originated when jet disturbances cross the recollimation shock.
61355	PETER	CALCULATING GAMMA-RAY EMISSION FROM COSMIC-RAY INTERACTIONS IN THE SOLAR ATMOSPHERE	Cosmic-ray transport in the inner solar system and cosmic-ray interactions in the solar atmosphere and corona are currently poorly constrained. Recently, the Fermi Collaboration claimed a detection of gamma rays from cosmic-ray interactions in the solar atmosphere. Theoretical models for this signal from the solar disk are more than 20 years old and demonstrably incorrect---the Fermi observations exceed the theoretical predictions by an order of magnitude. We propose to construct a novel model for the solar disk gamma rays. We will use cosmic-ray propagation models for the solar system and particle-shower simulations to estimate this gamma-ray population, and use the observed Fermi/LAT data as a constraint on the propagation models.
61358	CHATTERJEE	PRECISION DISTANCES AND VELOCITIES FOR FERMI-DETECTED RADIO PULSARS	The distance to a source is a fundamental quantity in astrophysics. We propose to continue multi-epoch astrometric observations of a sample of Fermi-detected radio pulsars with the VLBA in order to obtain model-independent estimates of their distance and velocity. With observations in Cycles 3--5, we are completing astrometry on 12 pulsars. Here we request 4 observation epochs (of 8 total) on 9 pulsars previously deferred for the VLBA sensitivity upgrade, and calibrator searches for 3 new pulsars. Proper motion and parallax 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.
61364	BELOBORODOV	RADIATIVE PROCESSES IN GRB JETS	We propose to investigate radiative processes in gamma-ray burst (GRB) jets focusing on two aspects. (1) Production of photons and formation of their spectrum at the early, opaque stage of jet expansion, which is key for understanding the prompt GRB emission observed by Fermi telescope. We will investigate this problem using state-of-the-art radiative transfer simulations. (2) Temporarily extended GeV emission observed by LAT, which provides important constraints on the Lorentz factor of GRB jets. In particular, we will study gamma-gamma absorption of GeV emission by the scattered prompt radiation, which we estimate to be an important source of opacity.

61368	MCCOLLOUGH	A MULTI-WAVELENGTH STUDY OF GAMMA-RAY PRODUCTION IN CYGNUS X-3	Microquasars are X-ray binaries that contain a stellar-mass black hole with jets. Powered by accretion from the companion stars, they radiate strongly at X-ray and soft gamma-ray energies. The detection of Cyg X-3 at GeV gamma-ray energies has shown that microquasares are similar to AGN and GRBs. We propose to carry out a comprehensive study of the gamma-ray properties of Cyg X-3 in a multiwavelength context. The Fermi LAT survey data will be complemented by similar data from all-sky X-ray monitors, as well as by data from pointed observations at radio, sub-mm, infrared, soft X-ray, hard X-ray, and TeV gamma-ray wavelengths during periods of enhanced gamma-ray activities. The results are expected to give insight on particle acceleration and gamma-ray production in microquasars.
61372	BARING	COMPTONIZED FLARE EMISSION IN MAGNETARS	The Fermi mission has enhanced magnetar science through the observation of prolific activity from select sources using the Gamma-Ray Burst Monitor (GBM). Magnetar spectra are often best fit by a power-law with an exponential cutoff, a so-called Comptonized form. This proposal is to perform detailed numerical computations of the establishment of magnetar soft gamma-ray spectra using a Monte Carlo approach. It is planned to model an evolving Comptonizing cloud that expands in the magnetosphere. Given an impulsive injection of energy at either equatorial or polar locales, the transport of radiation and energy exchange between pairs and photons will be tracked, using observations to provide diagnostics on the injection site.
61373	FRANCKOWIAK	REVEALING THE ORIGIN OF THE FERMI BUBBLES	The Fermi bubbles are a spectacular remnant of a past activity in or around the Galactic center. They provide unique information about the history of the Milky Way and open a window into the gamma-ray study of similar extra-galactic objects. There are several theoretical models aiming to explain the origin of the bubbles. We propose to use two different foreground subtraction methods in order to get detailed information about the gamma-ray spectrum and the shape of the bubbles. The main goal of the analysis is to use the results of the new gamma-ray data analysis to discriminate among the theoretical models of the Fermi bubbles, e.g., jets from the Sgr A*, wind from a starburst activity, or stochastic acceleration of cosmic rays.
61378	SU	PROBING THE NATURE OF THE FERMI BUBBLES WITH IMPROVED DATA ANALYSIS	Our recent analysis of the Fermi-LAT data revealed two large gamma-ray bubbles, extending 10 kpc from the Galactic center. These structures could result from a large-scale accretion event on the central black hole, or a nuclear starburst in the last 10 Myr. Both hadronic and leptonic origin of the high energy gamma-ray from the bubbles have been proposed. We propose to discriminate the two models by improving our analysis with five-year Fermi-LAT observations, and careful constraints on both the spatial morphology and the energy spectrum. By understanding the origin and evolution of these structures, we will be able to infer the past active events in the inner Galaxy and the high-latitude cosmic ray population.

61382	MCCANN	SEARCH FOR PULSED VHE EMISSION FROM YOUNG FERMI PULSARS IN ARCHIVAL VERITAS DATA	The shape of pulsar emission spectra above the GeV break energy is an important probe of magnetospheric emission physics. Recent studies, including the detection of the Crab pulsar above 100 GeV by VERITAS, have shown that the canonical picture of curvature radiation from the outer gap may be incomplete. We propose to search for pulsed very-high-energy (VHE) emission from 14 young pulsars which have sizable exposures in archival VERITAS data. VHE detection of even a single additional pulsar will have significant implications. We will analyse all available LAT data producing phase-resolved spectra with the highest possible statistics which, combined with VERITAS spectral points or upper-limits, will provide the best measurements of the shape of the emission spectra above the break energy.
61383	MEYER	ADVANCING THE NEW RADIO-LOUD AGN UNIFICATION SCHEME WITH FERMI	We propose to use Fermi observations to enhance a new comprehensive database of radio-loud AGN and carry out tests to evaluate the emerging unification scheme, in which the phenomenology of a jetted AGN depends on the efficient or inefficient accretion mode onto the central black hole, the jet kinetic power, and its orientation. We suggest that blazars are divided into two populations, based on accretion mode, in the synchrotron and inverse Compton peak frequency-peak luminosity planes, and that this divide is caused by a difference in the jet velocity structure. We will extensively test and refine this scheme using a large sample of Fermi-detected jets.
61405	SPITKOVSKY	CURRENT SHEET EMISSION MODEL FOR FERMI GAMMA-RAY PULSARS	We will develop the model for gamma-ray emission from pulsars observed by Fermi. The model will be based on the 3D magnetospheric solutions which include the backreaction of currents on the structure of the field. Recent modeling indicates 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 use both resistive force-free and full relativistic MHD models to provide the background field structure and plasma pressure and speed required to calculate beaming of the gamma-ray emission. We will also compute phase-resolved gamma ray spectra from dissipating current sheets, enabling the use of Fermi results to infer the physics of magnetosphere.
61407	RICHARDS	RADIO AND OPTICAL MONITORING OF RADIO-LOUD NARROW-LINE SEYFERT 1 GALAXIES	We propose a polarimetric multifrequency VLBA campaign to study a sample of 15 radio-loud narrow line Seyfert 1 galaxies (NLS1s), including 7 detected by Fermi. Bimonthly VLBA observations will permit study of jet kinematics, morphology, spectral evolution, Faraday rotation, and magnetic field structure and evolution. This will be accompanied by twice-weekly single-dish radio monitoring. Monthly spectroscopic optical observations of several optically bright targets will probe the accretion disk, broad line region, and seed photon activity. The presence of gamma-ray emission in NLS1s was a surprising Fermi discovery; this program, together with Fermi, will help understand this unusual population and probe the physics of jetted outflows powered by supermassive black holes.

61419	HEWITT	HIGH-ENERGY EMISSION FROM 3C 58	We propose to study gamma-ray emission from one of the youngest known PWNe, 3C 58. We have recently detected a hard-spectrum source in the off-peak phase of PSR J0205+6449. This is likely the first detection of 3C 58 in gamma-rays. The flux and hard spectrum observed by the LAT make a TeV detection very favorable. We request 15 hr of VERITAS observations, which will aid in modeling the nebula. We will obtain an improved spectrum by reanalyzing LAT and VERITAS data. We will then fit the multiwavelength SED to determine the physical parameters of the nebula -- pulsar age and birth period, the injected particle spectrum, nebular magnetic and radiation field strengths. Comparison to existing PWN evolutionary models will help to illuminate the early evolution of young, energetic pulsars.
61420	NELSON	CONSTRAINING THE EJECTED MASS IN FERMI-DETECTED NOVAE WITH THE VLA	We propose new radio observations of Nova Mon 2012 and Nova Sco 2012, two novae detected as gamma-ray transients with the Fermi-LAT. In combination with our existing and pending radio data, these observations will enable us to follow the mass ejection history of each nova, and place constraints on the mass ejected in each outburst. High spatial resolution imaging and a search for radio recombination lines will provide new constraints on the geometry of the nova ejecta. Finally, we will look for signatures of jets or shock interactions that could account for the gamma-ray emission.